GASKETS FOR PFAUDLER GLASSED STEEL EQUIPMENT

The very nature of Pfaudler glassed steel equipment prevents the use of threaded or welded connections and automatically requires glass to glass flanges which must be separated by some suitable gasket material.

Required Characteristics For Gaskets

In general, the characteristics of the ideal gasket for glassed steel equipment are as follows:

1. It must be chemically inert so as to be useful over the same range of service as glassed steel.
2. It must be able to withstand elevated temperatures.
3. It must have physical properties similar to rubber so that a tight joint can be obtained without resorting to high bolt loads, which would be dangerous for glassed steel flanges.
4. To be air-tight and leak-proof, it must be without ridges or bulky joints and it must be non-porous.
5. It must be able to be shimmed to make up for the distortion of glassed steel flanges caused by high-temperature firing.

Teflon-Shielded Gaskets

Until about 1946, there was no gasket which had all of these characteristics, even though there were several designs which were quite satisfactory for certain specific conditions. It was the development of Teflon by the duPont Co. in about 1944 that opened the way for the design of a gasket which would have all the required properties.

WHAT IS TEFLON?

"Teflon" is the duPont Company's trade-mark for tetrafluoroethylene resin. It is characterized by extreme inertness to chemicals, unusual heat-resistance and toughness over a wide range of temperatures. Its versatility in chemical service is unparalleled. In tests which have included every chemical and solvent generally encountered in industry, it has been attacked only by molten alkali metals and by fluorine at elevated temperatures and pressures*. It also has a remarkably wide range of working temperatures, having been used successfully from below - 90°F. to 500°F.**

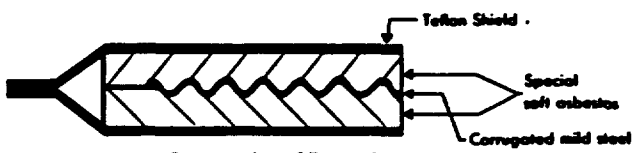
* *Pfaudler recommends that Teflon be carefully tested before using with fuming nitric acid at elevated tempreatures.*

** *Source: "Teflon", a catalog issued by the Polychemicals Dept., duPont Co., Wilmington, Delaware.*

STANDARD TEFLON GASKETS

Teflon meets requirements 1, 2, and 4 for the ideal gasket, but its physical and mechanical properties do not permit its use unaided as a gasket for glassed steel equipment. Therefore, Pfaudler developed the Teflon-shielded gasket. A combination of filler materials is used to provide the required physical properties.

Type "CRT" For high pressures, up to 500 p.s.i., our CRT gasket is used. The 3-piece insert is composed of a center core of thin corrugated mild steel sandwiched between soft asbestos. The soft asbestos provides the ability to take up the waviness of the glassed surface and the corrugated sheet provides the strength as well as a spring action which helps keep the gasket tight and reduces the need for shimming.



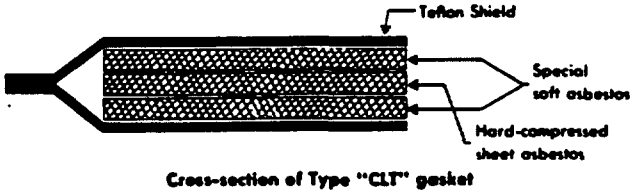
Cross section of Type "CRT" gasket

Insert Material For the soft asbestos outer piece of the insert or filler, we use a soft asbestos

mill board. It is 60% compressible and is the only material which we have tested for this purpose that does not get hard and brittle when it is subjected to prolonged heating at elevated temperatures.

Inserts for "CLT" or "CRT" gaskets should never be used without the Teflon shield. The soft asbestos outer pieces are very porous and the compressed sheet asbestos and mild steel are not corrosion-resistant.

Type "CLT" Our Type "CLT" gasket is a Pfaudler standard for temperatures up to 300°F. and for internal pressures up to 100 p.s.i. It has a 3-piece filler, or insert. The center core of hard compressed sheet asbestos gives strength. A thin layer of special soft asbestos is cemented to each side of this core to give compressibility.

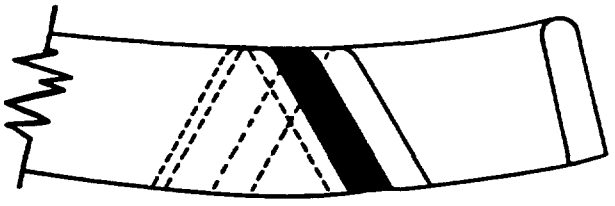


Cross-section of Type "CLT" gasket

Special Type "CLT" for Pyrex Pipe We have a special form of "CLT" gasket for use with pyrex piping. The Teflon shield has special dimensions and is notched for bolts. The insert is a single piece of soft asbestos. Since the maximum pressure is 50 p.s.i., the hard asbestos is not needed for strength. Its elimination makes the gasket more compressible.

Teflon Shield Design For sizes up to and including the 12"x 16" manhole gasket, Teflon shields are cut from Teflon cylinders.

For larger sizes, where cylinders are not available, we use molded Teflon tape. These large shields have a "U"-shaped cross-section to reduce the danger of splitting. They have one overlapped joint, which is heat sealed. The drawing shows how this joint is made diagonally to minimize the extra thickness of the gasket at the joint.



DISCOLORATION OF TEFLON

Teflon darkens at the surface when exposed to hot concentrated sulfuric acid and it is bleached by hot concentrated nitric acid. However, this discoloration does not reduce the effectiveness of the gasket and we do not know of any case where it has affected the product in any way.

TEFLON-WRAPPED GASKETS

Early in the development of the Teflon gasket, we tried using Teflon tape .004" or .005" thick as a protective wrapping for woven asbestos gaskets. This design was successfully used in some cases, but it was discarded because (1) it was practically impossible to shim, (2) seepage occurred at the overlapped joints, (3) the thin tape tended to split and tear.

"CRT" GASKETS STANDARD FOR OBSERVATION GLASS ASSEMBLY

When the "CLT" gasket was first developed, we had quite a bit of trouble in assembling observation glasses on glassed steel flanges. Shimming had to be done with extreme care or breakage would result. We now use a special "CRT" gasket as standard for observation glass assembly. This gasket is narrower than the standard "CRT" and therefore does not have the full 300 p.s.i. pressure rating. The spring action provided by its corrugated mild steel center core and extra thickness of asbestos mill board greatly reduce the need for shimming.

Other Gasket Materials

Most chemical equipment now manufactured by The Pfaudler Co. is equipped with Teflon-shielded gaskets as standard. There are cases, however, where the chemical conditions do not require Teflon or for one reason or another the user does not want Teflon. For these cases, other gaskets are recommended depending on the conditions involved.

We would like to emphasize, at this point, that our research and testing of gasket materials is a continuing process. Whenever useful new materials and designs are found, our recommendations will be changed or supplemented accordingly.

METAL - SHIELDED GASKETS

The Teflon shields are replaced by shields of metal where conditions of temperature (greater than 500° F.) and corrosives unsuitable for Teflon are involved, and where products which stick to Teflon, such as styrene, certain synthetic rubbers, and the various polymers are involved. Here we recommend the use of a shield of tantalum, lead, aluminum, tin, or other suitable metal over an insert. The inserts which are used are the "CRT" type or white woven asbestos, depending on pressure and other conditions.

TYPE "CBS"

Where the superior corrosion resistance of a shielded gaskets is not required, the CBS gasket may be suitable. This is composed of compressed blue asbestos, impregnated with Buna S rubber. This material was developed by Garlock in cooperation with Pfaudler and is Garlock's No. 7705. It is important to mention that the binder, although designated by us as Buna S, is a special mixture prepared by Garlock. It is a low sulfur synthetic rubber which remains fairly soft even at high temperatures.

"CBS" gaskets are satisfactory for a fairly wide range of acids and solvents at temperatures up to 500°F. They are *not* satisfactory for powerful oxidizing acids such as boiling nitric acid in excess of 25% concentration by weight, boiling concentrated sulfuric acid, fuming sulfuric acid, chlorosulfonic acid and chromic acid. Nor are they satisfactory for brominations or for hydrogen peroxide.

For use on glassed steel equipment, our standard "CBS" gaskets are limited to 125 p.s.i. On vessels of other materials of construction, the pressure limitation may be as high as 300 p.s.i.

RUBBER GASKETS

As noted previously, rubber comes the nearest to being the ideal gasketing material for glassed steel equipment. At ordinary temperatures, its physical properties are such that a tight joint can be maintained with a minimum of bolt tension. It is chemically inert to mild acids, and, in the proper composition, it can be used with solvents. It is *not* satisfactory at high temperatures, however. We feel that *225°F. should be the maximum temperature at which rubber gaskets should be used.*

For mild service, we recommend a rubber-type gasket called "Pfaudlerite" This material is odorless and tasteless and, therefore, finds its greatest use on food and brewery equipment. It is Garlock's No. 8747 or Manhattan's "Pfaudlerite".

A variety of commercial rubber gaskets are available and can be used if chemical conditions permit.

COMMERCIAL GASKETS

No attempt will be made here to survey the field of commercial gaskets. Rather, it is hoped that our listing of the requirements for a gasket will be helpful to the user if, for some reason, Teflon gaskets are not desired.

