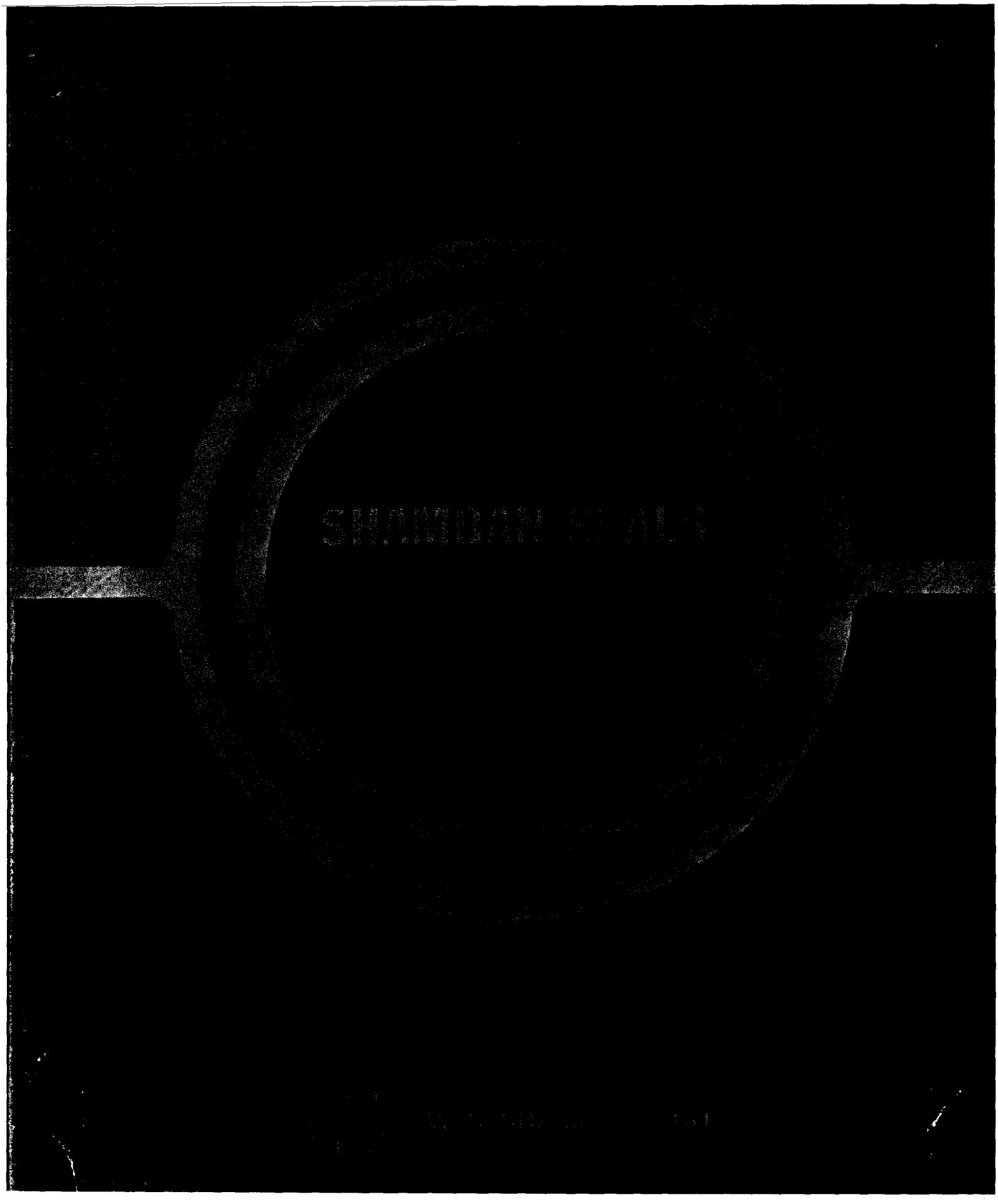


W. S. SHAMBAN & COMPANY

Designers, Engineers and Manufacturers of Specialized Plastics

2531 BREMER DRIVE FORT WAYNE, INDIANA
PHONE 742-6491 (Area Code 219)

Please Reply To
P. O. BOX 176
FORT WAYNE, INDIANA 46801

July 30, 1964

Pattiberne Michigan Corporation
Post Office Box 268
Berrien, Michigan

Attention: Mr. F. E. McDonald
Chief Engineer

Dear Sir:

Thank you for your inquiry of July 20, 1964. We are enclosing our Design Manual per your request.

We hope that this will be of value; and when you require any additional information, please call or write us.

Very truly yours,

Pat Forney

Pat Forney
Customer Service Manager

PF/kle

enc.

CAPABILITY BROCHURE

SHAMBAN SEAL CATALOG

TABLE OF CONTENTS

SHAMBAN

W. S. SHAMBAN & CO.

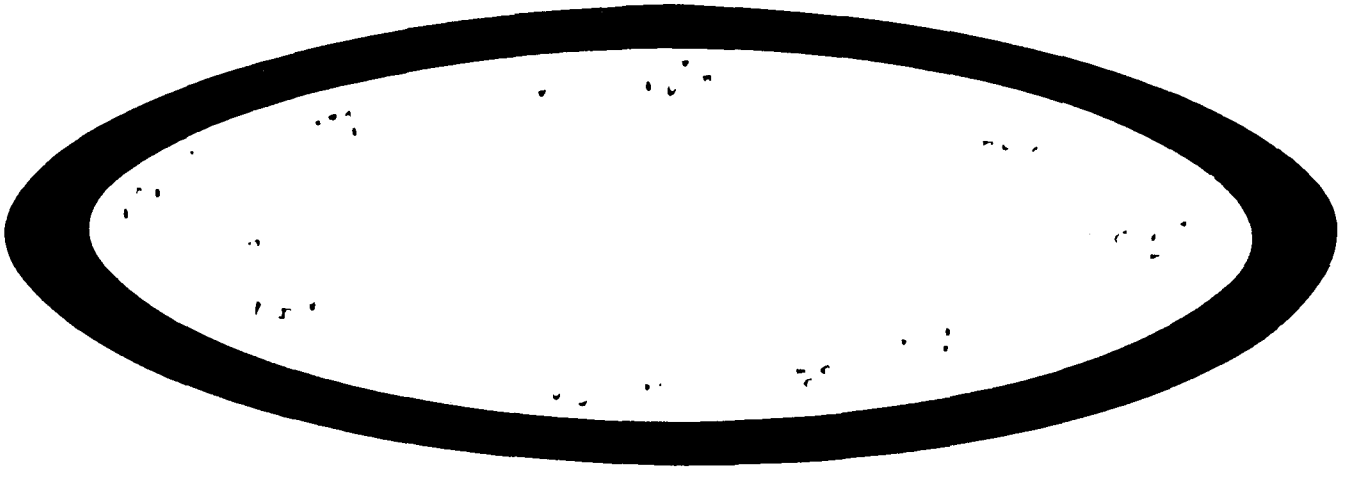
California: 11617 W. Jefferson Blvd., P.O. Box 2997, Culver City, California

Indiana: 2531 Bremer Drive, P.O. Box 176, Fort Wayne, Indiana

ENGINEERED PLASTICS for INDUSTRY ...

SHAMBAN

SHAMBAN

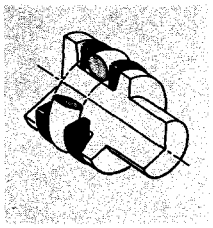


TEFLON* SEALS

for HYDRAULIC and PNEUMATIC applications

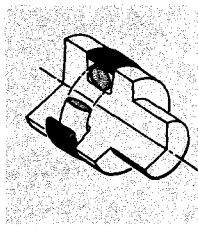
PRESSURES TO 5000 PSI TEMPERATURES −350° F. TO +500° F. IMPERVIOUS TO CORROSIVE EXPOSURE.

BACK-UP RINGS SINGLE TURN AND SPIRAL



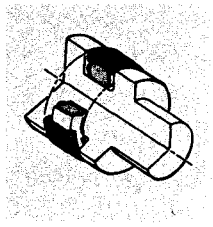
These rings prevent O-ring extrusion at high pressures. For continuous service at pressures to 3000 psi, temperatures −65° to −225° F. MS rings meet MIL-R-8791.
Also available in TURCON.Ⓣ

GLYD RINGS



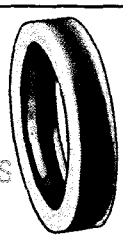
Used in many military and industrial applications where low friction and long life are important. Can be used with "O" or square rings and at pressures to 5000 psi and temperatures from −65° to +500° F. Furnished in all Teflon, TURCON, or filled compounds.

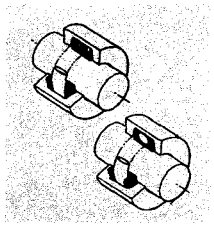
PLUS SEALS®



A Shamban development to overcome the problems of "O" ring and cap stick combinations. Designed for no-back-up ring grooves. An excellent seal with low breakout and low friction. Meets specs. MIL-P-5414, revisions D and E. Pressures to 5000 psi, temperatures −65° F. to +400° F.
Also available in TURCON.

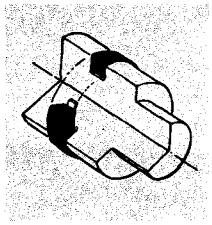
CHANNEL AND DOUBLE DELTA† CHANNEL SEALS





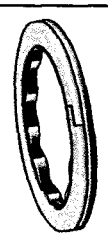
Used with conventional "O" rings. These seals increase ring life many times, prevent spiral failure and leakage. For O. D. and I. D. applications. Pressures to 5000 psi, temperatures −65° F. to +400° F.
Available in TURCON or teflon.

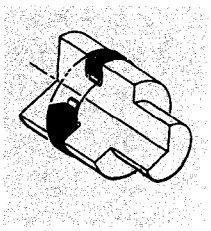
PISTON RINGS



Made of a special teflon formulation, reinforced. A most efficient, durable seal for gas compressors and other applications without normal lubrication. Virgin teflon rings are furnished for equipment processing foods, juices, body fluids and other corrosive liquids.
Also available in TURCON.

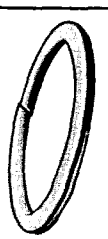
DUAL PISTON RINGS

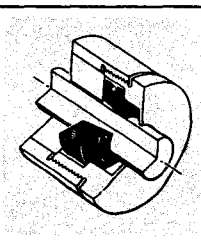




A pressure-responsive, dual ring seal with very low friction factor for O. D. applications in hydraulic service such as servo actuators. Light marcel stainless steel spring provides wall contact at low pressures. Made of teflon. Pressures to 5000 psi, temperatures −350° F. to +400° F.
Also available in durable TURCON.

SCRAPER RING





Interchangeable with MS-28776 Metal scraper ring. This Shamban ring provides 100% wall contact, effective rod cleaning action and prevents rod scoring. Breakout and running friction are negligible. Furnished in teflon, nylon, bronze reinforced teflon and delrin.
Also available in TURCON.

SAFE-SURE SEALING

CHECK LIST of applications now using Shamban seals

AIRCRAFT commercial and military
MISSILES
SPACE CRAFT
AUTOMOBILES
TRUCKS
CONSTRUCTION MACHINERY
PLANT EQUIPMENT
PUMPS
DRILLING EQUIPMENT
FARM MACHINERY
MINING and LOGGING MACHINERY
MARINE EQUIPMENT
MISSILE LAUNCHING INSTALLATIONS
AIRCRAFT HANDLING EQUIPMENT
MATERIAL-HANDLING EQUIPMENT

also on

HYDRAULIC and PNEUMATIC EQUIPMENT, CONTROL SYSTEMS and UNITS

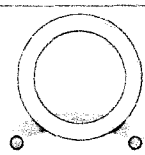
* DuPont Trademark
® Ⓣ Shamban Trademarks

Anti-Corrosive Devices—Teflon Gaskets and Packings for Chemical, Petro-chemical, Pharmaceutical and Processing Industries

TUF-E-NUZ® PURE TEFLON PACKING

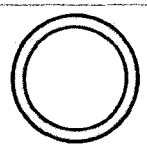
Provides corrosion resistance, positive sealing, great durability and can replace hundreds of conventional gaskets and packings in rod, valve stem, stuffing box and flange applications. Furnished in wool or string form. Temperatures from −450° to 550° F.

ELASTOSEAL® ENCAPSULATED "O" RINGS



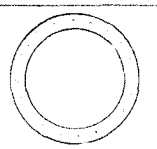
Combines corrosion-resistance of teflon with resilience and sealing security of rubber "O" rings at substantially lower cost. Specified for static seals in any corrosive environment in piping systems and equipment. Temperatures: −65° to +450° F. Pressures to 1500 psi.

TEFLON "O" RINGS



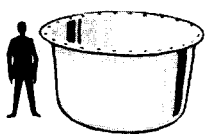
Complete line of standard AN sizes available. Widely used in high temperature applications with corrosive exposure, such as synthetic hydraulic fluids. An economical, efficient static seal for temperatures −120° F. to +550° F.

PIPE FLANGE GASKETS



The unique manufacturing skills of Shamban produce a wide range of pipe flange gasket types and sizes for applications involving corrosive environment and extreme temperature and pressure requirements. −120° F. to +400° F. and with proper reinforcement up to 30,000 psi. The sealing efficiency and durability of Shamban gaskets are cutting costs in many plants.

MOLDED LINERS FOR PROCESSING VESSELS



A Shamban "first." Self-supporting, molded teflon liners for kettles, vats, pans, pressure vessels of irregular or standard configuration used in corrosive environment and wide temperature range. Zero porosity, lowest friction co-efficient, chemically inert, these liners are molded to customer specification by a unique Shamban process.

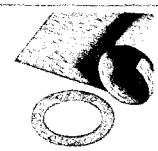
MOLDED AND MACHINED PACKINGS

A wide range of types and sizes in "U" and "V" cup packings, also many types of flange packings, both molded and machine finished are available. These products, standard or custom, provide sealing efficiency in corrosive environment at temperatures from −120° F. to +350° F. and pressures to 2000 psi for "V" cups and 1500 psi for "U" cups.

CUP AND CONE RING PACKING

As rod seals, these products are made of virgin teflon or filled compounds for a very wide range of applications—processing, hydraulic or pneumatic equipment used in corrosive environment. No lubrication is needed. Available in sizes for many standard rods.

TEFLON IMPREGNATED FIBER FELT

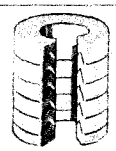


A unique low-pressure seal or gasket material of utmost resiliency and durability for use in extreme applications and corrosive environments. Made of Armalon* impregnated with teflon resin. Withstands ambient temperatures from −320° F. to +550° F. without appreciable loss of physical properties.

ENVELOPE GASKETS

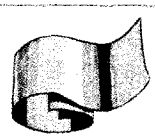
A standard leakproof seal for use in a wide range of applications involving corrosive exposure. Teflon envelopes offer flat sealing surface and prevent corrosion of resilient filler. Available in split and milled type, standard gaskets and the Shamban Tri-Seal® gasket for extreme conditions.

"V" CHEVRON PACKING



These packings are available in both molded and machined configuration for a wide range of moving shaft seals. Corrosion resistance is combined with the advantage of "Chevron" principle for better sealing, low draft friction, long life and no wicking action. Temperatures −120° F. to + 500° F.

GASKET MATERIALS

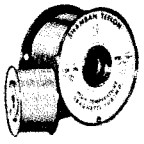


Shamban offers a very wide range of chemically inert gasket materials. Virgin teflon, glass, graphite and moly filled compounds of teflon. Fabricated gaskets are furnished in most standard inert materials and in hundreds of sizes. These materials offer the ultimate in sealing efficiency and corrosion resistance. Available for prompt delivery from stock.

SEE **SHAMBAN** FOR SOPHISTICATED REQUIREMENTS IN PLASTIC FABRICATIONS AND MATERIALS

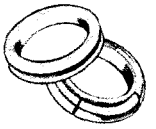
for the ELECTRICAL and ELECTRONIC industries
TFE PRODUCTS OF ADVANCED TECHNOLOGY

SPAGHETTI TUBING



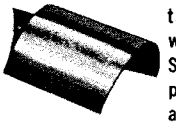
The most COMPLETE LINE of Teflon spaghetti tubing available. 3 wall tricknesses, .006 to .01—STANDARD, THIN WALL and MICROTHIN. Natural and N.E.M.A. colors. 31 standard sizes, custom sizes on request.

GROMMETS



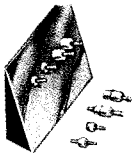
Teflon or nylon, one-piece snap-in with 45° split or integral molding. Channel type in lengths specified. All with Shamban and uniformity.

FLEXIBLE PRINTED CIRCUITRY



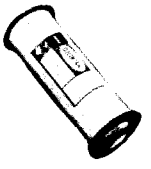
KOP-R-KLAD*. Uniformity at extreme tolerances not elsewhere available. Produced by Shamban's exclusive bonding process which retains performance characteristic of both copper and insulating material.

INSULATORS



Stand-off and Feed-thru types for radar, TV and all electronic uses. Temperature range −450° F. to +550° F.

TAPES



Standard teflon tape available from .002 mils up, with widths up to 36-inch and ready for bonding when so specified.

UNSINTERED TAPE

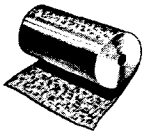
Available in wide range of thicknesses and widths in either strip or rolls. The perfect tape for many uses.

Shamban specialty products

"BONDAID" ETCHANT

Prepares surface of any fluorocarbon for bonding to metal, glass, textiles, wood and other materials.

COATED GLASS FABRICS

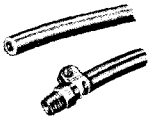


Teflon impregnated woven glass fabrics and laminates. Rolls or sheets. Wide range of widths and thicknesses.

UNIVERSAL THREAD SEAL

Replaces "pipe dope." Shamban teflon thread seal cuts cost of pipe assembly. Fast, clean, chemically inert.

SAFE-T-LINE TUBING

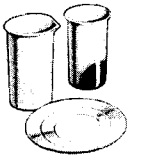


Neoprene tube with teflon lining. Perfect flexible conduit for electrical applications and low pressure hose.

FLEX-HOSE

Teflon tubing with spiral wall convolutions. "Bends around corners" and retains I. D. Damps pipeline vibration.

LABORATORY WARE



The Shamban molded virgin teflon line includes beakers, stirring rods, watch glasses, dishes and tubing.

BASIC SHAPES

RODS

Always available in Teflon, Nylon, Delrin, Kel-F, Halon, Kynar, Celcon, Lexon and Merlon. Beading of .030" to 15.5" diameter rods that meet all government and commercial specifications.

TEFLON SHEETS

Shamban CONTINUOUS MOLD process produces any length required. Widths up to 48". Uniform density and thickness, stress-free. Can be furnished bondized for bonding to any material.

TUBES

Available in hundreds of size and wall combinations in the same materials as rods.

FILM

Fluorocarbon films are available in thickness from .002 mil and widths from 1" to 48".

EXTRUSIONS

THE SHAMBAN CUSTOM FACILITY is equipped to produce extrusions to customer specifications in a wide range of materials. Complete specifications and data on all Shamban Products listed above will be sent promptly upon request.

W. S. SHAMBAN & CO.
11617 W. Jefferson Blvd., Culver City, California 90232
Phone: (Area Code 213) UP 0-6877 — TWX: 871-5220
2531 Bremer Drive, Fort Wayne, Indiana 46803
Phone: (Area Code 219) 742-6491 — TWX: 241-2360

CL 61464 Printed in U.S.A.

INTRODUCTION TO APPLICATION DATA SHEETS

The Seal Application Data Sheets in this section of the SHAMBAN SEAL Catalog provide a cursory look at the basic types of SHAMBAN SEALS standards. Many of the seal drawings referred to in the Application Data Sheets are omitted from the drawings contained in the Installation Data Section of the Catalog – some have been omitted because experience has indicated a limited use for certain types.

You may obtain copies of SHAMBAN SEAL drawings not included in your Catalog by contacting your nearest Shamban Distributor or Shamban Field Engineer or by writing to the Factory Engineering Department.

APPLICATION DATA CATEGORIES	DATA SHEET CODE
BACK-UP RINGS	A
GEO-RINGS	B
PLUG SEALS	C
CHANNEL SEALS	D
PISTON RINGS	E
SCRAPER RINGS	F
CAP SEALS	G
FOOT SEALS	H

MS SPIRAL BACK-UP RING

APPLICATION CONFIGURATION **NO. A1**

MILITARY STANDARDS

The TFE (Teflon) MS Spiral Back-Up Ring is an anti-extrusion device for use with the conventional O-ring. The spiral design feature of this type back-up ring eliminates the possibility of gaping or overlap at the ends.

This ring has replaced the leather back-up ring to a large extent, and is directly interchangeable with it and with the single turn back-up ring described in Shamban Application Data Sheet No. A3.

Military Standards – MS-28782 and MS-28783 – have been established for virgin TFE spiral back-up ring design.* (For design details and ordering information, see the MS Back-Up Ring Section of the Shamban Seal Catalog.) Sizes of MS type spiral back-up rings, in addition to those included in the MS standards, can be obtained by specifying Shamban No. S-11109, shown in the MS Back-Up Ring section. In addition, a commerical series of back-up rings are available as described in Application Data Sheet No. A2.

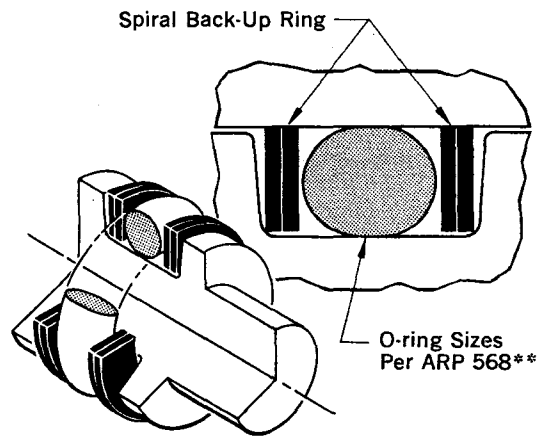


Illustration Shows Application Part Nos. MS-28782.

RECOMMENDED OPERATING CONDITIONS

Pressure Range: up to 3000 psi

Temperature Range: —65°F to 225°F

*Applicable Military Specification MIL-P-8791B

**Uniform dash numbering system for O-rings

W. S. SHAMBAN & CO.

California: 11617 W. Jefferson Blvd., P.O. Box 2767, Culver City, California

Indiana: 2531 Bremer Drive, P.O. Box 176, Fort Wayne, Indiana

MS SINGLE-TURN BACK-UP RING

APPLICATION CONFIGURATION **NO. A3**

MILITARY STANDARDS

The TFE (Teflon) MS Single-Turn Back-Up Ring is an anti-extrusion device for use with the conventional O-ring. This ring is directly interchangeable with the spiral back-up ring described in Shamban Application Data Sheet No. A1.

Military standards — MS-28774 and MS-9058 (for boss connection) — have been established for virgin TFE single-turn back-up ring designs. For design data and ordering information, see the MS Back-Up Ring section of the Shamban Seal Catalog.

The Single-Turn Back-Up Ring can be used in O-ring glands as described in all revisions of MIL-P-5514 and in industrial O-Ring design handbooks; however it was designed specifically for glands per MIL-P-5514 Revisions C and D. To avoid gaping at the ends at low temperatures, the MS-28774 Single-Turn Back-Up Ring is dimensioned to have some overlap in the installed condition at room temperature.

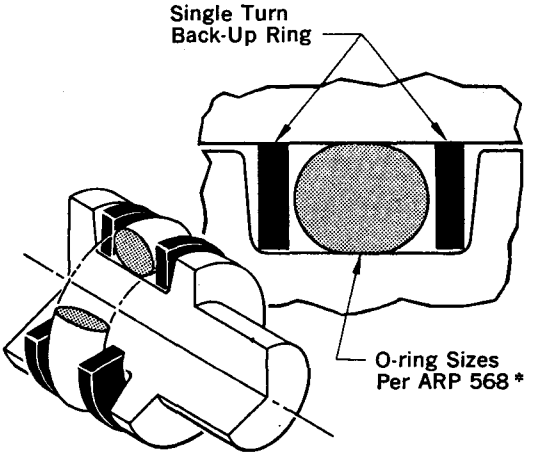


Illustration Shows Application Part Nos. MS-28774.

RECOMMENDED OPERATING CONDITIONS

Pressure Range up to 3000 psi

Temperature Range: −65°F to +300°F

Special Note: MS-28774 and MS-9058 Back-Up Rings are furnished in virgin TFE only per MIL-P-8791B. The same sizes Shamban Single-Turn Back-Up Rings, S-11248 and S-2619, are available in wear-resistant Turcon** and reinforced TFE. Ordering instructions for Shamban Seals made out of other than virgin TFE, are given in the general Seal Information Section of the Shamban Seal Catalog.

*Uniform dash numbering system for O-rings
**Turcon™ is Shamban's exclusive, wear-resistant TFE.

SHAMBAN

W. S. SHAMBAN & CO.

California: 11617 W. Jefferson Blvd., P.O. Box 2767, Culver City, California
Indiana: 2531 Bremer Drive, P.O. Box 176, Fort Wayne, Indiana

SHAMBAN GLYD* RING

APPLICATION CONFIGURATION **NO. B1**

SERIES B AND C

The

SHAMBAN GLYD* RING

is a TURCON* seal for hydraulic and pneumatic actuators and valves which offers the designer all of the essential requirements of a reliable dynamic seal. Shamban engineers have combined the desirable qualities of Teflon† and rubber into a unique but simple sealing concept to include the following:

ADVANTAGES

LOWER FRICTION

Glyd Ring Friction Rating	30
O-Ring Friction Rating	100

POSITIVE SEALING

Maintains 'new O-ring' sealing ability for hundreds of thousands of cycles beyond the useful life of a conventional O-ring seal.

EXCEPTIONAL DURABILITY

Shamban's exclusive wear resistant Turcon* TFE is a modified virgin Teflon† that outlasts ordinary Teflon† ten to one.

EASE OF INSTALLATION

Can be installed in the field without special tools.

The Glyd Ring prevents O-Ring Extrusion — No Back-up rings are needed.

Glyd Rings are available for use with all of the O-ring sizes or with comparable sizes of the 'square' O-ring (See application Data Sheet B-2.)

CONTINUED ON NEXT PAGE

* Trademark of W. S. Shamban & Co.

† Registered DuPont Trademark

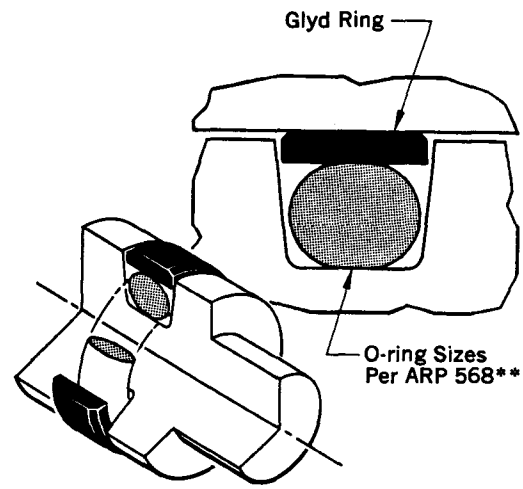


Illustration Shows O.D. Application Part Nos. S-12068 and S-12547

RECOMMENDED OPERATING CONDITIONS

Pressure Range: Up to 5000 psi

Temperature Range: −65°F to +400°F

(If this seal is to be exposed to a combination of high pressure and high temperatures, special design considerations may be necessary.)

*Turcon is Shamban's exclusive, wear-resistant TFE.
**Uniform dash numbering system for O-rings.

DISTRIBUTOR

W. S. SHAMBAN & CO.

California: 11617 W. Jefferson Blvd., P.O. Box 2767, Culver City, California 90232

Indiana: 2531 Bremer Drive, P.O. Box 176, Fort Wayne, Indiana 46801

Federal Code Identification No. 97820

SHAMBAN GLYD* RING

APPLICATION CONFIGURATION **NO. B2**

SERIES D

Three types of
SHAMBAN GLYD RINGS

are available as off-the-shelf standards. These standards are designated as either Series B, Series C or Series D Glyd Rings.

SERIES B GLYD RINGS

are designed for use with O-Rings for cylinder bore diameters and rod diameters described in Revision C thru E of SPECIFICATION MIL-P-5514:

S12068 Outside Diameters (Piston)
S12066 Inside Diameters (Rod)

SERIES C GLYD RINGS

are designed for use with O-Rings for cylinder bore diameters and rod diameters that are the decimal equivalent of fractions. (As described in the commonly used O-Ring reference data:

S12547 Outside Diameters (Piston)
S12546 Inside Diameters (Rod)

SERIES D GLYD RINGS

offer the designer the opportunity to use a square ring to support the Glyd Ring rather than the conventional O-Ring. (See Application Data Sheet B-1).

Series D Glyd Rings are designed for use with cylinder bore diameters and rod diameters that are the decimal equivalent of fractions, (as described in the commonly used O-Ring reference data).

S12728 Outside Diameters (Piston)
S12727 Inside Diameters (Rod)

ORDERING INFORMATION

Gland design data for cylinder bore and rod diameters from 1/8" to 16" is shown on the Glyd Ring Installation Drawings located in the Seal Installation Data Section of the Shamban Seal Design Manual.

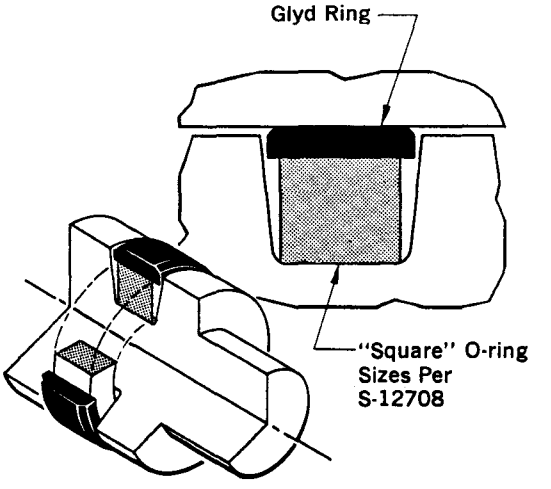


Illustration Shows O.D. Application Assembly
Part No. S-12728

RECOMMENDED OPERATING CONDITIONS

Pressure Range: up to 5000 psi
Temperature Range: —65°F to +400°F

(If this seal is to be exposed to a combination of high temperature and high pressure, special design considerations may be necessary.)

*Turcon is Shamban's exclusive, wear-resistant TFE.

DISTRIBUTOR

W. S. SHAMBAN & CO.

California: 11617 W. Jefferson Blvd., P.O. Box 2767, Culver City, California 90232
Indiana: 2531 Bremer Drive, P.O. Box 176, Fort Wayne, Indiana 46801
Federal Code Identification No. 97820

SHAMBAN PLUS® SEAL

APPLICATION CONFIGURATION
NO. C1

The

PLUS SEAL

is a new type of Shamban Seal for the no-back-up ring width groove. This seal is easy to install and has low breakout and running friction combined with excellent sealing characteristics for extended periods.

FRICTION RATING	
Shamban Plus Seal	30
Conventional O-Ring	100

It is designed to overcome the installation difficulties, poor performance and limited service life frequently experienced with O-ring and cap strip combinations. The gland design for the Plus Seal is in accordance with the no-back-up groove dimensions of MIL-P-5514, Revisions C thru E.

The Plus Seal is available as an assembly consisting of the Plus Ring expander and the Seal Ring. The radial thickness of the Plus Ring expander is less than that of an O-ring to allow greater thickness of the Seal Ring. The Plus Ring is contoured and proportioned to give uniform support to the Seal Ring. Installation damage and tipping of the Seal Ring are eliminated.

The Seal Ring portion of the Plus Seal Assembly is available in wear-resistant TURCON* and several other TFE materials. The Plus Ring portion is furnished in military, commercial and special elastometric compounds.

Ordering information and installation data for all of the dynamic O-ring sizes are shown on Plus Seal drawings:

S-11943 OUTSIDE DIAMETER (PISTON)
S-11940 INSIDE DIAMETER (ROD)

* Trademark of W. S. Shamban & Co.

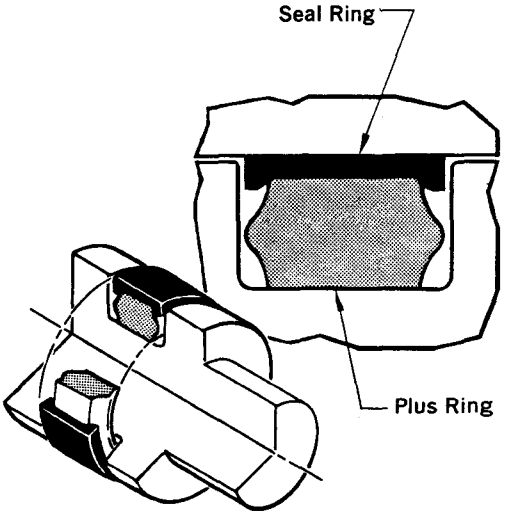


Illustration Shows Plus Seal Part No. S-11943 (O.D.)

RECOMMENDED OPERATING CONDITIONS

Pressure Range: up to 5000 psi
Temperature Range: —65°F to +400°F

(If this seal is to be exposed to a combination of high temperature and high pressure, special design considerations may be necessary.)

*Turcon is Shamban's exclusive, wear-resistant TFE.

DISTRIBUTOR

W. S. SHAMBAN & CO.
California: 11617 W. Jefferson Blvd., P.O. Box 2767, Culver City, California 90232
Indiana: 2531 Bremer Drive, P.O. Box 176, Fort Wayne, Indiana 46801
Federal Code Identification No. 97820

SHAMBAN CAP SEAL

APPLICATION CONFIGURATION
NO. G1

The terms

CAP SEAL
CAP STRIP
and
SLIPPER SEAL

are frequently used interchangeably. A "Cap Seal" is usually for a no-back-up ring groove. It is a relatively thin TFE ('Teflon†) or reinforced TFE ring placed between an O-ring and a rod (in the case of an I.D. seal) or a cylinder bore (in the case of an O.D. seal).

A standard no-back-up ring groove has room for an O-ring only. When a "Cap Seal" is used with an O-ring in this type groove, the crowding that results often presents installation difficulties.

Although the "Cap Seal" is not recommended for new design – see Plus® Seal, Glyd* Ring, Channel* Seal and others – it is a convenient solution to some retrofit problems in spite of its disadvantage.