WOVEN GASKETS

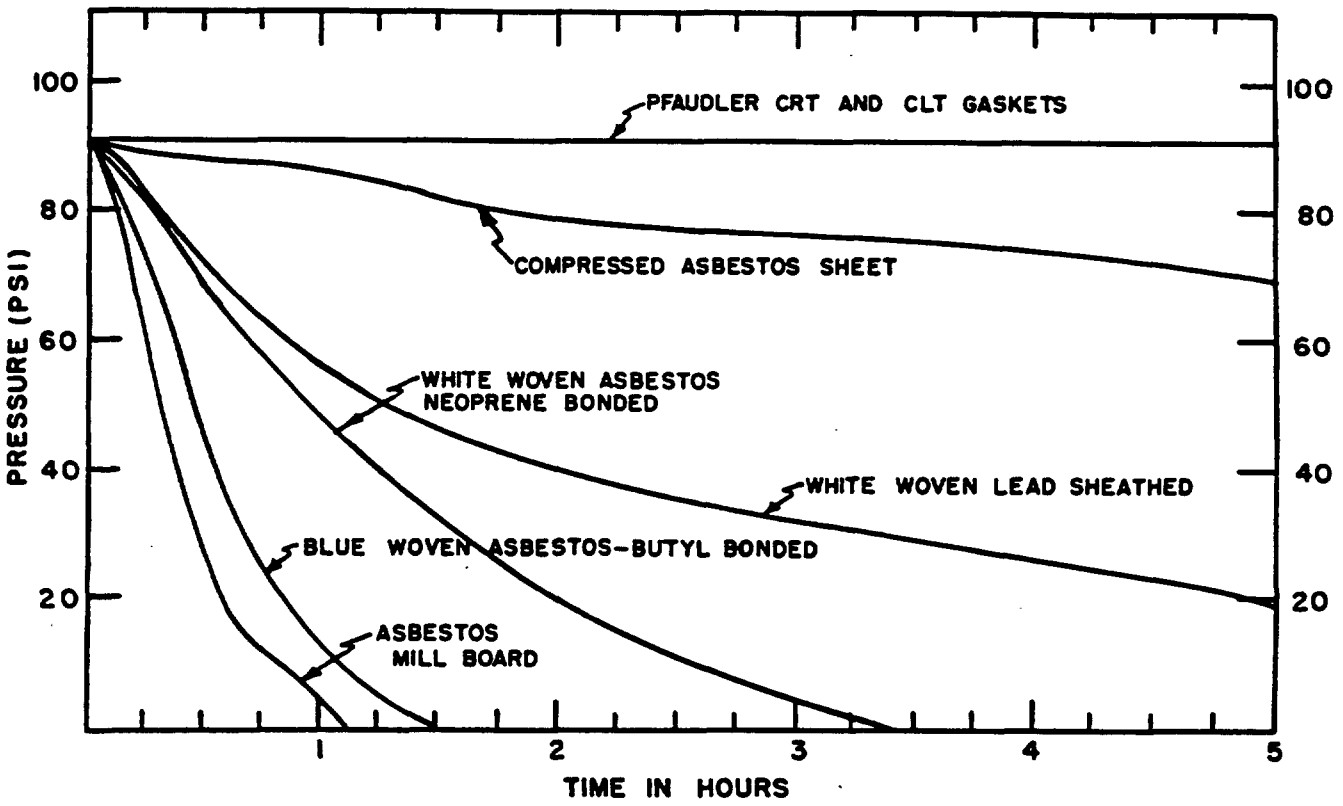
Woven gaskets are generally not satisfactory for glassed steel equipment because of their porosity. We do not recommend their use. Two exceptions should be noted: (1) some users have achieved good results by impregnating woven asbestos gaskets with special resins; (2) with a metal shield, as noted above, a woven asbestos gasket may be satisfactory.

SILICONE AND GLASS - FIBERED GASKETS

We have tested numerous designs and compositions in this class of materials and have not found any which is satisfactory for use on glassed steel equipment, either as a standard or a special. We will continue to evaluate such materials as they are submitted to us.

NOTE: *Under no condition should soft resilient materials such as rubber or similiar plastics by used in a Teflon shield, since they may burst the shield when the assembly is pulled tight between the flanges.*

GASKET POROSITY COMPARISON



Tests were conducted on a number of different gasket materials to determine their relative degrees of porosity. The amount of seepage through or around these gaskets at various bolt tensions was recorded and compared. Bolt tensions ranging from 29 ft. lbs. to 75 ft. lbs. were used. All of this work was done at room temperature and is only intended to provide a comparison of the porosity of the gaskets tested.

A comparison of the leakage obtained with various types of gaskets under 29 ft. lbs. compression is shown above. Asbestos millboard was the most porous while compressed asbestos sheet was the least. Adding a Teflon shield to the compressed sheet decreased its porosity to a negligible figure.

It should be noted that the test equipment had 5" glassed steel flanges of our standard chemical equipment design and standard Pfaudler split flanges with ¾" bolts.

PFAUDLER GASKETS TYPE CRT

All Prices Net
F.O.B. Factory

Nov. 1, 1969

A laminated gasket with center insert of corrugated mild steel and TFE shield.
For pressures to 500 psi and temperatures to 500°F.

NOTE: See page 5A for quantity discount prices.

ROUND

Nominal Size (in.)	Part Number	Insert Assembly			Price	Boxing Charge
		Thickness (in.)	I.D. (in.)	O.D. (in.)		
1	1440001	1/8	1-3/8	2-1/2	$ 2.00	
1½	1440081	1/4	2	3-3/8	2.00	
2	1440002	1/4	2-1/2	4	3.00	
3	1440003	1/4	3-1/2	5-3/8	4.00	
4	1440004	1/4	4-1/2	6-1/2	5.00	
5	1440005	1/4	5-1/2	7-1/2	6.00	
5½	1440705	1/4	5-7/8	7-1/4	8.00	
6	1440006	1/4	6-1/2	8-1/2	7.00	
8	1440008	1/4	8-1/2	10-1/2	9.00	
10	1440010	1/4	10-3/4	13	13.00	
12	1440012	1/4	12-3/4	15	19.00	
14	1440014	1/4	14-3/4	17	26.00	
16	1440016	1/4	17	19	31.00	
18	1440018	1/4	18-1/2	21	35.00	
18	1440519	1/4	20	22-1/2	37.00	
20	1440020	1/4	20-1/2	23	39.00	
24	1440024	1/4	24-1/2	27	46.00	
24	1440026	1/4	24-1/2	27-1/2	47.00	
30*	1440030	1/4	30	33	55.00	
30	1440530	1/4	30-1/2	33-1/2	55.00	
32	1440032	1/4	32-1/2	35-1/8	62.00	
36*	1440036	1/4	36-1/2	39-1/8	74.00	
36	1440037	1/4	36-1/2	39-1/2	74.00	
40	1440040	1/4	40-3/4	43-3/4	84.00	
42	1440042	1/4	42-1/2	45-1/2	96.00	
48	1440048	1/4	48-3/4	52-1/8	99.00	$19.00
60	1440060	3/8	60-3/4	64-1/8	149.00	20.00
66	1440066	3/8	67	70-3/4	165.00	21.00
84	1440084	3/8	85	88-3/4	223.00	25.00

ELLIPTICAL

9 x 12	1445009	1/4	9 x 12	23 x 16	$18.00
12 x 16	1445012	1/4	12½ x 16½	15 x 19	26.00
14 x 18	1445014	1/4	14½ x 18½	17 x 21	42.00

**Stocked for replacement only.*
Gaskets shown (except those indicated by an asterisk) are current stock standard. Other standard size gaskets are available on a custom basis.

PFAUDLER GASKETS TYPES CRTa & CRPb

Nov. 1, 1969

All Prices Net
F.O.B. Factory

Type CRTa

A laminated gasket with center insert of corrugated mild steel; tantalum shield with asbestos sealers cemented to the O.D. of shield. For temperature to 900°F and pressure to 500 psi.

Nominal Size (in.)	Part Number	Insert Assembly			Price
		Thickness (in.)	I.D. (in.)	O.D. (in.)	
½	2089895	¼	21/32	1-7/8	$56.00
1	1444201	¼	1-3/8	2-1/2	64.00
1-½	1444281	¼	2	3-3/8	70.00
2*	1444202	¼	2-1/2	4	81.00
3	1444203	¼	3-1/2	5-3/8	106.00
4*	1444204	¼	4-1/2	6-1/2	116.00
5	1444205	¼	5-1/2	7-1/2	123.00
6*	1444206	¼	6-1/2	8-1/2	130.00
8	1444208	¼	8-1/2	10-1/2	150.00
10*	1444210	¼	10-3/4	13	171.00
12	1444212	¼	12-3/4	15	202.00
14	1444214	¼	14-1/2	17	229.00
16	1444216	¼	17	19	238.00
18	1444218	¼	18-1/2	21	286.00
20	1444220	¼	20-1/2	23	308.00
22	1444222	¼	22-1/2	25	330.00
24	1444224	¼	24-1/2	27	363.00
30	1444230	¼	30-1/2	33-1/2	561.00
32	1444232	¼	32-1/2	35-1/8	583.00
36	1444236	¼	36-1/2	39-1/2	600.00
40	1444240	¼	40-3/4	43-3/4	616.00

Currently stocked. Other standard sizes available on a custom basis.

Type CRPb

A laminated gasket with center insert of corrugated mild steel with lead shield. Normally used for polymer service up to 300°F and 500 psi.

2	1442002	¼	2-1/2	4	$ 12.00
3	1442003	¼	3-1/2	5-3/8	13.00
4	1442004	¼	4-1/2	6-1/2	14.00
5	1442005	¼	5-1/2	7-1/2	15.00
5½	1442705	¼	5-7/8	7-1/4	17.00
6	1442006	¼	6-1/2	8-1/2	18.00
18	1442018	¼	18-1/2	21-1/2	24.00
18	1442519	¼	20	22-1/2	24.00

CRPb Gaskets shown above are currently stocked. Other sizes available on a custom-built basis. Refer to Rochester for prices.

PFAUDLER

DATA SHEET

#91

PFAUDLER CR-SERIES ENVELOPED GASKETS

WHY A CR-TYPE GASKET

Most flanged connections can be sealed by any one of a wide variety of gaskets currently available. However, Glasteel® and Nucerite® flanges have unique gasketing requirements. In order to provide proper seal, a gasket used on these flanges must possess all of the following characteristics:

- It must be soft and compressible to provide a tight seal without damage to the glass.
- It must be non-porous.
- It must be free of ridges or bulky joints.
- It must permit easy shimming, if needed, to compensate for flange irregularities.
- It must withstand the entire temperature and pressure range for which Glasteel is used.
- It must be chemically inert, with corrosion resistance at least equivalent to that of glassed steel.

Pfaudler CR-series gaskets are the only ones on the market today that satisfy all of these requirements. They provide the chemical resistance, compressibility, and strength to seal Glasteel and Nucerite flanges with relatively low bolt torques. (Refer to Pfaudler Manual IM81-100, Sec. 5.)

GASKET TERMINOLOGY

The Pfaudler symbol used to designate a CR-series gasket refers to its materials of construction. The first two letters (CR) indicate inserts of Compressible blue asbestos millboard Reinforced with a corrugated mild steel core. These provide the physical characteristics listed above. (The asbestos provides the compressibility. The steel gives the needed strength as well as a spring action that helps to keep the gasket tight and reduces the need of shimming.)

The final letter (or pair of letters) refers to the shield material which provides the required chemical characteristics. Thus, a CRT gasket consists of reinforced asbestos inserts with a TFE shield, while a CRTA gasket has a tantalum shield.