Ordering information and installation data are shown on Shamban "Cap Seal" drawings:

S-11338 OUTSIDE DIAMETER (PISTON)
S-11589 INSIDE DIAMETER (ROD)

* Trademark of W. S. Shamban & Co.
† Registered DuPont Trademark

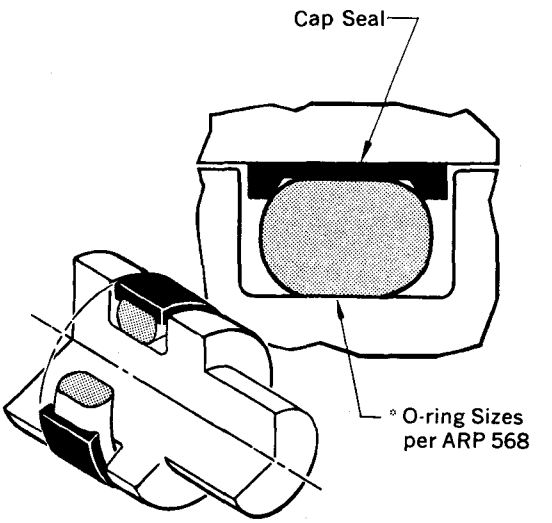


Illustration Shows Application Part No. S-11338 (O.D.).

RECOMMENDED OPERATING CONDITIONS

Pressure Range up to 3000 psi
Temperature Range: −65°F to +300°F

*Uniform dash numbering system for O-rings

(If this seal is to be exposed to a combination of high temperature and high pressure, special design considerations may be necessary.)

DISTRIBUTOR

W. S. SHAMBAN & CO.
California: 11617 W. Jefferson Blvd., P.O. Box 2767, Culver City, California 90232
Indiana: 2531 Bremer Drive, P.O. Box 176, Fort Wayne, Indiana 46801
Federal Code Identification No. 97820

SHAMBAN CHANNEL™ SEAL

APPLICATION CONFIGURATION

NO. D1

The Channel Seal is a precision TFE (Teflon) seal for military and industrial applications. It is similar in some respects to the Double Delta Channel Seal as described in Shamban Application Data Sheet D2. This type of seal is designed to fit two back-up ring width grooves as described in MIL-P-5514 and in industrial O-ring handbooks.

The Channel Seal is recommended for dynamic hydraulic and pneumatic sealing applications to reduce friction and provide "new seal" leakage performance for extended periods under conditions that normally result in limited service for conventional O-ring seals. It may also be used for static applications to improve service life and performance. As a replacement for conventional sealing methods, the Channel Seal with an O-ring is directly interchangeable with a two back-up ring and O-ring combination.

Ordering information and installation data for shaft sizes from ¾" to 15½" are shown on Channel Seal drawing S-11370 for glands in accordance with Revisions A and B of MIL-P-5514 and current industrial hydraulic design recommendations. Similarly, Channel Seal drawing S-12560 furnishes ordering information and installation data for glands in accordance with Revision C and D of MIL-P-5514. Channel Seals S-11370 and S-12560 are not interchangeable.

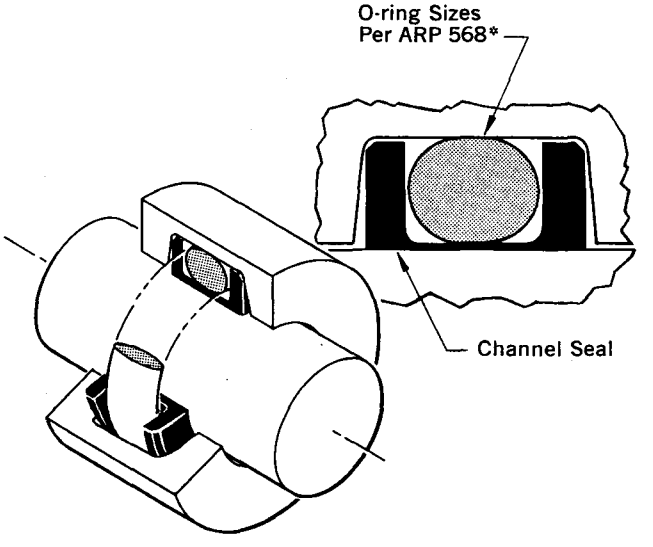


Illustration shows Application Part Nos. S-11370 and S-12560

RECOMMENDED OPERATING CONDITIONS

Pressure Range: up to 5000 psi

Temperature Range: −65°F to +400°F

(If this seal is to be exposed to a combination of high temperature and high pressure, special design considerations may be necessary.)

Special Note: This Channel Seal is furnished in virgin TFE (Teflon) unless otherwise specified. Ask about Shamban's wear-resistant Turcon**, or reinforced virgin TFE to meet special requirements.

*Uniform dash numbering system for O-rings

**Turcon™ is Shamban's exclusive, wear-resistant TFE.

W. S. SHAMBAN & CO.

California: 11617 W. Jefferson Blvd., P.O. Box 2767, Culver City, California

Indiana: 2531 Bremer Drive, P.O. Box 176, Fort Wayne, Indiana

DOUBLE DELTA CHANNEL™ SEAL

APPLICATION CONFIGURATION
NO.D2

The Double Delta Channel Seal is a precision Turcon* seal for military and industrial applications. It is similar in some respects to the Channel Seal described in Shamban Application Data Sheet D1. Double Delta Channel Seals are available for one back-up ring width and two back-up ring width O-ring grooves, as described in MIL-P-5514.

The Double Delta Channel Seal increases the service life of an O-ring five times or more by protecting it against the dynamic forces that cause O-ring failure. Breakout and running friction are also reduced. This type of seal is particularly effective under repeated exposure to excessive clearances and high pressures, such as are found in some aircraft shock strut installations.

Ordering information and installation data for shaft and cylinder bore sizes from ½" to 16" are shown on Shamban Double Delta Channel Seal drawings S-12714 (O.D.) and S-12715 (I.D.) for one back-up ring width grooves and S-12716 (O.D.) and S-12223 (I.D.) for two back-up ring width grooves. The gland dimensions shown on these drawings are in accordance with the recommendations of Revision A and B of MIL-P-5514 and industrial hydraulic design practice.

Similarly, Double Delta Channel Seal drawings S-12603 (O.D.) and S-12604 (I.D.) for one back-up ring width grooves, and S-12508 (O.D.) and S-12561 (I.D.) for two back-up ring width grooves, furnish ordering information and installation data for glands in accordance with the recommendations of Revision C and D of MIL-P-5514.

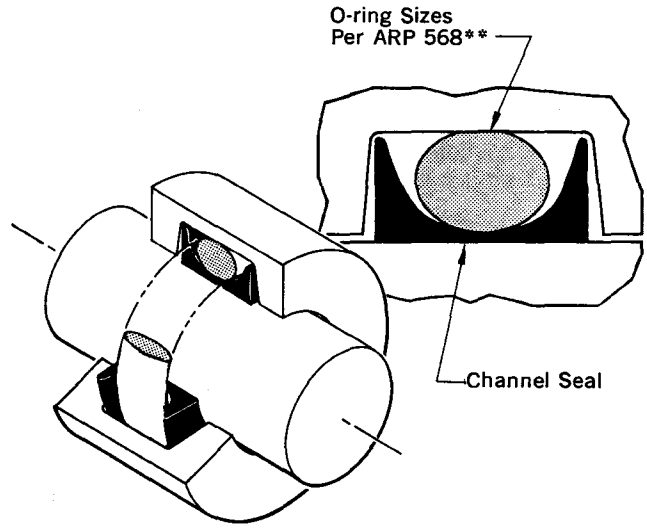


Illustration Shows Application Part Nos. S-12223 and S-12561.

RECOMMENDED OPERATING CONDITIONS

Pressure Range: up to 5000 psi
Temperature Range: −65°F to +400°F

(If this seal is to be exposed to a combination of high temperature and high pressure, special design considerations may be necessary.)

This Channel Seal is also available as a piston seal. Write Shamban Engineering, Dept. 31 for this information.

*Turcon™ is Shamban's exclusive, wear-resistant TFE.
**Uniform dash numbering system for O-rings.

W. S. SHAMBAN & CO.

California: 11617 W. Jefferson Blvd., P.O. Box 2767, Culver City, California
Indiana: 2531 Bremer Drive, P.O. Box 176, Fort Wayne, Indiana

SHAMBAN SCRAPER RING

APPLICATION CONFIGURATION
NO. F1

The
SHAMBAN TEFLON† SCRAPER RING

is directly interchangeable with the MS-28776 Metal Scraper Ring.

EFFECTIVE ROD CLEANING
action takes place because of 100% contact.

FRICTION IS NEGLIGIBLE
as compared to the conventional MS metal scraper ring.

ROD SCORING IS ELIMINATED.

A choice of other materials than TFE is available — nylon, bronze reinforced TFE, TURCON* and Delrin.

Gland Design can be varied to suit individual design requirements.

Ordering information and installation data are shown on drawing:

S-11065 SHAMBAN SCRAPER RING

Contact your nearest Shamban Distributor or Shamban Field Engineer or write the factory, Department 31 for specific recommendations.

* Trademark of W. S. Shamban & Co.
† Registered DuPont Trademark

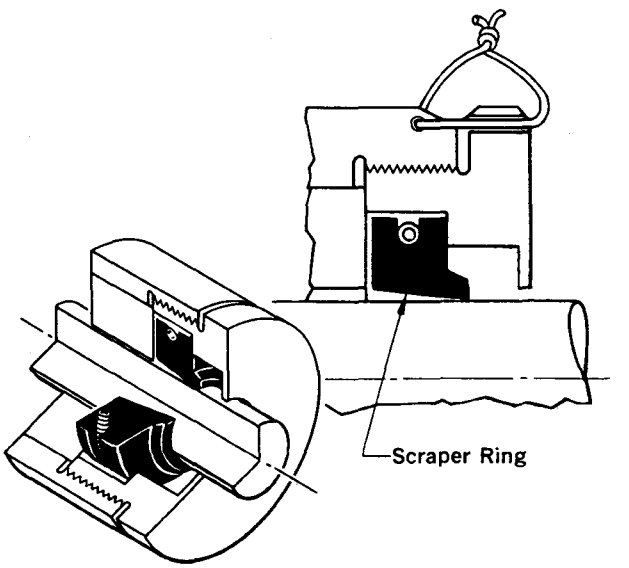


Illustration Shows Application Part No. S-11065

RECOMMENDED OPERATING CONDITIONS
Temperature Range: —450°F to +300°F

*Turcon is Shamban's exclusive, wear-resistant TFE.

DISTRIBUTOR

W. S. SHAMBAN & CO.
California: 11617 W. Jefferson Blvd., P.O. Box 2767, Culver City, California 90232
Indiana: 2531 Bremer Drive, P.O. Box 176, Fort Wayne, Indiana 46801
Federal Code Identification No. 97820

SHAMBAN FOOT SEAL

APPLICATION CONFIGURATION

NO. H1

The Foot Seal is a precision rod seal for military aircraft and industrial type hydraulic and pneumatic actuators where long service life and minimum maintenance is desirable. It requires a special split gland and should be used where some friction can be tolerated.

This type seal will give zero-leakage service for hundreds of thousands of cycles when made of wear-resistant Turcon*

Ordering information and installation data are shown on drawing S-12095 for precision military applications and on drawing S-12733 for industrial applications

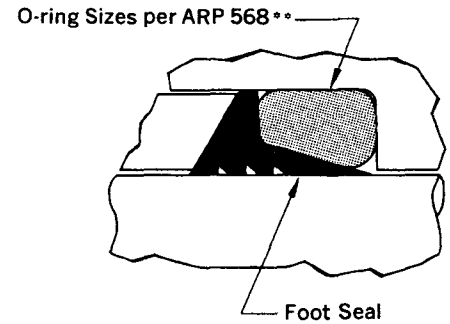


Illustration Shows Application Part Nos. S-12095 and S-12733.

RECOMMENDED OPERATING CONDITIONS

Pressure Range: up to 5000 psi

Temperature Range: —65°F to +400°F

*Turcon is Shamban's exclusive wear-resistant TFE.
**Uniform dash numbering system for O-rings.

(If this seal is to be exposed to a combination of high pressure and high temperatures, special design considerations may be necessary.)

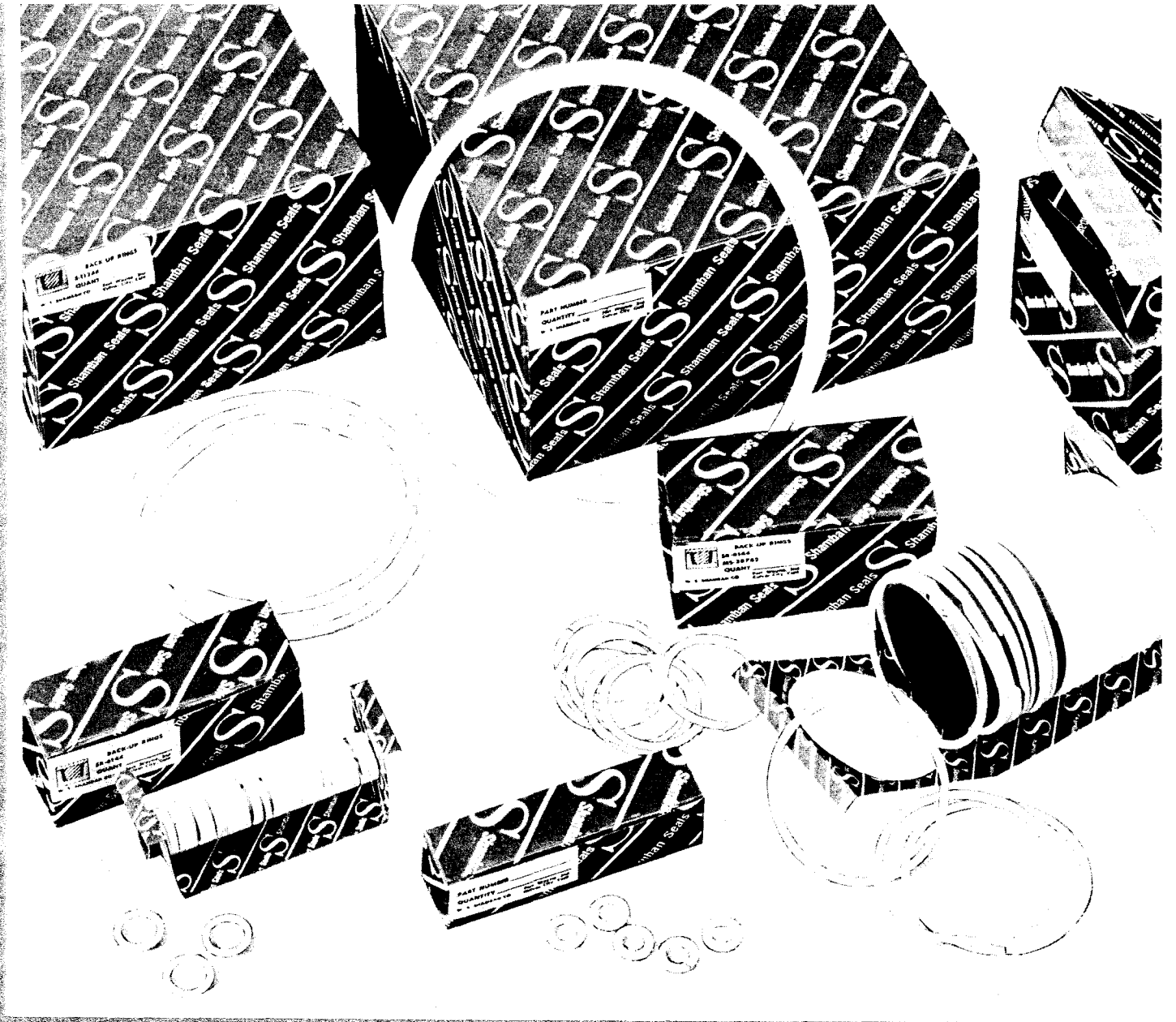
* Trademark of W. S. Shamban & Co.

DISTRIBUTOR

W. S. SHAMBAN & CO.

California: 11617 W. Jefferson Blvd., P.O. Box 2767, Culver City, California 90232
Indiana: 2531 Bremer Drive, P.O. Box 176, Fort Wayne, Indiana 46801
Federal Code Identification No. 97820

TEFLON BACK-UP RINGS



SINGLE TURN AND SPIRAL BACK-UP RINGS

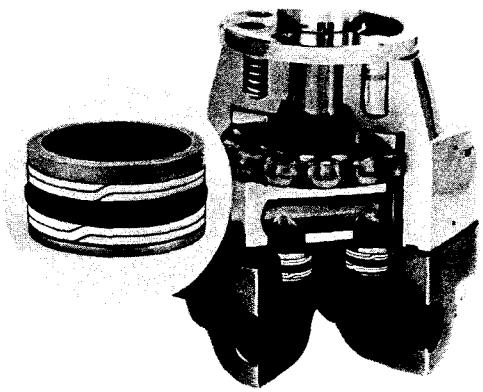
W. S. SHAMBAN & CO.

TEFLON® BACK-UP RINGS PROTECT O-RING SEALS

By preventing O-ring extrusion and reducing packing friction, Teflon back-up rings extend the service life and improve the performance of O-ring seals. With Teflon back-up rings, designers can now specify O-rings for environmental conditions previously considered too severe.

Shamban Back-up Rings are packaged on mandrels and shipped in specially designed containers for ease of handling and prevention of damage.

Designed to prolong O-ring life, SHAMBAN Back-up Rings protect the O-ring from nibbling, and prevent spiral failure. They extend the endurance as well as improve the performance of O-rings at higher temperatures and in fluids that have an adverse effect on the O-ring material. In some applications, the back-up ring stock can seal without O-rings if the packing completely fills the groove in one continuous spiral of several layers.



Shamban MS Back-up Rings are manufactured to rigid quality standards for all AN, MS and ARP 568 O-ring sizes. They are certified to military satisfaction, MIL-R-8791 and are interchangeable with the AN leather back-up ring standards AN 6246, AN 6244 and AN 6291. For those applications which do not require the rigid specification controls essential to military applications, SHAMBAN also offers industrial grade Back-up Rings for use with all of the standard O-Ring sizes.

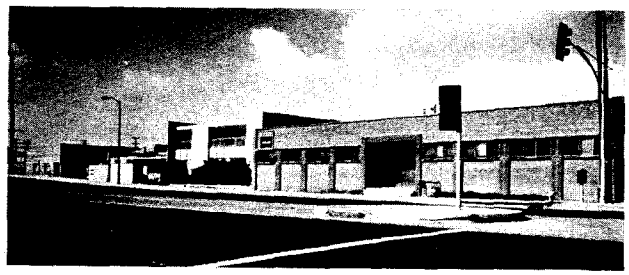
When special Back-up Ring requirements are necessary for non-standard hardware and unusual and environmental conditions, Shamban offers engineering assistance in the preparation of design details and in the selection of specially compounded Teflon materials.

® Registered Du Pont trademark

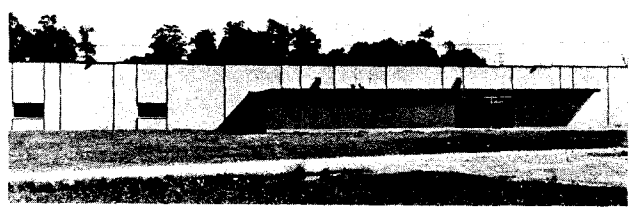
MS AND INDUSTRIAL BACK-UP RINGS

		SHAMBAN DRAWING NUMBER
SINGLE TURN BACK-UP RINGS	MS-28774	S-11248 S-12766 (Industrial)
	MS-9058	SR-2619 S-12507 (Uncut)
SPIRAL BACK-UP RINGS	MS-28782	SR-6144 S-11109
	MS-28783	SR-7234 S-12517 (Industrial)

W. S. SHAMBAN & COMPANY — ENGINEERING AND MANUFACTURING FACILITIES

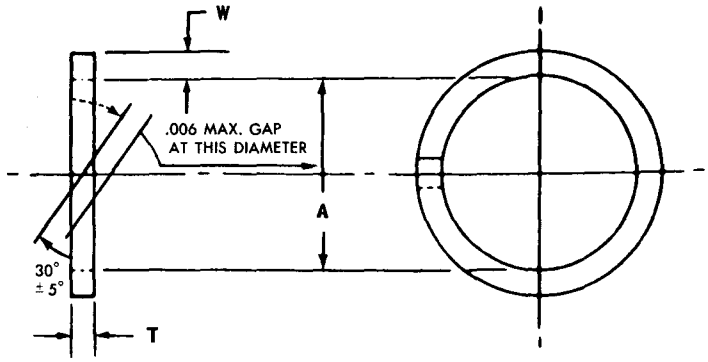


11617 W. JEFFERSON BLVD., CULVER CITY, CALIFORNIA
PHONE: (AREA CODE 213) 397-2195 TWX: 871-5220



2531 BREMER DRIVE, FORT WAYNE, INDIANA
PHONE: (AREA CODE 219) 742-6491 TWX: 241-2360

RESEARCH AND DEVELOPMENT • DESIGN • QUALITY AND RELIABILITY ASSURANCE LABS • COMPLETE EXTRUSION • MOLDING • MACHINING • FABRICATION • ADVANCED TECHNOLOGY PLASTICS



MS-9058

TEFLON BACK-UP RING BOSS CONNECTION

SINGLE TURN

SHAMBAN DWG. NO. SR-2619

Dash No.	Tubing Size O.D.	A Dia.	W ± .002	T ± .004
02	1/8"	.246	.112	.056
03	3/16"	.309	.112	.056
04	1/4"	.360	.117	.061
05	5/16"	.423	.117	.061
06	3/8"	.478	.121	.061
07	7/16"	.549	.121	.061
08	1/2"	.656	.125	.061
09	9/16"	.718	.125	.061
10	5/8"	.769	.131	.073
11	11/16"	.878	.159	.073
12	3/4"	.941	.169	.073
16	1"	1.191	.169	.073
20	1 1/4"	1.503	.169	.073
24	1 1/2"	1.752	.169	.073
28	1 3/4"	2.127	.169	.073
32	2"	2.377	.169	.073

NOTES

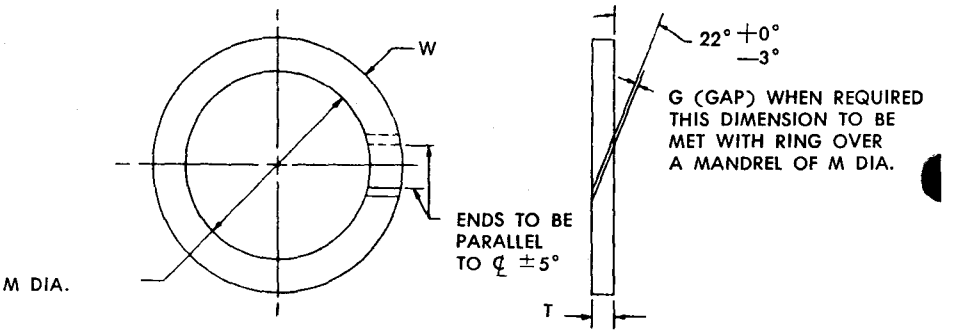
1. Material: Teflon. MIL-R-8791, Latest Revision (Certification on request.)
2. Surfaces are smooth and free from irregularities.
3. Dimensions in inches.
4. This Series corresponds to the Dash numbers of AN6290 Gasket Rings.

MS-28774

TEFLON BACK-UP RING

SINGLE TURN

SHAMBAN DWG. NO. S-11248



Dash No.	M. DIA.	T	W	G	SHAMBAN EQUIVALENT SPIRAL RING NUMBER
04	.109±.001	.052 .045	.054 .052	.000 .005	S11109-4
05	.124				S11109-5
06	.140				SR6144-1
07	.171				SR6144-2
08	.202				SR6144-3
09	.234				SR6144-4
10	.265				SR6144-5
11	.327				SR6144-6
12	.390				SR6144-7
13	.455				S11109-13
14	.518				S11109-14
15	.580				S11109-15
16	.643				S11109-16
17	.705				S11109-17
18	.768				S11109-18
19	.830				S11109-19
20	.898				S11109-20
21	.960				S11109-21
22	1.023				S11109-22
23	1.085				S11109-23
24	1.148				S11109-24
25	1.210				S11109-25
26	1.273				S11109-26
27	1.335				S11109-27
28	1.398				S11109-28
110	.390		.087 .085	.000 .006	SR6144-8
111	.452				SR6144-9
112	.515				SR6144-10
113	.577				SR6144-11
114	.640				SR6144-12
115	.702				SR6144-13
116	.765				SR6144-14
117	.832				S11109-117
118	.895				S11109-118
119	.957				S11109-119
120	1.020				S11109-120
121	1.082				S11109-121
122	1.145				S11109-122
123	1.207				S11109-123
124	1.270				S11109-124
125	1.332				S11109-125
126	1.397				S11109-126
127	1.459				S11109-127
128	1.522				S11109-128
129	1.584				S11109-129
130	1.647				S11109-130
131	1.709				S11109-131
132	1.772				S11109-132
133	1.834				S11109-133
134	1.897				S11109-134
135	1.959				S11109-135
136	2.022				S11109-136
137	2.084				S11109-137
138	2.147				S11109-138
139	2.209				S11109-139

Dash No.	M. DIA.	T	W	G	SHAMBAN EQUIVALENT SPIRAL RING NUMBER
140	2.258±.002	.052 .045	.087 .085		S11109-140
141	2.320				S11109-141
142	2.383				S11109-142
143	2.445				S11109-143
144	2.508			No Cut	S11109-144
145	2.570				S11109-145
146	2.633				S11109-146
147	2.695				S11109-147
148	2.758				S11109-148
149	2.820				S11109-149
210	.766±.001		.120 .118	.000 .006	SR6144-15
211	.828				SR6144- 6
212	.891				SR6144-17
213	.953				SR6144-18
214	1.016				SR6144-19
215	1.078				SR6144-20
216	1.141				SR6144-21
217	1.203				SR6144-22
218	1.266				SR6144-23
219	1.334				SR6144-24
220	1.397				SR6144-25
221	1.459				SR6144-26
222	1.522				SR6144-27
223	1.647			.000 .007	SR7234-1
224	1.772				SR7234-2
225	1.897				SR7234-3
226	2.022				SR7234-4
227	2.147				SR7234-5
228	2.272				SR7234-6
229	2.397				SR7234-7
230	2.522				SR7234-8
231	2.631±.002				SR7234-9
232	2.756				SR7234-10
233	2.881				SR7234-11
234	3.006				SR7234-12
235	3.131				SR7234-13
236	3.256				SR7234-14
237	3.381				SR7234-15
238	3.506				SR7234-16
239	3.631				SR7234-17
240	3.756				SR7234-18
241	3.881				SR7234-19
242	4.006				SR7234-20
243	4.131±.003			No Cut	SR7234-21
244	4.256				SR7234-22
245	4.381				SR7234-23
246	4.506				SR7234-24
247	4.631				SR7234-25
248	4.756				SR7234-26
249	4.881				SR7234-27
250	5.008				SR7234-28
251	5.133				SR7234-29
252	5.258				SR7234-30

S-28774

TEFLON BACK-UP RING / SINGLE TURN

Dash No.	M. DIA.	T	W	G	SHAMBAN EQUIVALENT SPIRAL RING NUMBER
253	5.383±.003	.052 .045	.120 .118	No Cut	SR7234-31
254	5.508				SR7234-32
255	5.633				SR7234-33
256	5.758				SR7234-34
257	5.823±.004				SR7234-35
258	6.008				SR7234-36
259	6.258				SR7234-37
260	6.508				SR7234-38
261	6.758				SR7234-39
262	7.008				SR7234-40
263	7.258				SR7234-41
264	7.508				SR7234-42
265	7.758				SR7234-43
266	8.008				SR7234-44
267	8.258				SR7234-45
268	8.508				SR7234-46
269	8.758				SR7234-47
270	9.008				SR7234-48
271	9.258				SR7234-49
272	9.508				SR7234-50
273	9.758				SR7234-51
274	10.008				SR7234-52
325	1.513±.001	.075 .065	.184 .182	.000 .007	SR6144-28
326	1.638				SR6144-29
327	1.763				SR6144-30
328	1.888				SR6144-31
329	2.013				SR6144-32
330	2.138				SR6144-33
331	2.268				SR6144-34
332	2.393				SR6144-35
333	2.518				SR6144-36
334	2.643				SR6144-37
335	2.768				SR6144-38
336	2.893				SR6144-39
337	3.018				SR6144-40
338	3.143				SR6144-41
339	3.273				SR6144-42
340	3.398				SR6144-43
341	3.523				SR6144-44
342	3.648				SR6144-45
343	3.773				SR6144-46

Dash No.	M. DIA.	T	W	G	SHAMBAN EQUIVALENT SPIRAL RING NUMBER
344	3.898±.001	.075 .065	.184 .182	.000 .007	SR6144-47
345	4.028				SR6144-48
346	4.153				SR6144-49
347	4.278				SR6144-50
348	4.403				SR6144-51
349	4.528				SR6144-52
425	4.551	.110 .100	.237 .235	.000 .008	SR6144-88
426	4.676				SR6144-53
427	4.801				SR6144-54
428	4.926				SR6144-55
429	5.051				SR6144-56
430	5.176				SR6144-57
431	5.301				SR6144-58
432	5.426				SR6144-59
433	5.551				SR6144-60
434	5.676				SR6144-61
435	5.801				SR6144-62
436	5.926				SR6144-63
437	6.051				SR6144-64
438	6.274±.004			No Cut	SR6144-65
439	6.524				SR6144-66
440	6.774				SR6144-67
441	7.024				SR6144-68
442	7.274				SR6144-69
443	7.524				SR6144-70
444	7.774				SR6144-71
445	8.024				SR6144-72
446	8.524				SR6144-73
447	9.024				SR6144-74
448	9.524				SR6144-75
449	10.024				SR6144-76
450	10.524±.005				SR6144-77
451	11.024				SR6144-78
452	11.524				SR6144-79
453	12.024				SR6144-80
454	12.524				SR6144-81
455	13.024				SR6144-82
456	13.524				SR6144-83
457	14.024				SR6144-84
458	14.524				SR6144-85
459	15.024				SR6144-86
460	15.524				SR6144-87

NOTES

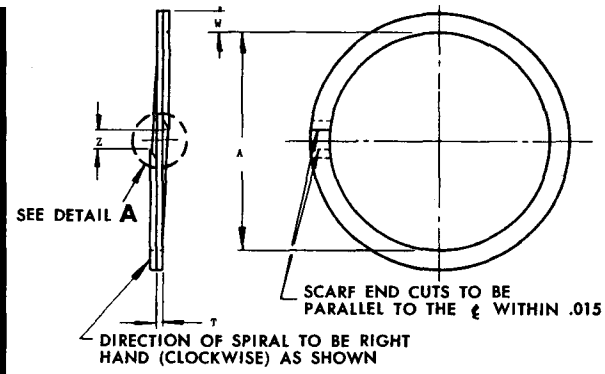
1. Material: Teflon. MIL-R-8791, Latest Revision (Certification on request.)
2. Surfaces are smooth and free from irregularities. Edges are clean and sharp.
3. Dash numbers of MS-28774 single turn back-up rings correspond to the dash numbers of ARP-568 uniform dash numbering system for "O" rings.
4. Dash numbers of SR-6144 spiral back-up rings correspond to dash numbers of MS-28782 spiral back-up rings and AN6227 O-ring seals.
5. Dash numbers of SR-7234 spiral back-up rings correspond to the dash numbers of MS-28783 spiral back-up rings and AN6230 O-ring seals.
6. Inspection should be accomplished with ambient temperature of 73° ±2°F.

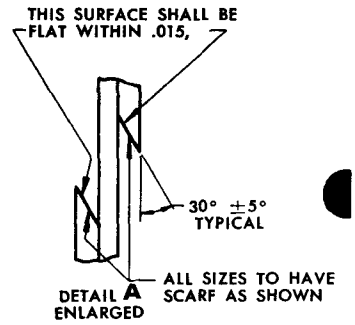
MS-28782

TEFLON BACK-UP RING

SPIRAL

SHAMBAN DWG. NO. SR-6144



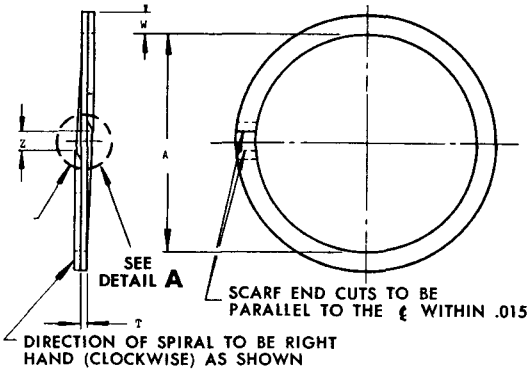


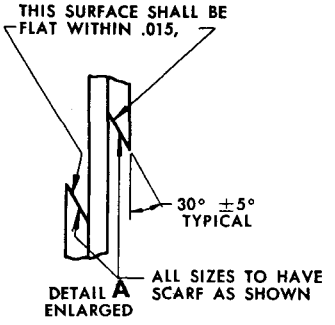
Dash No.	Nominal Size I.D.	Nominal Size O.D.	Actual Size A Dia	T	W	Z
01	1/8	1/4	.125	.029 .025	.056 .054	.062 .032
02	5/32	9/32	.156			
03	3/16	5/16	.188			
04	7/32	11/32	.219			
05	1/4	3/8	.250			
06	5/16	7/16	.312			
07	3/8	1/2	.375			
08	3/8	9/16	.375		.089 .087	.078 .032
09	7/16	5/8	.438			
10	1/2	11/16	.500			
11	9/16	3/4	.562			
12	5/8	13/16	.625			
13	11/16	7/8	.687			
14	3/4	15/16	.750			
15	3/4	1	.750		.122 .120	.093 .047
16	13/16	1 1/16	.812			
17	7/8	1 1/8	.875			
18	15/16	1 3/16	.938			
19	1	1 1/4	1.000			
20	1 1/16	1 5/16	1.062			
21	1 1/8	1 3/8	1.125			
22	1 3/16	1 7/16	1.188			
23	1 1/4	1 1/2	1.250			
24	1 5/16	1 9/16	1.312			
25	1 3/8	1 5/8	1.375			
26	1 7/16	1 11/16	1.438			
27	1 1/2	1 3/4	1.500			
28	1 1/2	1 7/8	1.500	.036 .031	.186 .184	.188 .062
29	1 5/8	2	1.625			
30	1 3/4	2 1/8	1.750			
31	1 7/8	2 1/4	1.875			
32	2	2 3/8	2.000			
33	2 1/8	2 1/2	2.125			
34	2 1/4	2 5/8	2.250			
35	2 3/8	2 3/4	2.375			
36	2 1/2	2 7/8	2.500			
37	2 5/8	3	2.625			
38	2 3/4	3 1/8	2.750			
39	2 7/8	3 1/4	2.875			
40	3	3 3/8	3.000			.250 .093
41	3 1/8	3 1/2	3.125			
42	3 1/4	3 5/8	3.250			
43	3 3/8	3 3/4	3.375			
44	3 1/2	3 7/8	3.500			