DESIGN CHARACTERISTICS

Two factors influence gasket performance—quality of materials used and method of construction. In Pfaudler CR-series gaskets, these two factors are combined to provide outstanding performance characteristics.

Inserts

The outer, compressible inserts are made from a selected grade of blue asbestos millboard that provides heat resistance to 900°F. It is about 30% compressible and has excellent thickness recovery in high-temperature service.

TFE Shields

TFE shields are standard for most applications. In order to have the required corrosion resistance and sealing characteristics, they are made from 100% pure TFE that is free of pinholes. High-voltage testing is used to insure it meets this standard. Physical dimensions are equally important and are held to critical tolerances.

Slit type shields are machined from a cylinder for gasket sizes through 18-in. I. D. These are usually an inside envelope type, but outside envelope gaskets are available for special applications.

Shields for gaskets over 18-in. diameter are made by forming TFE tape over the inserts and heat-sealing the ends by a patented method. The cross section is U-shaped to prevent cracking at the I.D.

In some applications, close clearances or product adherence problems make the slit-type shield unsatisfactory. When this is the case, a channel type TFE shield can be supplied on gaskets up to 18-in. I.D. on a custom basis.

Metal Shields

Metal shields are used in some applications where TFE may not be satisfactory. These shields are formed over the inserts by means of a patented process. Note that, due to the stiffness of the metal, higher bolting torques are required for these gaskets.

TFE SHIELDS			
			
	Standard Slit Type	US Pat. 3207644 Butt-Welded Tape	Channel Type

Shapes and Sizes

Round and elliptical CRT gaskets are readily available for all standard size Glasteel and Nucerite flanges. In addition, 1-degree tapered CRT gaskets are available through 6-in. size for use with Glasteel pipe where required. Metal-shielded gaskets and non-standard size CRT gaskets are made to order.

● Note that nominal gasket size is the same as the size opening for which it is intended. Thus, a 6-in. gasket is used on a 6-in. I.D. nozzle; a 14 x 18-in. gasket is used on a 14 x 18-in. manhole; etc.

SERVICE RECOMMENDATIONS

CRT gaskets are the recommended standard for most service applications. However, the TFE shield may be unsuitable in some applications such as those where the temperatures are considerably above 500°F for extended periods of time or in polymerization where adherence is a problem. Metal-shielded gaskets are substituted for such applications. Specific recommendations for each type of gasket are shown in the Table below.

HOW TO ORDER

When ordering gaskets, state the nominal size (I.D. of the flanged opening) and the quantity desired. Since some vessels are equipped with custom nozzles, include the MFR No. from the nameplate of the vessel. This will insure getting the proper gasket.

Shim material is included with all gaskets of 30-in. diameter and larger. It must be specified if required for smaller gaskets.

Address all orders to:

THE PFAUDLER CO.
Division of Sybron Corporation
1000 West Ave.
Rochester, N. Y. 14603

Attn: Parts Dept.

PFAUDLER CR-SERIES GASKETS

Symbol	Construction	Typical Service Applications
CRT	TFE shield Blue asbestos inserts Corrugated steel core	All chemical service. Temp: to 500°F. Press: to 500 psig. Nom. Sizes: 1 thru 84 in.
CMT	TFE shield Blue asbestos inserts Flat steel core	Modified CRT gasket. Used where gasket width is 3/8 in. or less. Nom. Sizes: 1/2 in. & 3/4 in.
CRTA	Tantalum shield Blue asbestos inserts Corrugated steel core Asbestos sealers	All chemical service except free SO_3. Temp: to 900°F. Press: to 500 psig. Nom. Sizes: 1 thru 84 in.
CRTI	Titanium shield Blue asbestos inserts Corrugated steel core Asbestos sealers	Special purpose gasket. Temp: to 900°F. Press: to 500 psig. Nom. Sizes: 3 thru 12 in.
CRST	Stainless steel shield Blue asbestos inserts Corrugated steel core Asbestos sealers	Special purpose gasket. Temp: to 900°F. Press: to 500 psig. Nom. Sizes: 1 thru 84 in.
CRAL	Aluminum shield Blue asbestos inserts Corrugated steel core	Polymer service such as polystyrene. Temp: to 900°F. Press: to 500 psig. Nom. Sizes: 1 thru 84 in.
CRPB	Lead shield Blue asbestos inserts Corrugated steel core	Polymer service such as PVC. Temp: to 500°F. Press: to 500 psig. Nom. Sizes: 1 thru 84 in.

Notes:

1. Method of forming metal-shielded gaskets protected under Pat. No. 3336659.
2. Thin asbestos sealers are used with harder metal shields (Ta, Ti, st. steel) to effect a good seal. Shields of soft metal (e.g. Al, Pb) do not require these sealers.

Printed in U.S.A.

4. SHIMMING PFAUDLER CRT GASKETS

4.1 GENERAL

4.1.1 CRT Gaskets

Pfaudler CRT gaskets are standard on all Glasteel equipment. Experience has shown that only CR-type gaskets (CRT, CRTa, CRPb, etc.) will give satisfactory performance. Therefore, never replace a CR-type gasket with one of a different type unless approved by Pfaudler.

4.1.2 Need for Shimming

Flanges of glass-lined equipment sometimes warp slightly during firing. In most cases the warping will cause no problem. However, to insure uniform pressure around their entire circumference, the gaskets on large diameter flanges (12 x 16 in. or larger) must be shimmed if the distortion or waviness exceeds 1/16 inch.

In multiple installations it is often desirable to have the drives lined up vertically. This can be accomplished only by shimming each agitator nozzle gasket unless the nozzle is absolutely square with the vessel.

The gaskets of new vessels are shimmed as required before they are shipped from the factory, but shimming must be repeated as described below when replacing the gaskets in the field. Keep in mind that proper shimming and installation of gaskets will reduce the possibility of leakage and will prolong their service life.

4.1.3 Shim Material

Always use soft asbestos such as JM-83 or equivalent for shim material. Never use a hard asbestos to shim a CR-type gasket.

4.2 SHIMMING A LARGE DIAMETER GASKET

1. Raise cover from flange and remove old gasket.
2. Prepare a protective ring of some hard material such as hard asbestos, and place it on the flange to protect the glass, Then replace the cover.
3. Select a starting point on outside circumference of flange and mark it permanently with a prick punch.
4. Starting at this "O" point, use chalk or colored crayon pencil and mark flange at 6-in. intervals around its entire circumference.
5. List these marks on a sheet of paper, designating them 0, 6, 12, 18, etc. (See Fig. 15)
6. Using a set of feeler gages, measure and record any gap above or below protective ring at each mark on the flange. (Repeat to check all measurements.)
7. Remove TFE shield from new gasket. (Handle shield carefully so that it does not crease or crack.)
8. Set gasket on bench and mark it with a 0-point.
9. Prepare a soft asbestos shim for each location where gap exceeds 1/16 in., making shim same thickness as gap. (Use micrometer to measure it.)
10. Carefully taper both ends of shim to a feather edge, making a long taper to eliminate a "step" that could permit leakage.
    - A belt sander is easiest to use. If none is available, use an ordiniary grinder or even a very sharp knife and finish with sandpaper.
11. Apply a thin coat of cement (e.g., 3M Rubber Adhesive 1711) to mating sides of shim and gasket and let air dry.
12. Press shim carefully into place on gasket.
13. If it was necessary to make shim of two or more pieces dovetailed together, cover joints as shown below. (Use 1/16-in. thick asbestos feathered at ends and extending 3 in. each side of joint.)

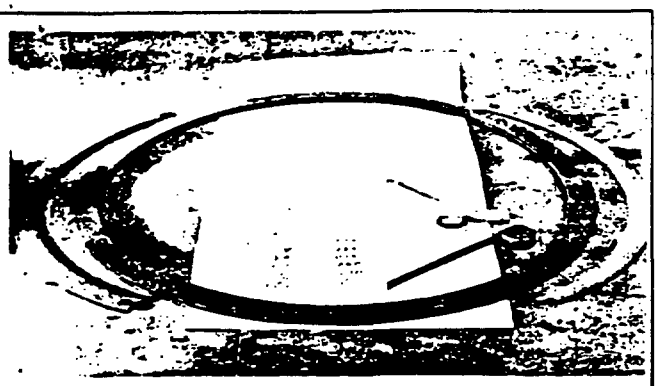
14. After inserting all shims, replace TFE shield on gasket and mark 0-point on OD of gasket insert.
15. Place gasket on flange, making sure it is right side up and 0-point is at mark on flange.
16. Install cover on flange. (See Sec. 5 for bolt torques.)

Note

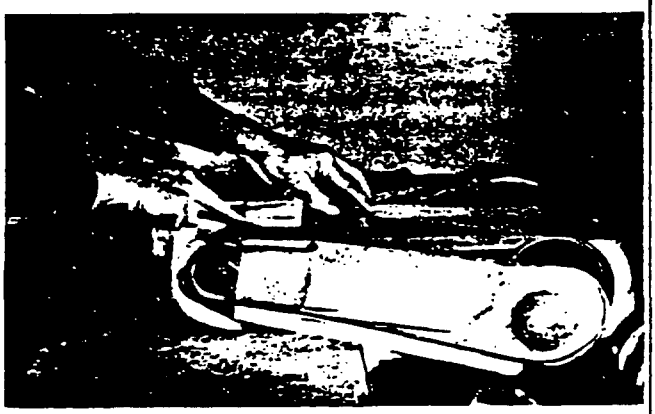
It is best to use a new gasket after each disassembly. If old gasket is reused, be sure it is properly oriented. If cover is to be reoriented or replaced, check gap and shim as required.

4.3 SHIMMING THE AGITATOR NOZZLE GASKET

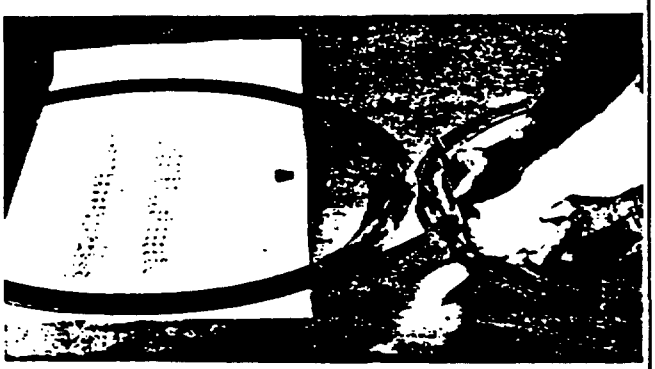
1. Make sure vessel is properly leveled–its straight sides vertical and drive support horizontal.
2. Work around nozzle with a spirit level to locate high and low sides. Mark them as shown in Fig. 16.
3. Determine and record amount of shim needed to make top of gasket horizontal in all directions.
4. Using soft asbestos as shim material, mark shim using high marks on nozzle as a guide.
5. Cut shim between high side marks and taper its ends to a feather edge (see Sec. 4.3, Step 10).
6. Carefully remove TFE shield from gasket, being careful not to crease or crack it.
7. Coat both sides of shim with cement (3M Rubber adhesive 1711 or equivalent) and air dry.
8. Apply a thin coat of cement to top of metal insert and to under side of upper gasket layer, and let air dry.
9. Insert shim in proper location and press layers together.
10. Replace TFE shield on assembled gasket inserts and mark high side.
11. Place gasket on nozzle, making sure it is properly oriented.