Dash No.	Nominal Size I.D.	Nominal Size O.D.	Actual Size A Dia	T	W	Z
45	3 5/8	4	3.625	.036 .031	.186 .184	.250 .093
46	3 3/4	4 1/8	3.750			
47	3 7/8	4 1/4	3.875			
48	4	4 3/8	4.000			
49	4 1/8	4 1/2	4.125			
50	4 1/4	4 5/8	4.250			
51	4 3/8	4 3/4	4.375			
52	4 1/2	4 7/8	4.500			
53	4 5/8	5 1/8	4.625	.052 .046	.239 .237	.312 .188
54	4 3/4	5 1/4	4.750			
55	4 7/8	5 3/8	4.875			
56	5	5 1/2	5.000			
57	5 1/8	5 5/8	5.125			
58	5 1/4	5 3/4	5.250			
59	5 3/8	5 7/8	5.375			
60	5 1/2	6	5.500			
61	5 5/8	6 1/8	5.625			
62	5 3/4	6 1/4	5.750			
63	5 7/8	6 3/8	5.875			
64	6	6 1/2	6.000			
65	6 1/4	6 3/4	6.250			
66	6 1/2	7	6.500			
67	6 3/4	7 1/4	6.750			
68	7	7 1/2	7.000			
69	7 1/4	7 3/4	7.250			
70	7 1/2	8	7.500			
71	7 3/4	8 1/4	7.750			
72	8	8 1/2	8.000			
73	8 1/2	9	8.500			
74	9	9 1/2	9.000			
75	9 1/2	10	9.500			
76	10	10 1/2	10.000			
77	10 1/2	11	10.500			
78	11	11 1/2	11.000			
79	11 1/2	12	11.500			
80	12	12 1/2	12.000			
81	12 1/2	13	12.500			
82	13	13 1/2	13.000			
83	13 1/2	14	13.500			
84	14	14 1/2	14.000			
85	14 1/2	15	14.500			
86	15	15 1/2	15.000			
87	15 1/2	16	15.500			
88	4 1/2	5	4.500			

NOTES

1. Material: Teflon. MIL-R-8791, Latest Revision (Certification on request.)
2. Surfaces are smooth and free from irregularities.
3. Dimensions in inches.
4. Z gap dimensions to be met with ring over a mandrel to "A" diameter +.000, —.002.
5. Spiral coils flat and closed within .250 inch total in free position.
6. Dash numbers of these rings correspond to the dash numbers of AN6227 seals. Sizes and dimensions correspond to MS-28774





MS-28783

TEFLON BACK-UP RING

SPIRAL

SHAMBAN DWG. NO. SR-7234

Dash No.	Nominal Size I.D.	Nominal Size O.D.	Actual Size A Dia	Actual Size T	Actual Size W	Actual Size Z
01	1⅝	1⅞	1.625	.029 .025	.121 .119	.250 .093
02	1¾	2	1.750			
03	1⅞	2⅛	1.875			
04	2	2¼	2.000			
05	2⅛	2⅜	2.125			
06	2¼	2½	2.250			
07	2⅜	2⅝	2.375			
08	2½	2¾	2.500			
09	2⅝	2⅞	2.625			
10	2¾	3	2.750			
11	2⅞	3⅛	2.875			
12	3	3¼	3.000			
13	3⅛	3⅜	3.125			
14	3¼	3½	3.250			
15	3⅜	3⅝	3.375			
16	3½	3¾	3.500			
17	3⅝	3⅞	3.625			
18	3¾	4	3.750			
19	3⅞	4⅛	3.875			
20	4	4¼	4.000			
21	4½	4⅜	4.125			
22	4¼	4½	4.250			
23	4⅜	4⅝	4.375			
24	4½	4¾	4.500			
25	4⅝	4⅞	4.625			
26	4¾	5	4.750			

Dash No.	Nominal Size I.D.	Nominal Size O.D.	Actual Size A Dia	Actual Size T	Actual Size W	Actual Size Z
27	4⅞	5⅛	4.875	.029 .025	.121 .119	.250 .093
28	5	5¼	5.000			
29	5⅛	5⅜	5.125			
30	5¼	5½	5.250			
31	5⅜	5⅝	5.375			
32	5½	5¾	5.500			
33	5⅝	5⅞	5.625			
34	5¾	6	5.750			
35	5⅞	6⅛	5.875			
36	6	6¼	6.000			
37	6¼	6½	6.250			
38	6½	6¾	6.500			
39	6¾	7	6.750			
40	7	7¼	7.000			
41	7¼	7½	7.250			
42	7½	7¾	7.500			
43	7¾	8	7.750			
44	8	8¼	8.000			
45	8¼	8½	8.250			
46	8½	8¾	8.500			
47	8¾	9	8.750			
48	9	9¼	9.000			
49	9¼	9½	9.250			
50	9½	9¾	9.500			
51	9¾	10	9.750			
52	10	10¼	10.000			

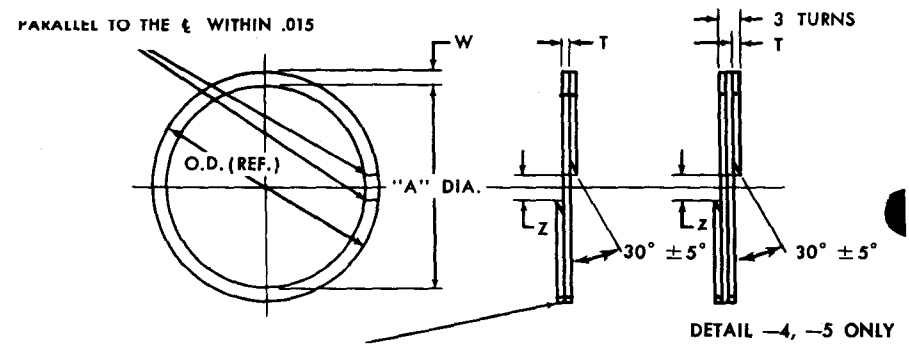
NOTES

1. Material: Teflon. MIL-R-8791, Latest Revision (Certification on request.)
2. Surfaces are smooth and free from irregularities.
3. Dimensions in inches.
4. Z gap dimensions to be met with ring over mandrel to "A" diameter +.000, —.002.
5. Spiral coils flat and closed within .250 inch total in free position.
6. Dash numbers of these rings correspond to the dash numbers of AN6230 seals. Sizes and dimensions correspond to MS-28783.

S-11109

TEFLON BACK-UP RING

SPIRAL



Dash No.	Nominal Size I.D.	Nominal Size O.D.	A Dia	Actual Size T	Actual Size W	Actual Size Z
04	5/64	3/16	.078	.019 .016	.054 .052	.062 .032
05	3/32	7/32	.094			
06	1/8	1/4	.125	.029 .025	.056 .054	
07	5/32	9/32	.156			
08	3/16	5/16	.188			
09	7/32	11/32	.219			
10	1/4	3/8	.250			
11	5/16	7/16	.312			
12	3/8	1/2	.375			
13	7/16	9/16	.437			.078 .032
14	1/2	5/8	.500			
15	9/16	11/16	.562			
16	5/8	3/4	.625			
17	11/16	13/16	.687			
18	3/4	7/8	.750			
19	13/16	15/16	.812			.093 .047
20	7/8	1	.875			
21	15/16	1 1/16	.937			
22	1	1 1/8	1.000			
23	1 1/16	1 3/16	1.062			
24	1 1/8	1 1/4	1.125			
25	1 3/16	1 5/16	1.187			
26	1 1/4	1 3/8	1.250			
27	1 5/16	1 7/16	1.312			
28	1 3/8	1 1/2	1.375			
110	3/8	9/16	.375		.089 .087	.078 .032
111	7/16	5/8	.438			
112	1/2	11/16	.500			
113	9/16	3/4	.562			
114	5/8	13/16	.625			
115	11/16	7/8	.687			
116	3/4	15/16	.750			
117	13/16	1	.812			.093 .047
118	7/8	1 1/16	.875			
119	15/16	1 1/8	.937			
120	1	1 3/16	1.000			
121	1 1/16	1 1/4	1.062			
122	1 1/8	1 5/16	1.125			
123	1 3/16	1 3/8	1.187			
124	1 1/4	1 7/16	1.250			
125	1 5/16	1 1/2	1.312			
126	1 3/8	1 9/16	1.375			
127	1 7/16	1 5/8	1.437			
128	1 1/2	1 11/16	1.500			.182 .062
129	1 9/16	1 3/4	1.562			
130	1 5/8	1 13/16	1.625			
131	1 11/16	1 7/8	1.687			
132	1 3/4	1 15/16	1.750			
133	1 13/16	2	1.812			
134	1 1/8	2 1/16	1.875			
135	1 15/16	2 1/8	1.937			
136	2	2 3/16	2.000			
137	2 1/16	2 1/4	2.062			
138	2 1/8	2 5/16	2.125			

Dash No.	Nominal Size I.D.	Nominal Size O.D.	A Dia	Actual Size T	Actual Size W	Actual Size Z
139	2 3/16	2 3/8	2.187	.029 .025	.089 .087	.182 .062
140	2 1/4	2 7/16	2.250			
141	2 5/16	2 1/2	2.312			
142	2 3/8	2 9/16	2.375			
143	2 7/16	2 5/8	2.437			
144	2 1/2	2 11/16	2.500			
145	2 9/16	2 3/4	2.562			
146	2 5/8	2 13/16	2.625			
147	2 11/16	2 7/8	2.687			
148	2 3/4	2 15/16	2.750			
149	2 13/16	3	2.812			
210	3/4	1	.750		.122 .120	.093 .047
211	13/16	1 1/16	.812			
212	7/8	1 1/8	.875			
213	15/16	1 3/16	.938			
214	1	1 1/4	1.000			
215	1 1/16	1 5/16	1.062			
216	1 1/8	1 3/8	1.125			
217	1 3/16	1 7/16	1.188			
218	1 1/4	1 1/2	1.250			
219	1 5/16	1 9/16	1.312			
220	1 3/8	1 5/8	1.375			
221	1 7/16	1 5/8	1.438			
222	1 1/2	1 3/4	1.500			
223	1 5/8	1 7/8	1.625		.121 .119	.250 .093
224	1 3/4	2	1.750			
225	1 7/8	2 1/8	1.875			
226	2	2 1/4	2.000			
227	2 1/8	2 3/8	2.125			
228	2 1/4	2 1/2	2.250			
229	2 3/8	2 5/8	2.375			
230	2 1/2	2 3/4	2.500			
231	2 5/8	2 7/8	2.625			
232	2 3/4	3	2.750			
233	2 7/8	3 1/8	2.875			
234	3	3 1/4	3.000			
235	3 1/8	3 3/8	3.125			
236	3 1/4	3 1/2	3.250			
237	3 3/8	3 5/8	3.375			
238	3 1/2	3 3/4	3.500			
239	3 5/8	3 7/8	3.625			
240	3 3/4	4	3.750			
241	3 7/8	4 1/8	3.875			
242	4	4 1/4	4.000			
243	4 1/8	4 3/8	4.125			
244	4 1/4	4 1/2	4.250			
245	4 3/8	4 5/8	4.375			
246	4 1/2	4 3/4	4.500			
247	4 5/8	4 7/8	4.625			
248	4 3/4	5	4.750			
249	4 7/8	5 1/8	4.875			
250	5	5 1/4	5.000			
251	5 1/8	5 3/8	5.125			
252	5 1/4	5 1/2	5.250			
253	5 3/8	5 5/8	5.375			
254	5 1/2	5 3/4	5.500			
255	5 5/8	5 7/8	5.625			
256	5 3/4	6	5.750			

Dash numbers of S-11109 spiral packings correspond to dash numbers of MS-28784.

S-11109

TEFLON BACK-UP RING / SPIRAL

Dash No.	Nominal Size I.D.	Nominal Size O.D.	A Dia	Actual Size T	Actual Size W	Actual Size Z
257	5⅞	6⅛	5.875	.029 .025	.121 .119	.250 .093
258	6	6¼	6.000			
259	6¼	6½	6.250			
260	6½	6¾	6.500			
261	6¾	7	6.750			
262	7	7¼	7.000			
263	7¼	7½	7.250			
264	7½	7¾	7.500			
265	7¾	8	7.750			
266	8	8¼	8.000			
267	8¼	8½	8.250			
268	8½	8¾	8.500			
269	8¾	9	8.750			
270	9	9¼	9.000			
271	9¼	9½	9.250			
272	9½	9¾	9.500			
273	9¾	10	9.750			
274	10	10¼	10.000			
325	1½	1⅞	1.500	.036 .031	.186 .184	.188 .062
326	1⅝	2	1.625			
327	1¾	2⅛	1.750			
328	1⅞	2¼	1.875			
329	2	2⅜	2.000			
330	2⅛	2½	2.125			
331	2¼	2⅝	2.250			
332	2⅜	2¾	2.375			
333	2½	2⅞	2.500			
334	2⅝	3	2.625			
335	2¾	3⅛	2.750			
336	2⅞	3¼	2.875			
337	3	3⅜	3.000			
338	3⅛	3½	3.125			.250 .093
339	3¼	3⅝	3.250			
340	3⅜	3¾	3.375			
341	3½	3⅞	3.500			
342	3⅝	4	3.625			
343	3¾	4⅛	3.750			
344	3⅞	4¼	3.875			
345	4	4⅜	4.000			

Dash No.	Nominal Size I.D.	Nominal Size O.D.	A Dia	Actual Size T	Actual Size W	Actual Size Z
346	4⅛	4½	4.125	.036 .031	.186 .184	.250 .093
347	4¼	4⅝	4.250			
348	4⅜	4¾	4.375			
349	4½	4⅞	4.500			
425	4½	5	4.500	.052 .046	.239 .237	.312 .188
426	4⅝	5⅛	4.625			
427	4¾	5¼	4.750			
428	4⅞	5⅜	4.875			
429	5	5½	5.000			
430	5⅛	5⅝	5.125			
431	5¼	5¾	5.250			
432	5⅜	5⅞	5.375			
433	5½	6	5.500			
434	5⅝	6⅛	5.625			
435	5¾	6¼	5.750			
436	5⅞	6⅜	5.875			
437	6	6½	6.000			
438	6¼	6¾	6.250			
439	6½	7	6.500			
440	6¾	7¼	6.750			
441	7	7½	7.000			
442	7¼	7¾	7.250			
443	7½	8	7.500			
444	7¾	8¼	7.750			
445	8	8½	8.000			
446	8½	9	8.500			
447	9	9½	9.000			
448	9½	10	9.500			
449	10	10½	10.000			
450	10½	11	10.500			
451	11	11½	11.000			
452	11½	12	11.500			
453	12	12½	12.000			
454	12½	13	12.500			
455	13	13½	13.000			
456	13½	14	13.500			
457	14	14½	14.000			
458	14½	15	14.500			
459	15	15½	15.000			
460	15½	16	15.500			

NOTES

1. Material: Teflon AMS-3651, Latest Revision.
2. Surfaces are smooth and free from irregularities.
3. All dimensions in inches.
4. Z gap dimensions to be met with ring over a mandrel to "A" diameter +.000, —.002.
5. Dash numbers of these rings correspond to the dash numbers of of ARP-568 uniform dash numbering system for "O" rings.
6. Spiral coils flat and closed within .250 inch total in free position.

S 11065 SCRAPER RING

SERIES S-11065 PISTON ROD SCRAPER RING FOR HYDRAULIC AND PNEUMATIC SERVICE

MATERIALS

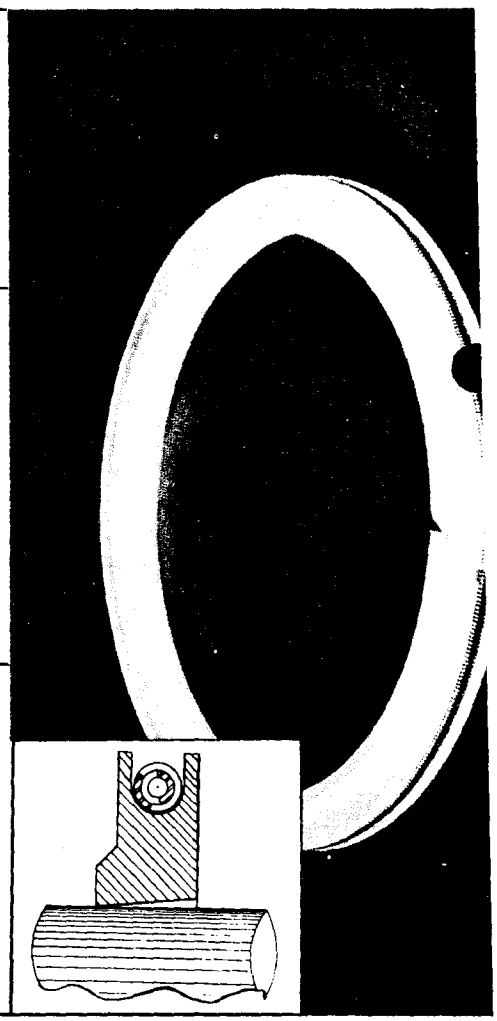
Shamban Piston Rod Scraper Rings made of Teflon will withstand acids, bases, solvents, oils, aromatic fuels, and corrosive liquids and gases. They will not shrink, swell, harden, dissolve, nor deteriorate with age. Also available in Nylon.

SUPERIOR PROPERTIES

Shamban scraper rings are spring-loaded to maintain firm contact on the rod, and absorb wear. They are responsive to rod misalignments, have less friction, and do not score the rod. Tough and extremely inert, Shamban scraper rings are flexible, long-lived, and self-adjusting.

USES AND APPLICATIONS

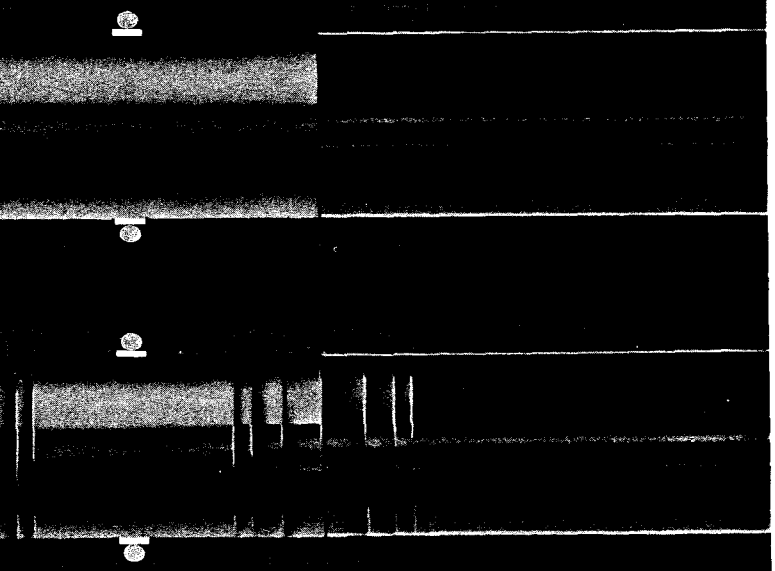
By keeping dirt and other foreign matter from vital O-ring seals, Shamban scraper rings assure seal reliability and extended packing life in aircraft and hydraulic retracting cylinders, shock struts, hydraulic actuators, control valves, and pneumatic equipment.



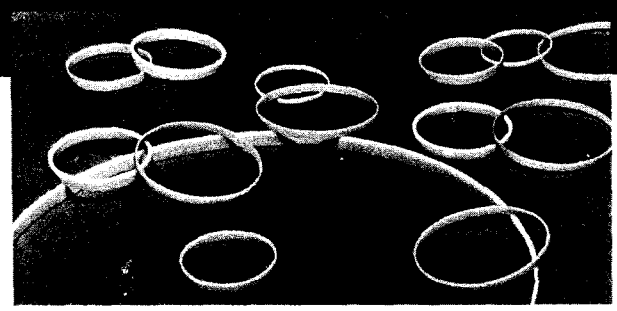
SIZES

Shamban scraper rings are available in 72 standard sizes for rods ranging from ½" O.D. to 13" O.D. Other sizes are available on request. S-11065 Scraper Ring dash numbers correspond to dash numbers of MS 28776 Scraper Ring. Also available as a solid ring with or without spring. Contact our engineering department for information about your specific requirements.

for lowest running friction and breakout friction



SHAMBAN TEFLON® GLȲD RINGS



eliminate O-ring wear, reduce breakout friction, insure smoothest actuation of pressure sensitive valves and cylinders

SHAMBAN Teflon GLȲD rings are designed to overcome the two problems most prevalent in the achievement of a good dynamic seal in pneumatic and hydraulic systems: *breakout and running friction,* and *seal service life.* The SHAMBAN GLYD ring, installed between the O-ring and the moving surface provides a chemically inert, nearly frictionless (.04 coef.) contact which eliminates torquing of the O-ring at initial actuation, and continues to keep running friction at an absolute minimum. The coefficients of breakout friction and running friction *become virtually the same.* Service life is increased many fold.

The advantages derived from use of the SHAMBAN GLȲD ring are manifold. Thc drastic reduction of friction loss increases the life cycle of the O-ring many times. The efficiency of the valve or cylinder is measurably increased; it becomes sensitive to actuating forces of more subtle intensity. Moreover, inertial drag and pressure fluctuations are eliminated. In systems used only intermittently, the usual damage to O-rings occurring when operation is begun is done away with, resulting in fewer equipment breakdowns and/or efficiency losses. An additional advantage of the SHAMBAN GLȲD ring is their broad temperature range from −65°F to +400°F, which qualifies them for nearly all services. The installation of SHAMBAN GLȲD rings sharply reduces maintenance costs, not only in terms of man hours but in system down-time as well. In pneumatic systems the need for injection lubrication is virtually eliminated. Moreover, SHAMBAN GLȲD rings, all constructed of Teflon, have an indefinite shelf life—simplifying parts inventory and assuring user of dependable quality rings at all times.

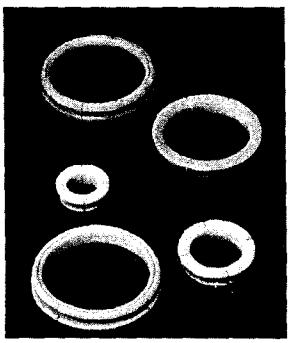
SHAMBAN I.D. and O.D. GLȲD *rings are available in a complete range of sizes, as shown in the selection charts included in this bulletin. They are designed to fit all standard O-ring sizes, and may be ordered through your Shamban distributor as a package including both O-ring and* GLȲD *ring.*

® Registered Du Pont trademark

for production quality and engineering excellence

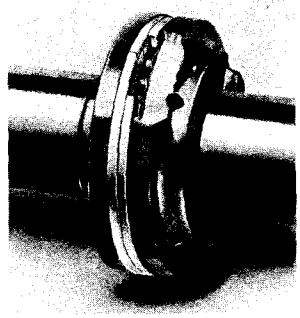
SPECIFY..SHAMBAN

GROMMETS — SHAMBAN Teflon or nylon grommets—one-piece snap-in and channel—are durable, snag-proof, non-abrasive and chemical resistant. They provide a secure, non-friction holding device that is easy to install; that prolongs the life of conduit; tubing, wire or cable. One piece snap-in type with 45° split or integral molding, channel type supplied in lengths specified by consumer.



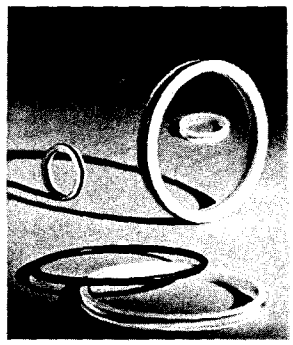
Shamban TEF-E-NUZ® PURE TEFLON PACKING replaces hundreds of different, obsolete, messy packings now used. Applies on rods . . . value stems . . . stuffing boxes of any size. Comes in 2 types: Type A, TEF-E-NUZ string; Type B. TEF-E-NUZ wool. Type A, can be used as a gasket replacement on grooved flanges. Conforms to irregular shapes. Equally efficient for hydraulic, pneumatic, vacuum packing use.

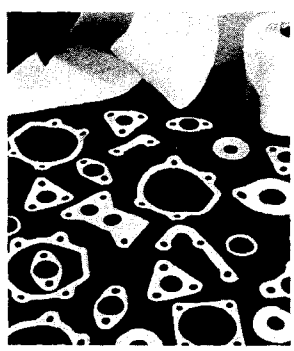
PISTON RING SEALS—The new Shamban Teflon Piston Ring Seal is a tough, chemically inert, corrosion-resistant seal that provides many advantages over all other types, particularly in hydraulic and pneumatic components. Compact, low-friction, —450°F to +550°F temperature range, outstanding dependability.



UNIVERSAL THREAD SEAL—Shamban Teflon Universal Ribbed Thread Seal provides a faster, cleaner, positive seal that reduces costs for connecting threaded pipe fittings or valves. It prevents electrolytic corrosion; eliminates sizing and galling; permits quick disassembling; and, is chemically inert. Shamban Thread Seal is thermally stable from —450°F to —500°F and is used in applications up to 30,000 P.S.I. and in vacuum systems.

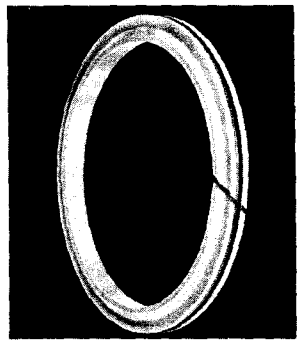
CHANNEL SEAL — Shamban Precision Teflon Channel Seal for Military and Industrial applications is designed to fit into back-up ring grooves as described in MIL Spec. P-5514 and industrial O-ring handbooks. Recommended for dynamic hydraulic and pneumatic sealing applications to reduce friction and to extend service life over conventional O-ring seals. It's interchangeable with conventional sealing methods.

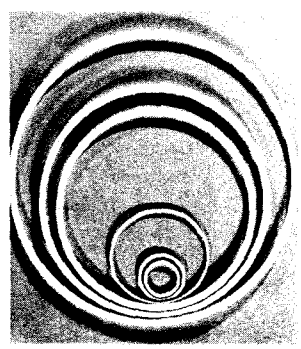




TEFLON AND TEFLON FELT SHEET & TAPE — Shamban Teflon Sheet and Tape is available in thicknesses from .005" and widths up to 48". Shamban 100% Teflon Felt is made from Teflon filament — either plain or impregnated with Teflon. Those Teflon gasket materials are being used in hydraulics, pneumatics, areo-space and petrochemical industries.

SCRAPER RINGS—Shamban Scraper and Wiper Rings, available in Teflon or Nylon, completely protect vital "O"-ring seals. Responsible to rod misalignments, the scraper rings are impervious to acids, bases, solvents, oil, fuels, gases and corrosive liquids. Will not score rod, self-adjusting, do not shrink, swell, harden, dissolve or deteriorate with age.





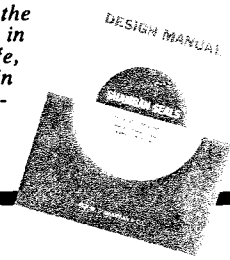
"O"-RINGS — Shamban "O"-Rings available in Teflon and Kel-F, are enjoying wide use as static and dynamic seals in hydraulic, pneumatic, chemical, and other fields of application.

THE SOLUTION TO YOUR ENGINEERED PLASTIC NEEDS

The briefly described products above represent only a portion of the extensive Shamban line. New products, new applications, and new uses for existing products are continually being developed by Shamban engineers. Imaginative design engineering, constantly improving production techniques, rigid quality control—all contributing factors to the Shamban reputation for product excellence.

WRITE FOR DESIGN MANUAL

Shamban Seal Design Manual describes the complete family of Shamban Seals for use in application requiring extended service life, reduced friction and seals that function in environmental extremes. It includes installation data as well as other Shamban products Description.



Stocked and Distributed by:

W. S. SHAMBAN & CO.

11617 W. Jefferson Blvd., Culver City, California
Phone: (Area Code 213) UP 0-6877 — TWX: 871-5220

2531 Bremer Drive, Fort Wayne, Indiana
Phone: (Area Code 219) 742-6491 — TWX: 241-2360

7015-A

Printed in U.S.A.

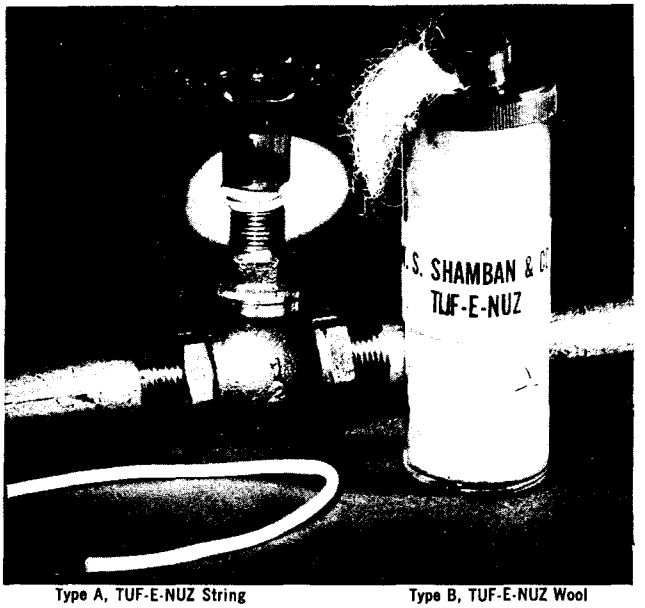
TUF-E-NUZ® PURE TEFLON PACKING

SHAMBAN

DATA SHEET #2301

TUF-E-NUZ® ..PURE TEFLON PACKING

Ensures Positive Sealing...Outlasts Other Packings... Replaces Hundreds of Different Packings In Use Today.



Type A, TUF-E-NUZ String Type B, TUF-E-NUZ Wool

APPLICATIONS

TUF-E-NUZ is a single packing that replaces hundreds of different obsolete, messy packings in use today. It quickly and easily applies on rods, valve stems and stuffing boxes of any size on original equipment, production, replacement, hydraulic, pneumatic and gas applications; and on any metal, plastic, carbon or other materials of equipment construction. In addition, TUF-E-NUZ Type A can be used as a gasket replacement on grooved flanges. And, it will conform to irregular shapes.

Made of pure Teflon TFE, TUF-E-NUZ provides all these exclusive Teflon features.

- **TUF-E-NUZ is white-glove clean**
- **TUF-E-NUZ will not contaminate processed products because of its built-in inertness to chemicals and solvents**
- **TUF-E-NUZ withstands temperature ranges of —450°F to +500°F.**
- **TUF-E-NUZ — because it is made of pure Teflon — ensures positive sealing**
- **TUF-E-NUZ outlasts packings made of all other materials.**

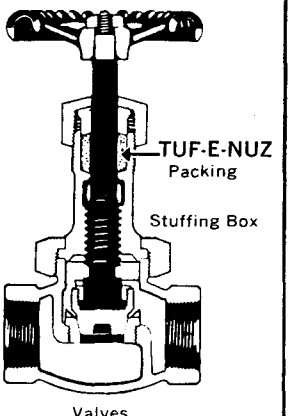
In addition to its Teflon features, unique TUF-E-NUZ has been made into a completely self-forming packing. For customer convenience, TUF-E-NUZ is available in Type A, 1/16" and 1/8" TUF-E-NUZ string; and Type B, TUF-E-NUZ wool.

USE TUF-E-NUZ IN SUCH INDUSTRIES AS . . .

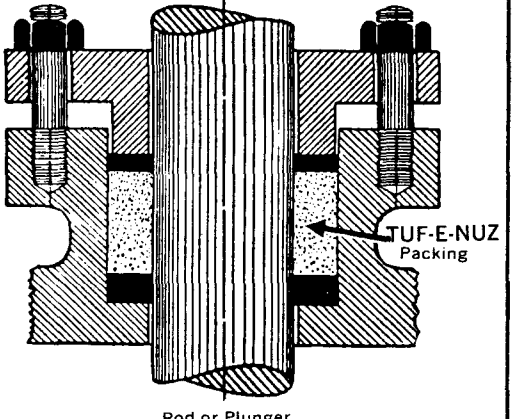
- Food Processing
- Dairy
- Steam and Refrigeration
- Pharmaceutical
- Chemical
- Aerospace
- Petroleum and Refineries
- General Industrial Uses

SIMPLE DIRECTIONS

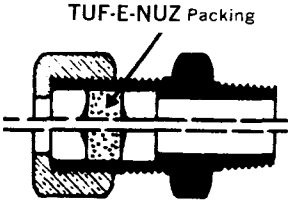
1. Wind the string around and push into well or recess. In the case of TUF-E-NUZ wool, just push the packing into the opening.
2. Tighten gland. Repeat until box or well is full. That's all there is to it.
3. A Teflon retaining washer (Bull-Ring) may be required if clearances are excessive.



Valves



Rod or Plunger



Thermostat Capillary Wells

SHAMBAN

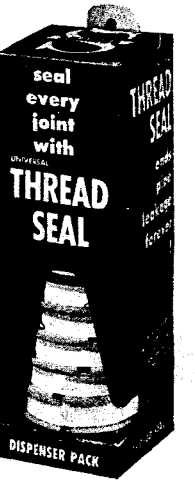
UNIVERSAL THREAD SEAL

The pipe dope and thread sealant that works better . . . does more . . . saves time and money on critical piping needs.

TEFLON Thread Seal . . . now in crush-proof, color-coded, easy-to-use plastic spools.

Faster, Cleaner, Positive Sealing . . . New, Low-Cost Way of Connecting Threaded Pipe Fittings or Valves

- **Provides leakproof joints**
- **Prevents electrolytic corrosion**
- **Cuts pipe assembly time**
- **Permits quick disassembly and rejoining**
- **Eliminates seizing and galling**
- **Furnishes chemical inertness**
- **Made of Shamban quality, 100% pure TEFLON-TFE in ribbon form**



UTS is available in ¼", ½" and 1" widths.

Spools come in 3 economy sizes—100", 260" and 520"

APPLICATIONS

Universal Thread Seal works best on **all** threaded pipe including steel, stainless steel, copper, plastic, brass, galvanized and aluminum. It is the cleanest, easiest, surest way of connecting threaded pipe, fittings or valves. UTS eliminates rework service calls . . . gives you considerable savings in labor and materials.