Cut shims to fill gaps



Taper shims to a feather edge



Cement shims to gasket

Figure 15. Shimming a Large Diameter Gasket

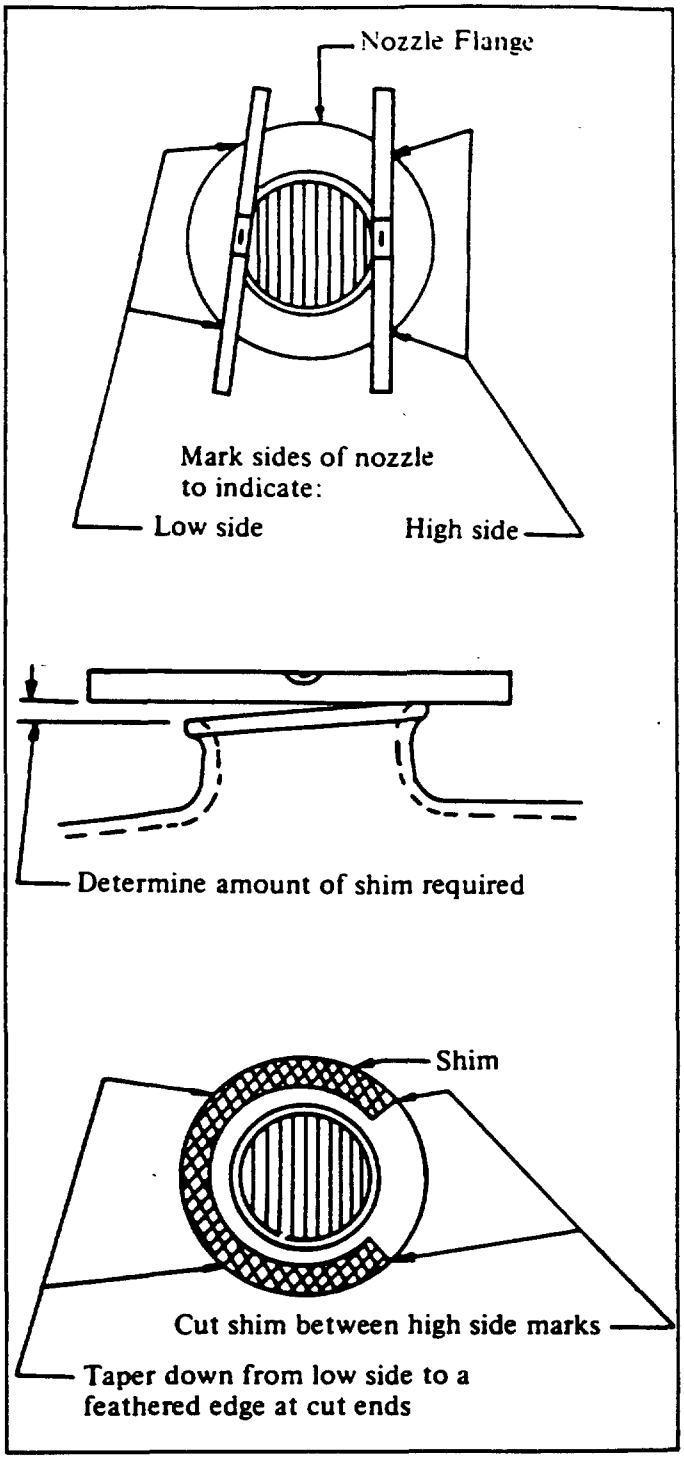


Figure 16. Shimming the Agitator Nozzle Gasket

4.4 SHIMMING GASKETS ON PIPE, VALVES, ETC.

Gaskets used on pipe, valves, and fittings must be shimmed if the flange faces are more than 1/16-inch out of parallel. Otherwise, excessive bolt torques may required to prevent leakage, resulting in distortion the flanges and possible damage to the glass surfaces. In general, follow the shimming procedure described in Sec. 4.2, Steps 9 thru 16.

4.5 SHIMMING METAL-SHIELDED GASKETS

Shimming procedures for metal-shielded CR gaskets (CRTa, CRPb, etc.) are essentially the same as used for CRT gaskets (TFE-shielded). The only difference is that the metal shield is not easily removed. Therefore, you must carefully pry open the shield with a spatula or putty knife to insert the shims and cement them in place. Be sure to press shield firmly back in place.

SYBRON | Pfaudler

DATA SHEET

#148

April 1981

The CRT-F Fiber-Free Gasket is now the standard gasket supplied by Pfaudler for use on Glasteel® equipment. It replaces and is interchangeable with the famous Pfaudler® CRT gasket. All CRT gasket sizes are now available in the CRT-F design.

Asbestos and other fibrous materials have been eliminated from the Pfaudler CRT-F Gasket, shown upper right. Components (reading from top to bottom) consist of: nonporous electrical-grade PTFE envelope, one of two compressible white PTFE inserts, corrugated stainless steel insert ring and the second PTFE insert.

FIRST NON-ASBESTOS ENVELOPE GASKET FOR GLASSED-STEEL VESSELS. THE PFAUDLER® CRT-F.

The CRT-F Gasket is the first fiber-free reinforced envelope gasket to be offered to the process industries for glassed-steel equipment. It was developed by Pfaudler as a flange-sealing gasket for use in applications where asbestos or other fibrous materials are undesirable.

To the pharmaceutical industry, the CRT-F Gasket represents a forward step in reducing particulate matter in the air in "clean room" processing areas used for parenteral and consumable drugs and their intermediates. To the other processing segments of the chemical industry, the new Pfaudler gasket offers an affordable way to reduce the presence of asbestos.

FIBER FREE. CORROSION RESISTANT.

In contrast to the industry standard Pfaudler® CRT envelope gasket, the Fiber-Free CRT-F uses inserts made of compressible white PTFE rather than blue asbestos millboard. The corrugated metal insert ring is made of corrosion-resisting stainless steel, instead of carbon steel. Whereas the envelope is made of the same high quality electrical-grade PTFE which is tested for porosity before and after forming.

TIGHT SEAL.

The CRT-F Gasket meets the requirements for sealing glassed-steel flanged connections properly.

- It is soft and compressible. Provides a tight seal without damage to the glassed sealing surface.
- It is nonporous. Free of ridges or bulky joints.
- It withstands the temperature and pressure limits for operating glassed-steel equipment. The CRT-F Gasket is designed for service up to 450°F and 500 psig.
- It can be shimmed, when necessary, to compensate for flange irregularities.
- It is chemically inert. Its corrosion resistance is comparable to that of glassed steel.

BUILT TO ASTM STANDARDS.

CRT-F Gaskets are manufactured solely by Pfaudler in accordance with ASTM Standard F336. We make sure the OD of the envelope, inserts and metal ring are equal. The ID of our corrugated stainless steel ring is larger than the ID of the PTFE inserts to avoid the possibility of cutting the envelope. And yet the envelope is sufficiently wide to cover the entire gasket taking into account the thickness of the two inserts and the metal ring.

RETROFITS ON EXISTING EQUIPMENT.

Since the CRT-F Gasket is similar in structure, design and configuration to the popular Pfaudler CRT gasket, it is designed to retrofit on existing glassed-steel equipment.

21 STANDARD SIZES.

A full array of nominal flange sizes is offered including the: 1½", 2", 3", 4", 6", 8", 10", 12", 14", 18", 20", 24", 30", 32", 36", 40", 42", 48" and 60" rounds in addition to the 12" x 16" and the 14" x 18" ellipticals. A nominal size refers to the ID of the nozzle for which the gasket is intended. Thus, a 6-inch CRT-F Gasket is used on a 6-inch glassed-steel nozzle.

BOLT TORQUE.

Recommended bolt torques for the CRT-F Fiber-Free Gasket are the same values as published by The Pfaudler Co. for the type CRT gasket. Ask your Pfaudler representative for a copy of Instruction Manual IM 81-100.

PRICE AND DELIVERY.

A call to our Parts Department will give you the current price and delivery on any size CRT-F Fiber-Free Gasket.

SYBRON | Pfaudler

THE PFAUDLER CO.; DIVISION OF SYBRON CORPORATION; ROCHESTER, NY 14603; (716) 235-1000.

PF 1179 5M
Printed in U.S.A.

4. SHIMMING PFAUDLER® CR-TYPE GASKETS

4.1 GENERAL

CAUTION: *Pfaudler can take no responsibility for performance or any damage resulting from the use of gaskets not of our manufacture, nor for failure to properly shim and install these gaskets. Use only the bolt torques shown in Section 5.*

CAUTION: *Before installing any CR-type gasket, the tape wrapped around the PTFE envelope must be removed. Failure to do so may result in a joint leak even if proper torque is applied to the connection.*

NOTE: It is best to use a new gasket after each disassembly. If the old gasket is reused, be sure it is properly oriented. If the cover is to be reoriented or replaced, check for gaps and shim as required.

4.1.1 CR Gaskets

Pfaudler CR-type gaskets are standard on all Galsteel equipment. Specific types of gaskets available from Pfaudler are CRT and CRT-F. The CRT-F gasket is completely free of asbestos and fiber. It uses a corrugated stainless steel metal insert.

4.1.2 Need for Shimming

Flanges of glass-lined equipment sometimes warp slightly during firing. In most cases the warping will cause no problem. However, to insure a tight seal around the entire sealing surface of the flange, gaskets must be shimmed if:

1. Distortion or waviness of the vessel flanges exceeds 1/16 inch for CRT gaskets or 1/32 inch for CRT-F gaskets.
2. Flange faces on pipes, valves, and fittings are more than 1/16 inch out of parallel for CRT gaskets or 1/32 inch for CRT-F gaskets.