For example, **in high or low pressure sealing applications,** use UTS on standard water pipe, steam lines, hydraulic and pneumatic equipment, air pumps and compressors, compressed gas equipment and nitrogen, oxygen and freon lines. UTS is being used successfully in applications up to 30,000 PSI. And, this Shamban teflon thread seal works equally well on vacuum applications.

For **high or low temperature sealing,** UTS operates efficiently on cooling, heating, refrigeration and cryogenics systems, steam lines, oil refinery piping, aircraft fittings, missile bolts and rocket and missile systems. UTS is thermally stable from −450°F. to + 550° F.

UTS—with its Shamban quality Teflon—is ideal for **gas or liquid lines** in petrochemicals, fuels and food processing, pharmaceuticals, and corrosives such as aqua regia, fuming nitric acid, hydrofluoric acid, caustic and solvents.

In **strong solvent or steam service,** tests by one of the nation's largest corporations proved the economy of Teflon pipe dope since it stopped leakage on threaded fittings. Elimination of leakage problems at threaded joints do away with the need for flanged fittings **that cost 3 times as much.** With UTS, you save money and time.

Frequent disassembly is no problem since UTS prevents galling, seizing or corrosion, permitting disassembly without high cost or waste.

Use it on farm machinery, mining equipment, conveyors, fabricated structures, plastic and aluminum piping, stainless steel lines, fuel systems, cylinder head studs, engine bolts, heating and air conditioning systems, and threaded electrical connections.

In fact, UTS can be used on anything that has a thread . . . not just pipes, but also studs, bolts, drum bungs, etc. Such applications are hydraulic cylinders, head bolts, swivel joint seals, valve stem packing, water meter connections, gas lines, gauges, instruments, electrical conduit and as an overwrap for braided packings.

To use: 1. Clean threads thoroughly, 2. Wrap threads overlapping one-half turn, 3. Press firmly into threads.

W. S. SHAMBAN & CO.

11617 W. Jefferson Blvd., Culver City, California 90232
Phone: (Area Code 213) UP 0-6877 — TWX: 871-5220

2531 Bremer Drive, Fort Wayne, Indiana 46801
Phone: (Area Code 219) 742-6491 — TWX: 241-2360

Stocked and Distributed By

Bulletin Data Sheet 2201

Printed in U.S.A.

Giant TFE moldings

SEVERAL advantages are claimed for a new process for molding large size fluorocarbon parts.

1) Cost is said to be one-quarter to one-half that of equivalent size parts machined from billets, and about two-thirds that of compression molded parts of similar dimensions.

2) Molded parts can have densities ranging from 1.6 to 2.2 (specific gravity).

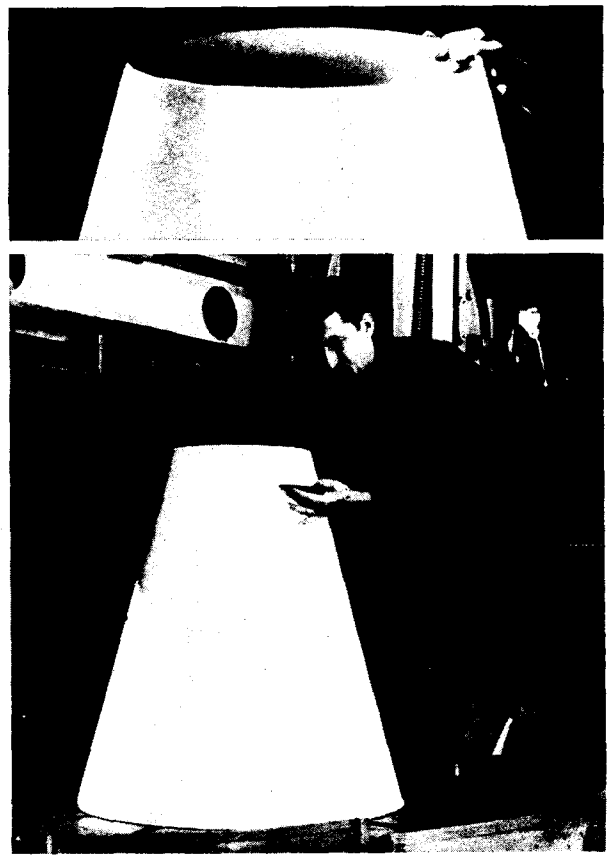
3) Wall thickness can range from a few mils up to one inch.

4) The finished product has relatively smooth surfaces throughout, and only minor post-mold finishing operations are required.

5) Parts can be open at one or both ends or fully closed.

No details on the process have been released. However, industry spokesmen suspect that the fluorocarbon powder is first made into a paste (using a molding aid such as naphtha or a similar material) to permit the particles to flow over each other, charged into a mold where it is squeezed to final shape, and then most of the molding aid removed. It is next sintered to produce the final product. During sintering the remainder of the molding aid is evaporated, leaving a pure fluorocarbon part. Since the removal of the molding aid will leave some void spaces, the part can be compressed a second time to make it denser, or left as originally sintered.

Although the process is still in its infancy and production limited, a number of markets for these giant moldings are visualized.



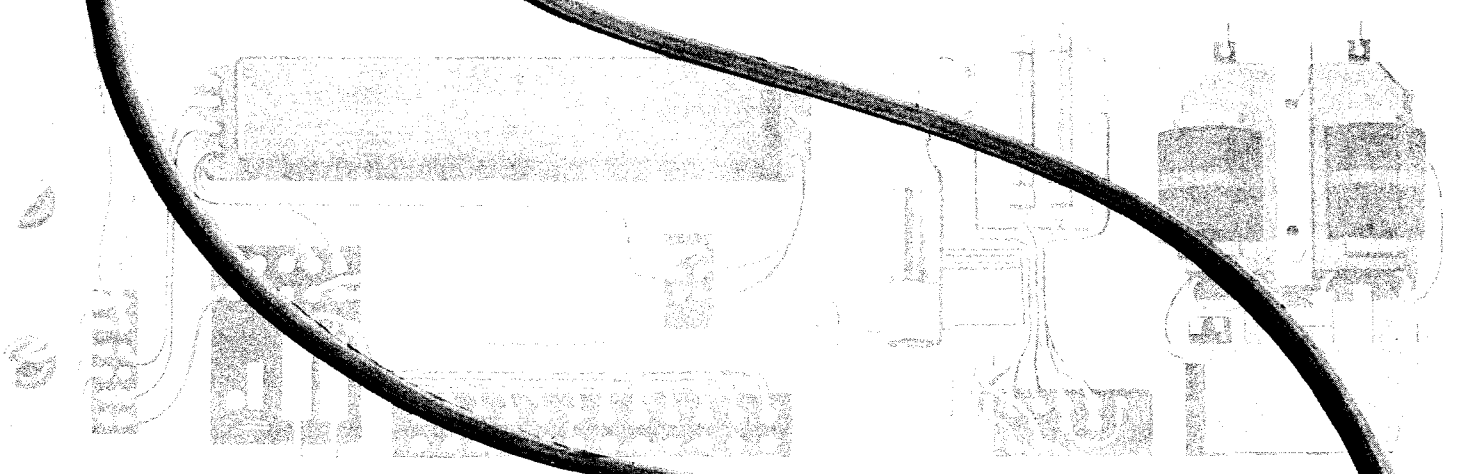
LARGE MOLDED TFE fluorocarbon heat shield for aerospace industry is checked for dimensional accuracy on machine on which it was produced. Note extreme thinness of wall section shown in photo above. (Photos, Haveg Industries Inc.)

- Nose cones for aerospace uses. In this application, the low coefficient of friction of the material is claimed to reduce heat build-up during reentry while providing high insulation to subsurface materials. At the same time, the lower weight of this type of cone lessens rocket fuel requirements.
- Bladder type liquid containers. Prime advantage of fluorocarbon bladders is their good chemical resistance and their ability to remain flexible at cryogenic (very low) temperatures.
- Industrial applications. Retorts, tanks, reactors, and pumps for handling corrosive liquids between 400 and 500° F. will now be available in large sizes. One possibility is a one-piece molded tank car liner for the transportation of corrosive chemicals. Only a thin wall is required, which is said to make this system competitive with other current approaches.

Large size fluorocarbon parts are, of course, not new; quite a few have been produced on the West Coast for military requirements. The new development is claimed to be more economical.

EARLIER LARGE fluorocarbon molding for aerospace application. Wall thickness is greater than for cone shown at upper right. According to manufacturer, production of this item is accomplished without the use of a molding aid. (Photo, W. S. Shamban & Co.)

Credits: Process developed by Haveg Industries Inc., Wilmington, Del., using Teflon TFE resin by Du Pont. Large moldings also produced by W. S. Shamban & Co., Culver City, Calif., using its own process.—**End**



SHAMBAN

TEFLON SPAGHETTI TUBING
STANDARD, THINWALL
AND MICROTHIN

W. S. SHAMBAN & CO.

NOW! THE INDUSTRY'S MOST COMPLETE LINE OF

Specify . . .

S-16882

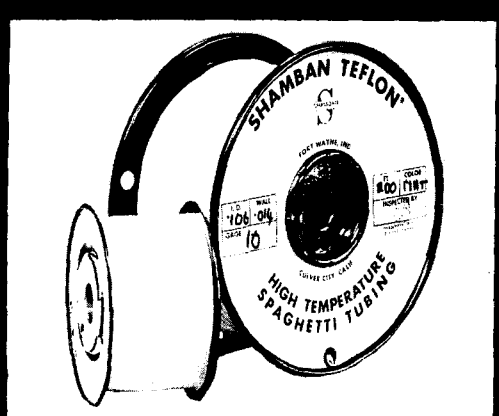
3 OUTSTANDING TEFLON SPAGHETTI TUBINGS TO FIT YOUR ENTIRE RANGE OF REQUIREMENTS

The value of Teflon spaghetti tubing in electronics manufacture and assembly has long been recognized. Its inherent polytetrafluorethylene properties, plus its flexibility and ease of handling, have established it as the best and most popular high temperature insulating sheathing used.

However, until now there has not been available a complete range of wall thickness with the necessary accuracy and consistency of quality. Shamban, as one of the leading processors of the country, now offers a complete line of tubing in three separate wall thickness sizes: STANDARD (.010 to .020), THINWALL (.008 to .015) and MICROTHIN (.006 to .012).

With this breadth of availability, the user of Teflon spaghetti tubing can get **exactly the tubing called for by the application.** No more will it be necessary to take the closest thickness available; the buyer can now be selective to the point of optimum specification.

This tubing range will reflect in weight savings, in critical space savings and of course in definite cost savings. None of the tubing is intended to obsolete or take the place of the other; each has its use to enable you to use **the right tubing for each application.**



Shamban STANDARD Teflon spaghetti tubing is unaffected by a wide range of ambient temperatures, pressure, altitudes and humidity. It is moisture and abrasion resistant at high and low temperatures, completely serviceable from −450°F to +550°F — more than 212°F above other spaghetti materials. Teflon, a Class C dielectric, has excellent dielectric strength (500 to 1000 volts/mil.), the lowest dielectric constant (2.0) and the lowest dissipation factor (.0002) of any solid dielectric. With a good power factor, there is no electrical property change from 77°F to 550°F temperature, or frequencies from 60 cycle to 100 mc.

Shamban STANDARD Teflon spaghetti tubing does not become embrittled due to aging under environmental temperatures, and its heat resistance permits use of the latest, fastest soldering techniques for accelerated assembly. Available in natural and standard N.E.M.A. colors to M.I. Std. 104, in sizes #30 through #0.
Special sizes on order. *To order list AWG, SIZE and* Shamban STANDARD conforms to specifications AMS 3653 (latest revision) and MIL-I-22129 .
SPECIFY SHAMBAN STANDARD.

S-16882

STANDARD WALL TEFLON SPAGHETTI SIZES

AWG SIZE	I.D. DIAMETER MINIMUM	I.D. DIAMETER MAXIMUM	WALL THICKNESS	TOL. ±
30	.010	.014	.010	.002
28	.013	.017	.010	.002
26	.016	.020	.010	.002
24	.020	.026	.012	.003
23	.023	.030	.012	.003
22	.026	.032	.012	.003
21	.029	.036	.012	.003
20	.032	.039	.016	.003
19	.036	.044	.016	.003
18	.040	.049	.016	.003
17	.045	.054	.016	.003
16	.051	.061	.016	.003
15	.057	.067	.016	.003
14	.064	.072	.016	.003
13	.072	.082	.016	.003
12	.081	.089	.016	.003
11	.091	.101	.016	.003
10	.102	.112	.016	.003
9	.114	.124	.020	.004
8	.129	.141	.020	.004
7	.144	.158	.020	.004
6	.162	.178	.020	.004
5	.182	.198	.020	.004
4	.204	.224	.020	.004
3	.229	.249	.020	.004
2	.258	.278	.020	.004
1	.289	.311	.020	.004
0	.325	.347	.020	.004

QUALITY TEFLON SPAGHETTI TUBING

Specify . . .

S-17014

SHAMBAN THINWALL

Shamban THINWALL tubing fills the size gap between the industry STANDARD (AMS 3653 latest revision) and Shamban Microthin (AMS 3654). It is intended to allow specification of the most economical as well as the most effective spaghetti size. In applications where heretofore Microthin was used simply because standard was too heavy, for example, Shamban THINWALL may fit in perfectly and at a considerable saving in cost. Thinwall tubing naturally enjoys the same physical properties as the other two spaghettis, offering all the advantages of Teflon. It has high dielectric strength, it is chemically inert, it is heat resistant (from − 450° to + 550°F.), it is tough and flexible, it has an extremely low coefficient of friction, it has zero moisture absorbtion and is highly resistant to weather exposure.

Shamban Thinwall, in sizes #30 through #0, is available in natural and N.E.M.A. colors, to Mil. Std. 104. Conforms to AMS 3655.
Special sizes on order. *To order list AWG, SIZE and* SPECIFY SHAMBAN THINWALL.

S-17014

THIN WALL TEFLON SPAGHETTI SIZES

AWG SIZE	INSIDE DIAMETER MINIMUM	INSIDE DIAMETER MAXIMUM	WALL	TOL. ±
30	.010	.017	.008	.002
28	.013	.020	.009	.002
26	.016	.023	.010	.002
24	.020	.026	.010	.002
22	.025	.032	.010	.002
20	.032	.039	.012	.003
19	.036	.044	.012	.003
18	.040	.048	.012	.003
17	.045	.054	.012	.003
16	.051	.061	.012	.003
15	.057	.067	.012	.003
14	.064	.072	.012	.003
13	.072	.080	.012	.003
12	.081	.089	.012	.003
11	.091	.101	.012	.003
10	.102	.112	.012	.003
9	.114	.124	.015	.003
8	.129	.141	.015	.003
7	.144	.158	.015	.003
6	.162	.176	.015	.003
5	.182	.198	.015	.003
4	.204	.224	.015	.003
3	.229	.249	.015	.003
2	.258	.278	.015	.003
1	.289	.311	.015	.003
0	.325	.347	.015	.003

Specify . . .

S-16879

SHAMBAN MICROTHIN®

Shamban MICROTHIN Spaghetti Tubing possesses the same properties, dielectric strength and constant as the STANDARD, with the exception of total voltage breakdown which, of course, is lower; however, most Teflon spaghetti installations do not require voltages above Microthin's capacity. For example, sizes #14 through #26 will insulate in excess of 5500 volts, sizes #1 through #5 in excess of 11,000 volts. Microthin, as previously stated, is approximately one half the weight and wall thickness of Standard; consequently, it is vastly more flexible. These characteristics, plus those of all Teflon tubing (including high heat-resistance which permits use of fast new soldering techniques) make it highly advantageous in the design and construction of lighter aircraft and missile components.
The new Microthin, when in its natural color, is essentially transparent.

Microthin in sizes #30 through #0, is available in natural and N.E.M.A. colors, to Mil. Std. 104 conforms to AMS 3654.
Special sizes on order. *To order list AWG, SIZE and* SPECIFY SHAMBAN MICROTHIN.

S-16879

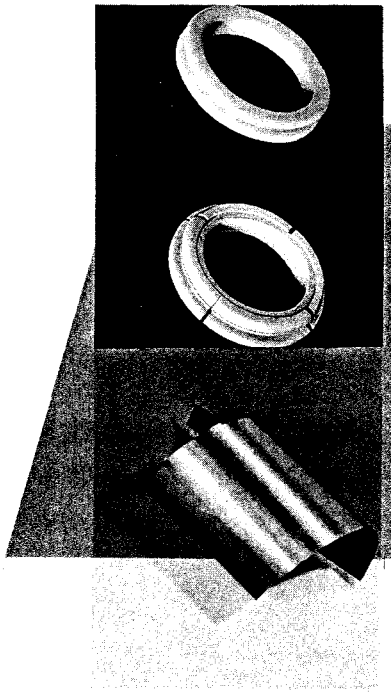
MICROTHIN® TEFLON SPAGHETTI SIZES

AWG SIZE	INSIDE DIAMETER MINIMUM	INSIDE DIAMETER MAXIMUM	WALL	TOL. ±
30	.010	.015	.006	.002
28	.012	.017	.006	.002
26	.016	.021	.006	.002
24	.020	.025	.006	.002
22	.025	.031	.006	.002
20	.032	.038	.006	.002
19	.036	.043	.006	.002
18	.040	.046	.006	.002
17	.045	.054	.006	.002
16	.051	.057	.006	.002
15	.057	.063	.006	.002
14	.064	.072	.008	.002
13	.072	.080	.008	.002
12	.081	.089	.008	.002
11	.091	.099	.008	.002
10	.102	.110	.008	.002
9	.114	.122	.008	.002
8	.129	.139	.008	.002
7	.144	.154	.008	.002
6	.162	.172	.010	.003
5	.182	.192	.010	.003
4	.204	.214	.010	.003
3	.229	.241	.010	.003
2	.258	.270	.010	.003
1	.289	.301	.010	.003
0	.325	.337	.012	.003

for production quality and engineering excellence

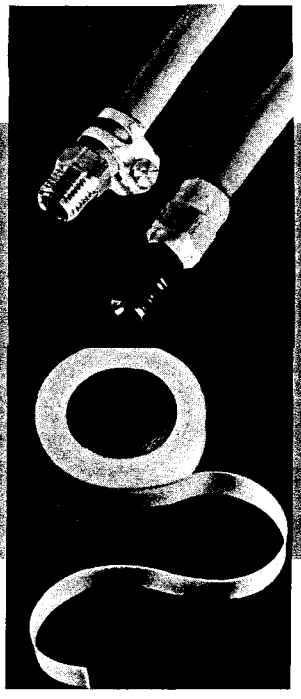
SPECIFY SHAMBAN

GROMMETS — **SHAMBAN** Teflon or nylon grommets—one-piece snap-in and channel—are durable, snag-proof, non-abrasive and chemical resistant. They provide a secure, non-friction holding device that is easy to install; that prolongs the life of conduit, tubing, wire or cable. One piece snap-in type with 45° split or integral molding, channel type supplied in lengths specified by consumer.