NOTE: When installing a CRT-F gasket on a flange where a non-shimmed CR-type gasket was previously used, it may be necessary to shim the CRT-F gasket.

The top of the drive nozzle gasket must be horizontal. If the drive nozzle is attached to the head or shell of the vessel, shim the drive nozzle gasket so the top of the gasket is horizontal when the gasket is positioned on the nozzle flange. If the drive nozzle is attached to a removable vessel cover, first shim the large cover gasket so the face of the drive nozzle is horizontal. If the nozzle face cannot be brought to the horizontal by shimming the cover gasket, you must shim the drive nozzle gasket also until its top is horizontal.

Although all assembled gaskets on new Pfaudler vessels are shimmed as required before the vessel is shipped, all gaskets must be shimmed when replaced. Proper shimming and installation of gaskets will prolong service life by reducing the possibility of leakage, potential damage to the glassed flanges, and fish-scale fractures of the glass.

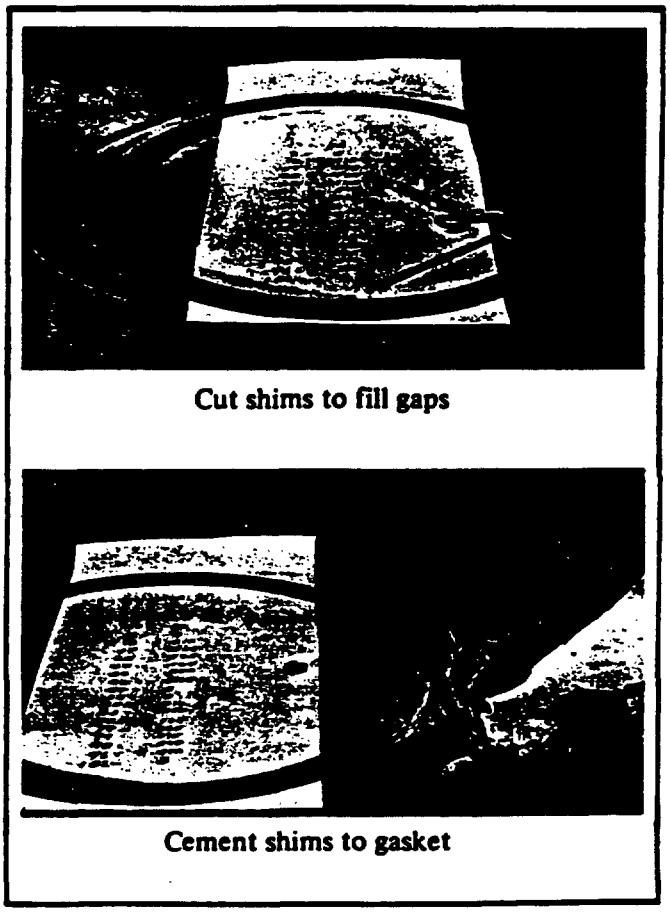
Specific shimming procedures for large-diameter gaskets are presented in Sec. 4.2 and 4.3. For shimming gaskets on pipe, valves, and fittings, use the procedure in Sec. 4.2, Steps 9-16.

4.1.3 Shim Material

Never use a hard material to shim a CR-type gasket. Select something equal or similar to the soft insert material used in the Pfaudler gasket (JM-83 or its equivalent). On CRT-F gaskets use ONLY the special non-asbestos shimming material supplied with the gasket.

4.2 SHIMMING A LARGE DIAMETER GASKET TO COMPENSATE FOR DISTORTION

1. Raise cover from flange and remove old gasket.
2. Prepare a protective ring of some hard material such as masonite, or an outer insert supplied with the gasket and place it on the flange to protect the glass, then replace the cover.
3. Select a starting point on outside circumference of flange (away from glass) and mark it permanently with a prick punch.
4. Starting at this 0 point, use chalk or colored crayon pencil and mark flange at 6-inch intervals around its entire circumference.
5. List these marks on a sheet of paper, designating them 0, 6, 12, 18, etc. (Fig. 20).



Cut shims to fill gaps

Cement shims to gasket

Figure 20. Shimming a Large Diameter Gasket

6. Using a set of feeler gauges and starting at 0 point, measure and record any gap above or below protective ring at each mark on the flange. Repeat to check all measurements.
7. Remove PTFE shield from new gasket. Handle shield carefully so that it does not crease or crack.
8. Set gasket on bench and mark it with a 0 point.
9. Prepare a shim for each location where gap exceeds 1/16 inch (1/32 inch for CRT-F), making shim same thickness as gap. Use a micrometer to measure it.
10. Carefully taper both ends of shim to a feather edge, making a long taper to eliminate a 'step' that could permit leakage. A belt sander is easiest to use. If none is available, use an ordinary grinder or even a very sharp knife and finish with sandpaper.

WARNING: Breathing or ingesting Asbestos Particles is a Known Health Hazard. Some Pfaudler CR-type gaskets have an asbestos component and are often installed with shims containing asbestos. Grinding or sanding asbestos may result in airborne particles and should only be done in accordance with OSHA regulations, (Refer to OSHA Standard 1910-1001). Asbestos-containing gasket material may be cut or shaped with a sharp knife to minimize airborne particles. Even when this method is used, wear a suitable air filter mask during the cutting operation.

11. For CRT and CRT-F gaskets apply a thin coat of cement (e.g. 3M Rubber Adhesive 1711) to mating sides of shim and gasket and let air dry.
12. Press shim carefully into place on gasket.
13. If it was necessary to make shim of two or more pieces dovetailed together, cover joints as shown below. Use 1/16 inch thick shim material feathered at ends.

14. After inserting all shims, replace PTFE shield on gasket and mark 0 point on OD of gasket insert with crayon.
15. Place gasket on flange, making sure it is right side up and 0 point on gasket is at mark on flange. Shims must be correctly positioned. Check proper shim locations noted on sheet of paper prepared in Step 5.
16. Install cover on flange. See Sec. 5 for bolt torques.

4.3 SHIMMING A LARGE DIAMETER AND/OR DRIVE NOZZLE GASKET TO MAKE DRIVE NOZZLE HORIZONTAL

1. Make sure vessel is properly leveled with its straight sides vertical (see Sec. 2.9).
2. Work around nozzle with a spirit level to locate high and low sides. Mark them as shown in Fig. 21. If nozzle is horizontal omit steps 3-10.
3. For the large diameter gasket, shim until the face of the drive nozzle is horizontal. For the drive nozzle determine and record amount of shim needed to make top of gasket horizontal.
4. Using recommended shim material, mark shim using high marks on nozzle as a guide.
5. Cut shim between high side marks and taper its ends to a feather edge (see Sec. 4.2 Step 10).
6. Carefully remove PTFE shield from gasket being careful not to crease or crack it.
7. For CRT and CRT-F gaskets coat both sides of shim with cement (3M Rubber Adhesive 1711 or equivalent) and air dry.
8. Insert shim in proper location and press layers together.
9. Replace PTFE shield on assembled gasket inserts and mark high side.
10. Place gasket on nozzle making sure it is properly oriented.

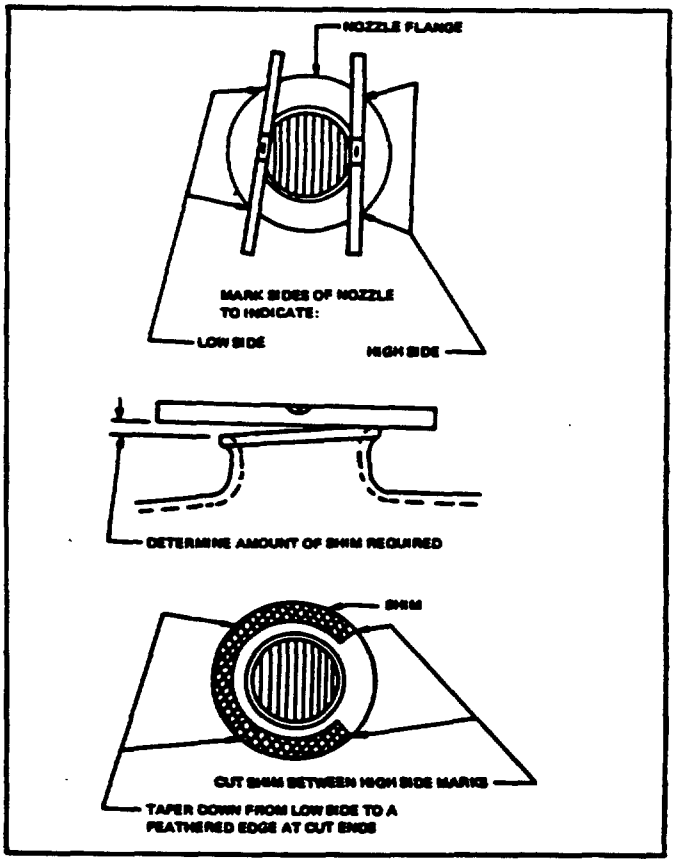


Figure 21. Shimming the Drive Nozzle Gasket

4. SHIMMING PFAUDLER® CRT GASKETS

4.1 GENERAL

This is Sec. 4 of Pfaudler Manual IM81-100. We have reprinted it here as a separate Instruction Sheet to be supplied with replacement gaskets. For additional information such as recommended bolt torques, refer to IM81-100.

- **It is best to use a new gasket after each disassembly. If the old gasket is to be reused, be sure it is properly oriented. If the cover is to be reoriented or replaced, check for gaps and shim as required.**

4.1.1 CRT Gaskets

Pfaudler CRT gaskets are standard on all Glasteel® equipment. Experience has shown that only CR-type gaskets (CRT, CRTa, CRPb, etc.) will give satisfactory performance. Therefore, never replace a CR-type gasket with one of a different type unless approved by Pfaudler.

4.1.2 Need for Shimming

Flanges of glass-lined equipment sometimes warp slightly during firing. In most cases the warping will cause no problem. However, to insure uniform pressure around their entire circumference, the gaskets on large diameter flanges (12 x 16 in. or larger) must be shimmed if the distortion or waviness exceeds 1/16 inch.

In multiple installations it is often desirable to have the drives lined up vertically. This can be accomplished only by shimming each agitator nozzle gasket unless the nozzle is absolutely square with the vessel.

The gaskets of new vessels are shimmed as required before they are shipped from the factory, but shimming must be repeated as described below when replacing the gaskets in the field. Keep in mind that proper shimming and installation of gaskets will reduce the possibility of leakage and will prolong their service life.

4.1.3 Shim Material

Always use soft asbestos such as JM-83 or equivalent for shim material. Never use a hard asbestos to shim a CR-type gasket.

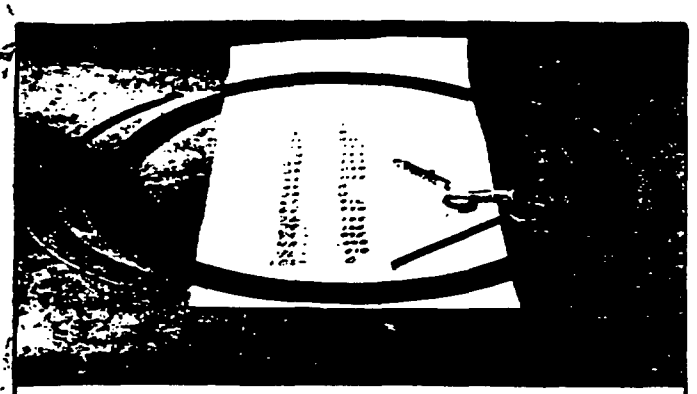
4.2 SHIMMING A LARGE DIAMETER GASKET

1. Raise cover from flange and remove old gasket.
2. Prepare a protective ring of some hard material such as hard asbestos, and place it on the flange to protect the glass, then replace the cover.
3. Select a starting point on outside circumference of flange and mark it permanently with a prick punch.
4. Starting at this "O" point, use chalk or colored crayon pencil and mark flange at 6-in. intervals around its entire circumference.
5. List these marks on a sheet of paper, designating them 0, 6, 12, 18, etc. (See Fig. 15)
6. Using a set of feeler gages, measure and record any gap above or below protective ring at each mark on the flange. (Repeat to check all measurements.)
7. Remove TFE shield from new gasket. (Handle shield carefully so that it does not crease or crack.)
8. Set gasket on bench and mark it with a 0-point.
9. Prepare a soft asbestos shim for each location where gap exceeds 1/16 in., making shim same thickness as gap. (Use micrometer to measure it.)
10. Carefully taper both ends of shim to a feather edge, making a long taper to eliminate a "step" that could permit leakage.
    - A belt sander is easiest to use. If none is available, use an ordinary grinder or even a very sharp knife and finish with sandpaper.
11. Apply a thin coat of cement (e.g., 3M Rubber Adhesive 1711) to mating sides of shim and gasket and let air dry.
12. Press shim carefully into place on gasket.
13. If it was necessary to make shim of two or more pieces dovetailed together, cover joints as shown below. (Use 1/16-in. thick asbestos feathered at ends and extending 3 in. each side of joint.)

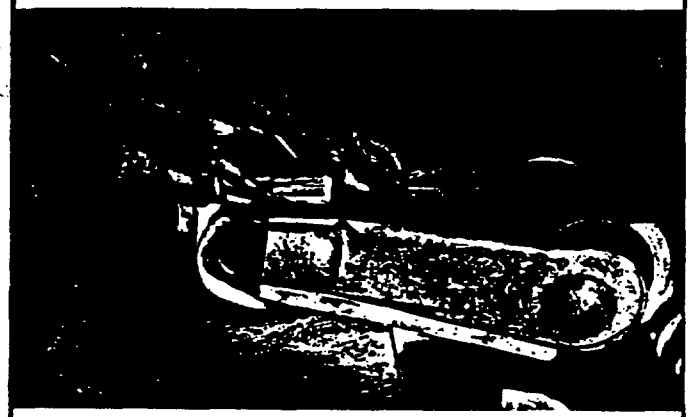
14. After inserting all shims, replace TFE shield on gasket and mark 0-point on OD of gasket insert.
15. Place gasket on flange, making sure it is right side up and 0-point is at mark on flange.
16. Install cover on flange. (See Sec. 5 for bolt torques.)

4.3 SHIMMING THE AGITATOR NOZZLE GASKET

1. Make sure vessel is properly leveled—its straight sides vertical and drive support horizontal.
2. Work around nozzle with a spirit level to locate high and low sides. Mark them as shown in Fig. 16.
3. Determine and record amount of shim needed to make top of gasket horizontal in all directions.
4. Using soft asbestos as shim material, mark shim using high marks on nozzle as a guide.
5. Cut shim between high side marks and taper its ends to a feather edge (see Sec. 4.3, Step 10).
6. Carefully remove TFE shield from gasket, being careful not to crease or crack it.
7. Coast both sides of shim with cement (3M Rubber adhesive 1711 or equivalent) and air dry.
8. Apply a thin coat of cement to top of metal insert and to under side of upper gasket layer, and let air dry.
9. Insert shim in proper location and press layers together.
10. Replace TFE shield on assembled gasket inserts and mark high side.
11. Place gasket on nozzle, making sure it is properly oriented.



CUT SHIMS TO FILL GAPS



TAPER SHIMS TO A FEATHER EDGE

CEMENT SHIMS TO GASKET

Figure 15. Shimming a Large Diameter Gasket

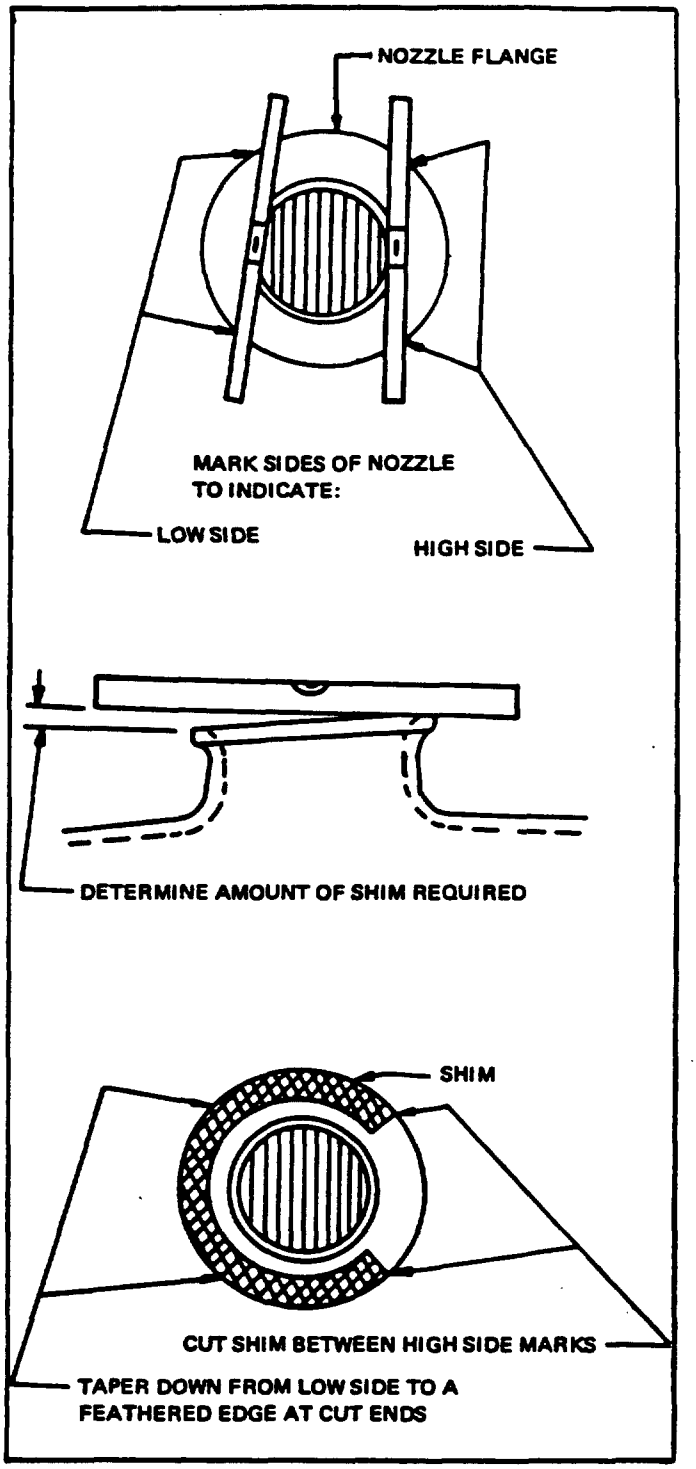


Figure 16. Shimming the Agitator Nozzle Gasket

4.4 SHIMMING GASKETS ON PIPE, VALVES, ETC.

Gaskets used on pipe, valves, and fittings must be shimmed if the flange faces are more than 1/16-inch out of parallel. Otherwise, excessive bolt torques may be required to prevent leakage, resulting in distortion of the flanges and possible damage to the glass surfaces. In general, follow the shimming procedure described in Sec. 4.2, Steps 9 thru 16.

4.5 SHIMMING METAL-SHIELDED GASKETS

Shimming procedures for metal-shielded CR gaskets (CRTa, CRPb, etc.) are essentially the same as used for CRT gaskets (TFE-shielded). The only difference is that the metal shield is not easily removed. Therefore, you must carefully pry open the shield with a spatula or putty knife to insert the shims and cement them in place. Be sure to press shield firmly back in place.

4. SHIMMING PFAUDLER® CRT AND CRT-F GASKETS

4.1 GENERAL

This is Sec. 4 of Pfaudler Manual IM 81-100. We have reprinted it here as a separate Instruction Sheet to be supplied with replacement gaskets. For additional information such as recommended bolt torques, refer to IM 81-100.

- It is best to use a new gasket after each disassembly. If the old gasket is to be reused, be sure it is properly oriented. If the cover is to be reoriented or replaced, check for gaps and shim as required.

CAUTION: Before installing any CR type gasket, the tape wrapped around the PTFE envelope must be removed. Failure to do so may result in a joint leak, even if proper torque is applied to the connection.

4.1.1 CR Gaskets

Pfaudler CRT gaskets are standard on all Glasteel® equipment. Other types of gaskets manufactured by Pfaudler are CRTa, CRTi, CRPb, CRAL and CRT-F. The CRTa gasket includes an asbestos sealer ring. Do not remove for installation. The CRT-F gasket is completely asbestos and fiber-free. It uses a stainless steel metal insert.

4.1.2 Need for Shimming

Flanges of glass-lined equipment sometimes warp slightly during firing. In most cases the warping will cause no problem. However, to insure a tight seal around their entire circumference, the gasket on large diameter flanges (12" x 16" or larger) must be shimmed if the distortion or waviness exceeds 1/16 inch for CRT, CRTa, CRPb, CRAL and CRTi type gaskets. When using CRT-F gaskets, if distortion or waviness exceeds 1/32 inch, shimming is required.

Note: 1.) When retrofitting CRT-F gaskets to a flange where non-shimmed CR type gaskets were previously installed, it may be necessary to shim the CRT-F gasket. 2.) Although it is recommended that all flanges 12" x 16" or larger be measured to determine if a shim is required, it may be necessary to shim smaller size openings. If a new gasket is properly installed and leaks, the flange should be measured to determine the need for a shim.

The top of the drive nozzle gasket must be horizontal. If a drive nozzle is mounted on a cover, this is accomplished by first shimming the large cover gasket so that the face of the drive nozzle is horizontal. If this cannot be fully accomplished by shimming the cover gasket, additional shimming of the drive nozzle gasket may be required.

If the drive nozzle is attached to the vessel head or shell, all adjustments must be made by shimming the drive nozzle gasket.

The gaskets on new Pfaudler vessels are shimmed as required before they are shipped from the factory, but shimming must be repeated as described below when replacing the gaskets in the field. Keep in mind that proper shimming and installation of gaskets will reduce the possibility of leakage, damage to glassed flanges, and will prolong their service life.

4.1.3 Shim Material

Never use a hard material to shim a CR type gasket. Select something equal or similar to the soft insert material used in the Pfaudler gasket (JM-83 or its equivalent). On CRT-F gaskets use ONLY the special non-asbestos shimming material supplied with the gasket.

4.2 SHIMMING A LARGE DIAMETER GASKET TO COMPENSATE FOR DISTORTION.

1. Raise cover from flange and remove old gasket.
2. Prepare a protective ring of some hard material such as hard asbestos, or an outer insert supplied with the gasket and place it on the flange to protect the glass, then replace the cover.
3. Select a starting point on outside circumference of flange (away from glass) and mark it permanently with a prick punch.
4. Starting at this "0" point, use chalk or colored crayon pencil and mark flange at 6-inch intervals around its entire circumference.
5. List these marks on a sheet of paper, designating them 0, 6, 12, 18, etc. (See Fig. 15).
6. Using a set of feeler gauges and starting at "0" point, measure and record any gap above or below protective ring at each mark on the flange. (Repeat to check all measurements).
7. Remove PTFE shield from new gasket. (Handle shield carefully so that it does not crease or crack).
8. Set gasket on bench and mark it with a 0-point.
9. Prepare a shim for each location where gap exceeds 1/16 inch (1/32 inch for CRT-F), making shim same thickness as gap. Use a micrometer to measure it.
10. Carefully taper both ends of shim to a feather edge, making a long taper to eliminate a "step" that could permit leakage.
    - A belt sander is easiest to use. If none is available, use an ordinary grinder or even a very sharp knife and finish with sandpaper. (See Asbestos Warning, Sec. 4.6).
11. For CRT gaskets apply a thin coat of cement (e.g. 3M Rubber Adhesive 1711) to mating sides of shim and gasket and let air dry. For CRT-F gaskets use CRT-F adhesive and follow the proper curing procedure per the instructions supplied with the adhesive.
12. Press shim carefully into place on gasket.
13. If it was necessary to make shim of two or more pieces dovetailed together, cover joints as shown below. (Use 1/16 inch thick shim material feathered at ends).

14. After inserting all shims, replace PTFE shield on gasket and mark 0-point on OD of gasket insert with crayon.
15. Place gasket on flange, making sure it is right side up and 0-point on gasket is at mark on flange. Shims must be correctly positioned. Check proper shim locations noted on sheet of paper prepared in Step 5.
16. Install cover on flange. (See IM 81-100, Sec. 5 for bolt torques).

4.3 SHIMMING A LARGE DIAMETER AND/OR DRIVE NOZZLE GASKET TO MAKE DRIVE NOZZLE HORIZONTAL.

1. Make sure vessel is properly leveled -- its straight sides vertical. (See IM 81-100, Sec. 2.7).
2. Work around nozzle with a spirit level to locate high and low sides. Mark them as shown in Fig. 16. If nozzle is horizontal do not proceed to steps 3-11.
3. For the large diameter gasket, shim until the face of the drive nozzle is horizontal. For the drive nozzle determine and record amount of shim needed to make top of gasket horizontal.
4. Using recommended shim material, mark shim using high marks on nozzle as a guide.
5. Cut shim between high side marks and taper its ends to a feather edge (See Sec. 4.2, Step 10).
6. Carefully remove PTFE shield from gasket being careful not to crease or crack it.
7. For CRT gaskets coat both sides of shim with cement (3M Rubber Adhesive 1711 or equivalent) and air dry. For CRT-F gaskets cement the shim with Pfaudler CRT-F gasket adhesive.
8. Apply a thin coat of cement to top of metal insert and to under side of upper gasket layer and cure per instructions provided with cement.
9. Insert shim in proper location and press layers together.
10. Replace PTFE shield on assembled gasket inserts and mark high side.
11. Place gasket on nozzle making sure it is properly oriented.

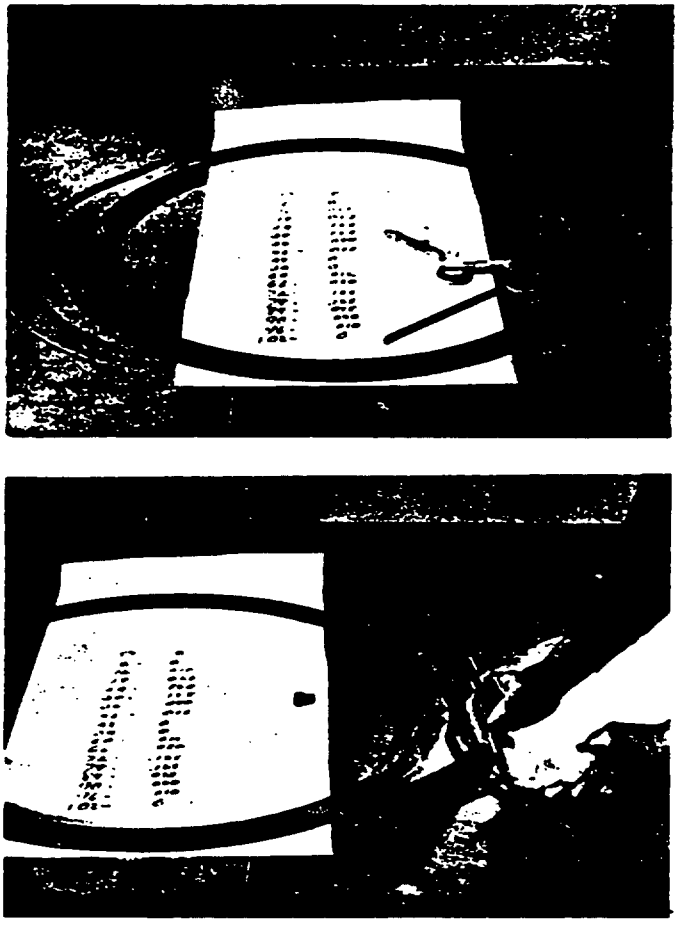


Figure 15. Shimming a Large Diameter Gasket

4.4 SHIMMING GASKETS ON PIPE, VALVES, ETC.

Gaskets used on pipe, valves, and fittings must be shimmed if the flange faces are more than 1/16 inch out of parallel. Otherwise, excessive bolt torques may be required to prevent leakage resulting in distortion of the flanges and possible damage to the glass surfaces. In general, follow the shimming procedure described in Sec. 4.2, Steps 9 through 16.

4.5 SHIMMING METAL-SHIELDED GASKETS

Shimming procedures for metal-shielded CR gaskets (CRTa, CRPb, etc.) are essentially the same as used for CRT gaskets (PTFE-shielded). The only difference is that the metal shield is not easily removed. Therefore, you must carefully pry open the shield with a spatula or putty knife to insert the shims and cement them in place. Be sure to press shield firmly back in place.

4.6 WARNING: BREATHING OR INGESTING ASBESTOS PARTICLES IS A KNOWN HEALTH HAZARD

Pfaudler® Type CR Gaskets [except CRT-F] have an asbestos component and are often installed with shims containing asbestos. Grinding or sanding asbestos may result in airborne particles and should only be done in accordance with OSHA regulations. [Refer to OSHA Standard 1910-1001].

Asbestos containing gasket material may be cut or shaped with a sharp knife to minimize airborne particles. Even when this method is used, it is recommended that an air filter mask be used during the cutting operation.

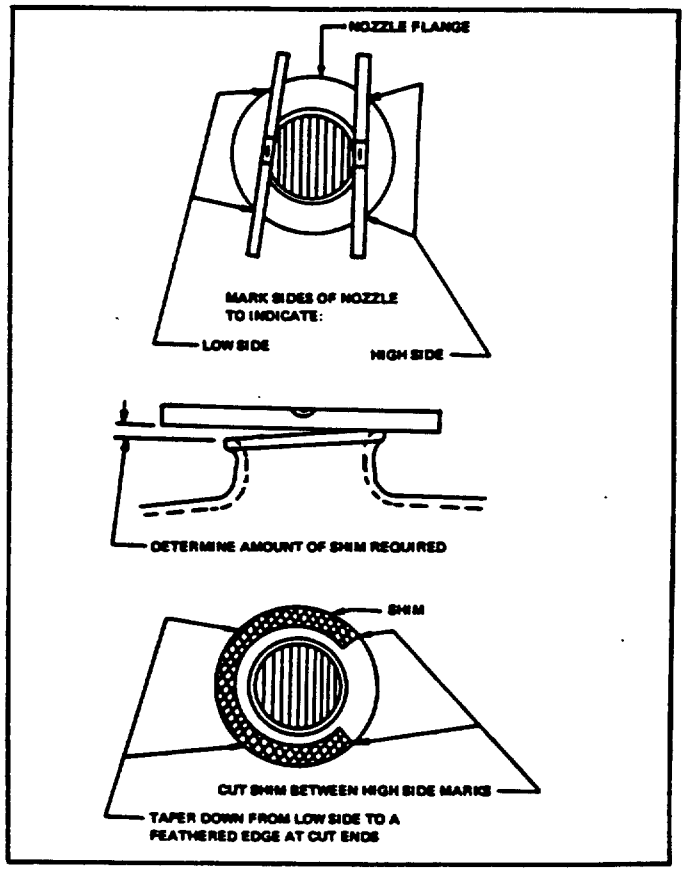


Figure 16. Shimming the Drive Nozzle Gasket

4. SHIMMING PFAUDLER CRT GASKETS

4.1 GENERAL

4.1.1 CRT Gaskets

Pfaudler CRT gaskets are standard on all Glasteel equipment. Experience has shown that only CR-type gaskets (CRT, CRTa, CRPb, etc.) will give satisfactory performance. Therefore, never replace a CR-type gasket with one of a different type unless approved by Pfaudler.

4.1.2 Need for Shimming

Flanges of glass-lined equipment sometimes warp slightly during firing. In most cases the warping will cause no problem. However, to insure uniform pressure around their entire circumference, the gaskets on large diameter flanges (12 x 16 in. or larger) must be shimmed if the distortion or waviness exceeds 1/16 inch.

In multiple installations it is often desirable to have the drives lined up vertically. This can be accomplished only by shimming each agitator nozzle gasket unless the nozzle is absolutely square with the vessel.

The gaskets of new vessels are shimmed as required before they are shipped from the factory, but shimming must be repeated as described below when replacing the gaskets in the field. Keep in mind that proper shimming and installation of gaskets will reduce the possibility of leakage and will prolong their service life.

4.1.3 Shim Material

Always use soft asbestos such as JM-83 or equivalent for shim material. Never use a hard asbestos to shim a CR-type gasket.

4.2 SHIMMING A LARGE DIAMETER GASKET

1. Raise cover from flange and remove old gasket.
2. Prepare a protective ring of some hard material such as hard asbestos, and place it on the flange to protect the glass, Then replace the cover.
3. Select a starting point on outside circumference of flange and mark it permanently with a prick punch.
4. Starting at this "O" point, use chalk or colored crayon pencil and mark flange at 6-in. intervals around its entire circumference.
5. List these marks on a sheet of paper, designating them 0, 6, 12, 18, etc. (See Fig. 15)
6. Using a set of feeler gages, measure and record any gap above or below protective ring at each mark on the flange. (Repeat to check all measurements.)
7. Remove TFE shield from new gasket. (Handle shield carefully so that it does not crease or crack.)
8. Set gasket on bench and mark it with a 0-point.
9. Prepare a soft asbestos shim for each location where gap exceeds 1/16 in., making shim same thickness as gap. (Use micrometer to measure it.)
10. Carefully taper both ends of shim to a feather edge, making a long taper to eliminate a "step" that could permit leakage.
    - A belt sander is easiest to use. If none is available, use an ordiniary grinder or even a very sharp knife and finish with sandpaper.
11. Apply a thin coat of cement (e.g., 3M Rubber Adhesive 1711) to mating sides of shim and gasket and let air dry.
12. Press shim carefully into place on gasket.
13. If it was necessary to make shim of two or more pieces dovetailed together, cover joints as shown below. (Use 1/16-in. thick asbestos feathered at ends and extending 3 in. each side of joint.)

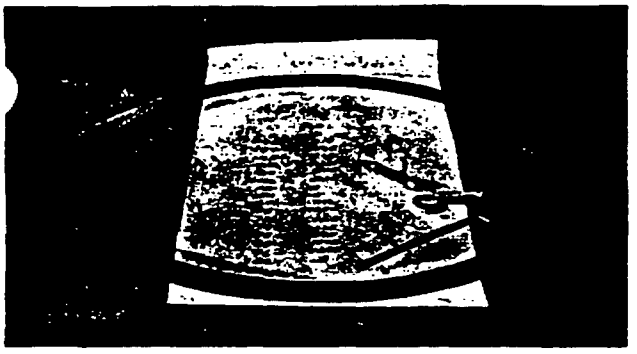
14. After inserting all shims, replace TFE shield on gasket and mark 0-point on OD of gasket insert.
15. Place gasket on flange, making sure it is right side up and 0-point is at mark on flange.
16. Install cover on flange. (See Sec. 5 for bolt torques.)

Note

It is best to use a new gasket after each disassembly. If old gasket is reused, be sure it is properly oriented. If cover is to be reoriented or replaced, check gap and shim as required.

4.3 SHIMMING THE AGITATOR NOZZLE GASKET

1. Make sure vessel is properly leveled--its straight sides vertical and drive support horizontal.
2. Work around nozzle with a spirit level to locate high and low sides. Mark them as shown in Fig. 16.
3. Determine and record amount of shim needed to make top of gasket horizontal in all directions.
4. Using soft asbestos as shim material, mark shim using high marks on nozzle as a guide.
5. Cut shim between high side marks and taper its ends to a feather edge (see Sec. 4.3, Step 10).
6. Carefully remove TFE shield from gasket, being careful not to crease or crack it.
7. Coat both sides of shim with cement (3M Rubber adhesive 1711 or equivalent) and air dry.
8. Apply a thin coat of cement to top of metal insert and to under side of upper gasket layer, and let air dry.
9. Insert shim in proper location and press layers together.
10. Replace TFE shield on assembled gasket inserts and mark high side.
11. Place gasket on nozzle, making sure it is properly oriented.



Cut shims to fill gaps

WARNING

WARNING: BREATHING OR INGESTING ASBESTOS PARTICLES IS A KNOWN HEALTH HAZARD.

Pfaudler® Type CRT Gaskets have an asbestos component and are often installed with shims containing asbestos. Grinding or sanding asbestos may result in airborne particles and should only be done in accordance with OSHA regulations, (Refer to OSHA Standard 1910-1001).

Asbestos containing gasket material may be cut or shaped with a sharp knife to minimize airborne particles. Even when this method is used, it is recommended that an air filter mask be used during the cutting operation.

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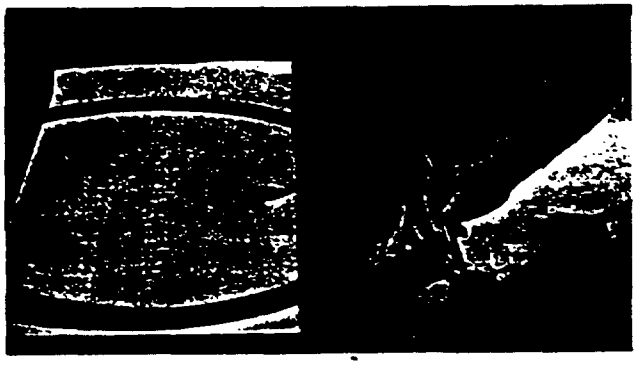

Cement shims to gasket

Figure 15. Shimming a Large Diameter Gasket

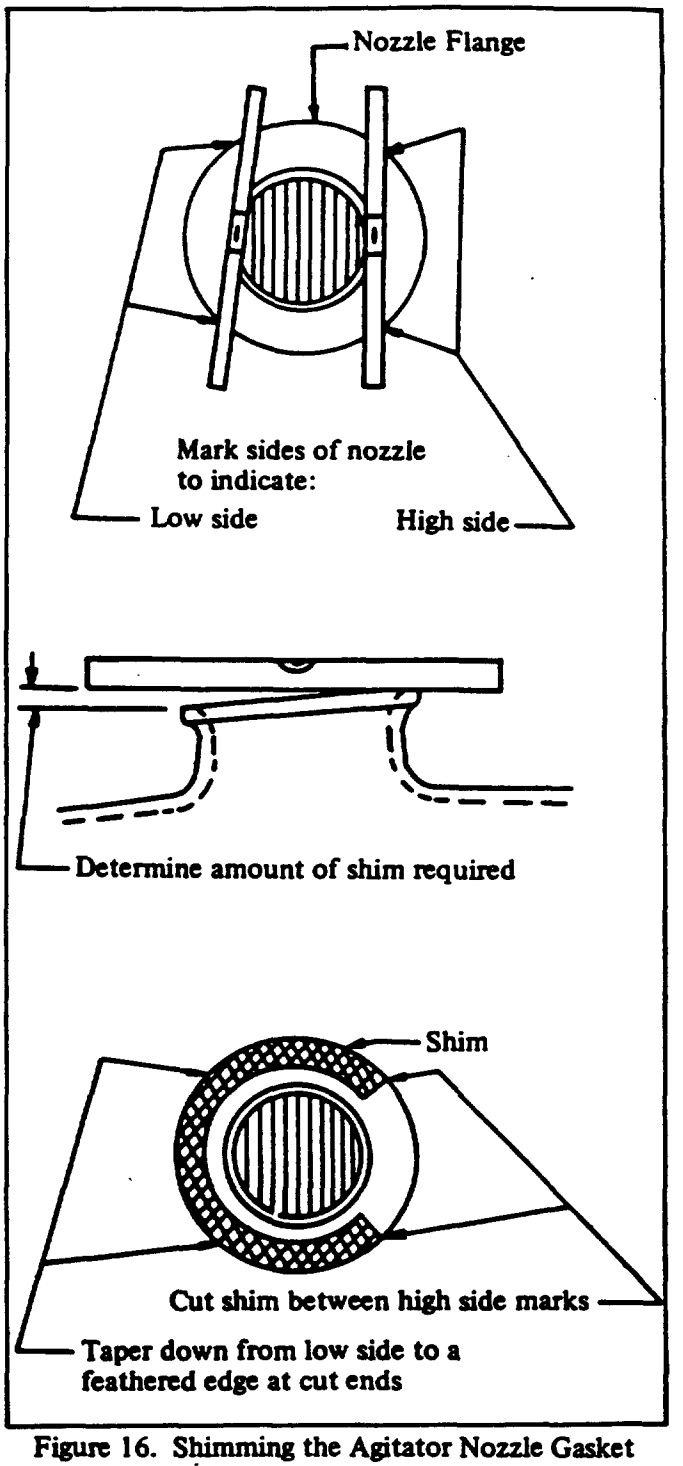

Figure 16. Shimming the Agitator Nozzle Gasket

4.4 SHIMMING GASKETS ON PIPE, VALVES, ETC.

Gaskets used on pipe, valves, and fittings must be shimmed if the flange faces are more than 1/16-inch out of parallel. Otherwise, excessive bolt torques may be required to prevent leakage, resulting in distortion of the flanges and possible damage to the glass surfaces. In general, follow the shimming procedure described in Sec. 4.2, Steps 9 thru 16.

4.5 SHIMMING METAL-SHIELDED GASKETS

Shimming procedures for metal-shielded CR gaskets (CRTa, CRPb, etc.) are essentially the same as used for CRT gaskets (TFE-shielded). The only difference is that the metal shield is not easily removed. Therefore, you must carefully pry open the shield with a spatula or putty knife to insert the shims and cement them in place. Be sure to press shield firmly back in place.