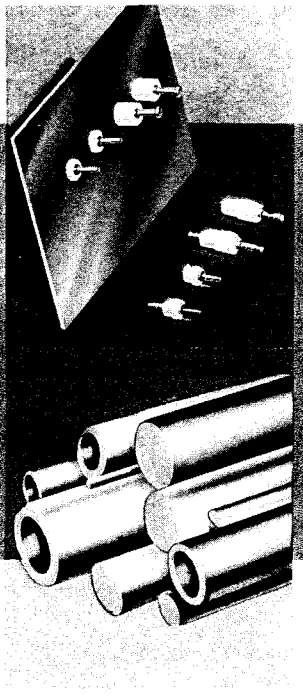
KOP-R-KLAD printed circuit laminate, by Shamban, offers the highest peel strength, best performance laminate on the market. It is available in 12 different styles, offering the ideal material for each application. For complete information, request bulletin.

SAFE-T-LINE — For insulating and resistance to heavy abrasion. Safe-T-Lines Teflon liner with Neoprene jacket is an excellent flexible conduit for electrical applications.



TEFLON TAPE—Perfect for wrap-on electrical insulation, on-the-spot insulating and many other applications. Available in varied widths and thicknesses in rolls or strips. For complete information request bulletin.

STAND-OFF and FEED-THRU INSULATOR—Absolute insulation for circuitry tiepoints is the guarantee of Shamban's Teflon Stand-off and Feed-thru insulators. A temperature range of —450°F to +550°F, resistance to high-frequency and voltage breakdown, and ability to withstand extreme pressures and humidities qualify this product for service in radar, television and all electronics.



RAW STOCK—Shamban Tape, Sheet, Rod, Tubing, Film, Extruded and Molded raw stock parts are available to the manufacturer for his own machining in a variety of sizes and fluorocarbon materials. Unchanging quality of material and manufacture plus delivery dependability make Shamban Raw Stock the industry's finest.

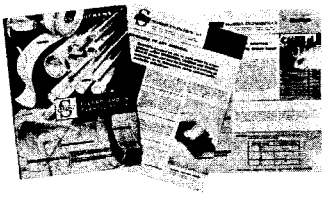
"BONDAID" ETCHANT treats the fluorocarbon so that a carbonaceous film is created on the surface. Since **"BONDAID" ETCHANT** is easy to use, selected sections or all of the fluorocarbon material may be treated. The carbonaceous film so created is now the anchor for any applicable adhesive. The adhesive employed is selected based on the end use: thus by use of **"BONDAID" ETCHANT** any fluorocarbon can be bonded to metals, plastics, glass, ceramics, textiles, wood, rubber, etc.

UNIVERSAL THREAD SEAL—**Shamban Teflon Universal Ribbed Thread Seal provides a faster, cleaner, positive seal that reduces costs for connecting threaded pipe fittings or valves. It prevents electrolytic corrosion; eliminates sizing and galling; permits quick disassembling; and, is chemically inert. Shamban Thread Seal is thermally stable from —450°F to —500°F**

THE SOLUTION TO YOUR EVERY FLUOROCARBON NEED

The briefly described products above represent only a portion of the extensive Shamban line. New products, new applications, and new uses for existing products are continually being developed by Shamban engineers. Imaginative design engineering, constantly improving production techniques, rigid quality control—all contributing factors to the Shamban reputation for product excellence.

For a complete description of the properties, characteristics and applications of the above products, contact your Shamban distributor or either of the Shamban factories, or write for comprehensive, illustrated brochure.



ADVANCED TECHNOLOGY PLASTICS • ENGINEERS • MANUFACTURERS • PROCESSORS • SHAMBAN

W. S. SHAMBAN & CO.

11617 W. Jefferson Blvd., Culver City, California 90232
Phone: (Area Code 213) UP 0-6877 — TWX: 871-5220

2531 Bremer Drive, Fort Wayne, Indiana 46801
Phone: (Area Code 219) 742-6491 — TWX: 241-2360

Stocked and Distributed By

Bulletin No. 71225

Printed in U.S.A.

TEFLON-IMPREGNATED TEFLON FIBER FELT

NO. S-16810

FOR STATIC OR MOVING LOW PRESSURE SEALING UNDER EXTREME PHYSICAL AND CHEMICAL ENVIRONMENTS

HIGH RESILIENCY

Teflon felt (Armalon*) acquires remarkable new properties when impregnated with Teflon resin. Compared to standard Teflon (which is non-resilient) the new material is strongly recommended for production of resilient gaskets for use in severe physical and chemical environments where other gasket materials fail. According to laboratory tests, gaskets made of Teflon impregnated felt seal at lower pressures than any other competitive materials except soft rubber.

*Registered Du Pont Trademark

WIDE APPLICATION

The unique properties of the Teflon-impregnated Teflon felt enable it to be used in sealing and gasketing under extremes of temperatures, corrosive chemicals, solvents, fuels, and lubricants in a variety of combinations. Specific applications include use as gaskets or seals in aircraft and missiles, or as gasketing in chemical plants where both extreme temperatures and corrosive chemicals are involved. The material is particularly adaptable to use with glass and glass-lined equipment, because it will conform to uneven flanges at low pressures. The hazard of damage to the equipment or extrusion of the gasket material from unusually high pressures is minimized.

RESISTS HEAT, COLD AND CORROSIVE CHEMICALS

Relatively soft and pliable with low coefficient of friction, the felt is unaffected by water or any of the common fuels, acids, bases, lubricants, hydraulic fluids or solvents. It withstands ambient temperatures from minus 320° F. to plus 550° F. After seven days exposure at 550° F., these materials exhibit essentially no change in strength or compressibility and a weight loss of only 2.5%. Samples have been subjected to severe impacts at —320° F. (temperature of liquid nitrogen) without cracking or other noticeable effect.

3 SIZES AVAILABLE

Shamban's Teflon-impregnated Teflon felt is available in thickness of 1/16", 1/8" and 1/4" in three sizes: quarter sheets 15" x 13"; half-sheets 15" x 26" or 13" x 30"; and full sheets 26" x 30".

PHYSICAL PROPERTIES

QUALITY DESIGNATION	SEC-63	SEC-125	SEC-250
Nominal Thickness (in.)	.063	0.125	0.250
Weight — ozs./sq. yd.	65	140	300
Tensile Strength — psi	850	1100	1675
Deformation Under Load (ASTM D-621-51 Method A-400 psi)	4.2%	4.8%	4.3%
Elongation (ASTM D-638-52 Modified)	45%	50%	60%
Coefficient of Linear Thermal Expansion —° F. (Fed. Spec. L-P 406B, Method #2032)	4×10^{-5}	4×10^{-5}	4×10^{-5}

When ordering Shamban Teflon-impregnated Teflon Fiber Felt, kindly specify by stock number and quality designation in addition to sheet sizes and amount desired. Example: S-16810; SEC-125: 13" x 30"; 85 sheets. For complete price and delivery information call or contact the authorized Shamban distributor listed below or contact factory direct.

W. S. SHAMBAN & CO.

11617 W. Jefferson Blvd., Culver City, California
Phone: (Area Code 213) 397-2195 — TWX: 871-5220

2531 Bremer Drive, Fort Wayne, Indiana
Phone: (Area Code 219) 742-6491 — TWX: 241-2360

DISTRIBUTOR

TEFLON FIBER FELT (NOT IMPREGNATED)

NO. S-16818

FOR USE AS FILTERS, GASKETS AND LAMINATED CONSTRUCTION UNDER SEVERE ENVIRONMENTAL CONDITIONS

COMPOSITION

Teflon® Fiber Felt is made of soft, pliable, porous Teflon fibers intermeshed in such a way as to provide several unique and desirable characteristics unobtainable in other felts. Teflon felts have extremely low coefficient of friction, won't absorb water, won't adhere to any known materials. They can be used at temperatures up to 400F., and under certain conditions, up to 550F.

USES

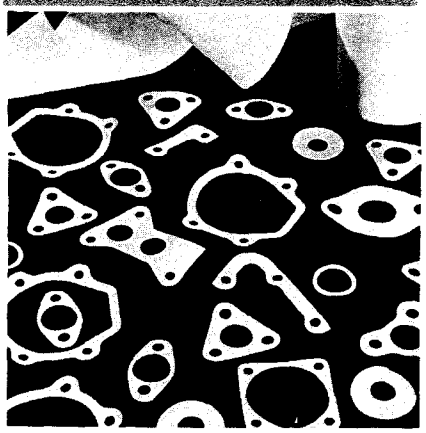
Shamban Teflon Fiber Felt's unique properties make it useful as a filter over a wide temperature range of strong acids, strong bases, almost all known solvents, liquid fuels, lubricants, hydraulic fluids and for removal of suspended particles from hot corrosive gases. The felts are also useful under corrosive conditions as bases for new types of heat and chemical resistant gaskets, expulsion bladder, valve stem packing, etc.

STANDS UP UNDER ONSLAUGHT OF HEAT AND CORROSIVE CHEMICALS

Teflon felt withstands attack by strong acids and bases and can be boiled for extended periods in aqua regia, fuming sulphuric acid, fuming nitric acid or caustic soda without appreciable tensile strength loss. Laboratory tests reveal that after seven days exposure at 550F., the material exhibits essentially no change in tensile strength and a weight loss of only 2.5%. As an example of chemical resistance, after seven days exposure in red fuming nitric acid, Teflon felt has essentially no loss of tensile strength and weight loss of only 0.7%.

® Registered Du Pont trademark

AVAILABILITY



Shamban Teflon Fiber Felt is immediately available in sizes as large as 24" wide and 4 yds. long. Thickness ranges between .060 in. to 500 in. For other thicknesses contact the factory.

PHYSICAL PROPERTIES

QUALITY DESIGNATION	SEC-6X		
Nominal thickness, in.	.060		
Weight, oz./sq. yd.	6.2		
Tensile strength, psi	400		
Elongation — per cent	140		
Bursting strength, lbs.	200		
Gurley Porosity — sec.*	2.1		

*Ball method — ASTM D 726-58

**Seconds required for passage of 100 cc of air through 1 sq. in. of material

HOW TO ORDER

When ordering Shamban Teflon Fiber Felt, kindly specify by stock number and quality designation in addition to size and number of pieces. Example: S-16818; SEC-6X3; 12" x 72"; 3 pieces. For complete price and delivery information, call or contact the authorized Shamban distributor listed below or contact the factory direct.

W. S. SHAMBAN & CO.

11617 W. Jefferson Blvd., Culver City, California
Phone: (Area Code 213) UP 0-6877 — TWX: 871-5220

2531 Bremer Drive, Fort Wayne, Indiana
Phone: (Area Code 219) 742-6491 — TWX: 241-2360

DISTRIBUTOR

TEFLON COATED GLASS FABRICS

NO. S-16811/-6

TEFLON-IMPREGNATED WOVEN GLASS THAT NOTHING STICKS TO

IDEAL FOR:

Cable Wrapping

Conveyor Belts

Insulation

Printed Circuitry

Food Processing

Packaging

Materials Handling

Diaphragms

Industrial Liners

Anti-Adhesive and Non-Sticky Requirements

. . . under severe environmental extremes**

CAUTION:

This material is inert below 390°F. and may be used in contact with edible substances at temperatures less than this. Before being placed in service with foodstuffs, the Teflon surface should receive a single but thorough washing with a solution of sodium carbonate, sodium bicarbonate or other harmless alkali.

USES

ELECTRICAL — The material provides efficient and highly reliable electrical insulation in excess of Class H requirements of 180°C. (or 200°C. U.S. Navy) up to 2300 volts. It is ideal for use as motor slot liners, cable wrappings, support pad insulation, armature spiders, phase separators, segments and slot stick and commutator insulation. It also provides efficient wrappings for low tension aircraft, radio hook-up and lead and thermocouple wires and cables. Other uses include relay, condenser and capacitor insulation, electrical panel boards, as a base for printed circuits, in resistors and rheostats, and as other structural parts.

NON-ELECTRICAL — The material's chemical and solvent resistance, high and low temperature characteristics, and anti-adhesive or anti-friction properties make it suitable for many diversified applications in aircraft, chemicals, food processing, packaging paper, plastics, printing, rubber, textile and other industries. Conveyor belts of the material are useful in baking, candy, and food and other industries where sanitation and ease of release are important. The material is ideal for non-sticking covers on heat sealing bars of packaging equipment, handsealing irons and sealing plates that reduce down-time and eliminate torn film due to sticking. Other uses: covers for can or drum driers which eliminate build-up latices, inks or impregnants in the textile finishing, paper treating and other industries, diaphragms or liners for use in hydraulic and industrial applications where heat resistance and/or chemical resistance is required.

ADVANTAGES

Teflon-coated glass fabrics (Armalon*) provide unique combinations of advantages that make the material extremely useful in applications requiring heat resistance, mechanical strength, extreme toughness and low flow under heat and pressure. The material is chemically inert, creating a protective coating against corrosion. Other advantages include excellent electrical properties over a wide range of temperatures and frequencies, and outstanding anti-adhesive and non-sticky qualities. Smooth to the touch, the fabrics vary in color from grey to light brown. Teflon-coated glass fabrics are also available coated one side only to allow adhesion to various materials using conventional adhesives.

OUTSTANDING PROPERTIES

ELECTRICAL — Power factor is less than .0125% from 60 to 1 million cycles between temperatures of minus 300°F. to plus 700°F. At room temperature, volume resistivity is greater than 10^{15} ohm-cm, and surface resistivity drops to 10^{13} ohms at 100% relative humidity. The material has unusual resistance to arcing and degradation at extremely elevated temperatures.

MECHANICAL — The glass fabric reinforcement together with the tough properties of Teflon result in structures of excellent strength and resistance to abrasion. The surface is smooth and exhibits remarkable anti-friction qualities. Flow under combined heat and pressure is very low, while flow under compressive load is zero. The material remains pliable at temperatures lower than —100°F., and remains inert up to 390°F. Simple forming can be accomplished with little difficulty, although for more complicated shapes, forming must take place at nearly 700°F. and 1,000 lbs. per sq. in. Flexibility of the fabrics is retained even after prolonged exposure at high or low temperatures.

CHEMICAL — There is no known solvent for Teflon. It is unaffected by all known chemical agents — excepting molten alkali metals and, under special conditions, fluorine gas and chlorine trifluoride. No other known chemical has any effect on it, even boiling aqua regia. Teflon coated glass fabrics are likewise unaffected, except at cut edges or through permeation, when exposed to chemicals that attack glass.

*Trademark for Du Pont Teflon Coated Glass Fabric

**Heat, cold, corrosion, tensile and compressibility factors. See reverse side of sheet for guide to electrical, mechanical and miscellaneous properties.

PROPERTIES

TEFLON COATED GLASS FABRICS—SINGLE PLY

PRODUCT QUALITY CODE	3 MIL 16811	5 MIL 16812	6 MIL 16813	8 MIL 16814	10 MIL 16815	14 MIL 16816	METHOD OF TEST
ELECTRICAL PROPERTIES							
Surface arc resistance, sec.	>180	>180	>180	>180	>180	>180	ASTM D-495
Dielectric strength, ¼" electrode v/m avg.	>750	>500	>500	>250	>500	>200	D-149
Dielectric constant 60 cycles	1.8	1.9	2.3	2.6	2.6	2.7	D-150
1,000,000 cycles	1.7	1.7	1.8	2.4	2.4	2.5	D-150
Power factor 60 cycles	.0025	.0020	.0012	.0017	.0011	.0014	D-150
1,000,000 cycles	.0009	.0008	.0010	.0016	.0009	.0011	D-150
Volume resistivity, ohm-cm, room conditions:	10^{19}	10^{19}	10^{19}	10^{19}	10^{19}	10^{19}	D-257
300°C.	10^{13}	10^{13}	10^{13}	10^{13}	10^{13}	10^{13}	D-257
Insulation resistance, ohms (96 hrs. at 90% R.H., 35°C.)	10^{9}	10^{8}	10^{9}	10^{8}	10^{9}	10^{8}	D-257
MECHANICAL PROPERTIES							
Tensile strength, lb/in. of width warp	>45	>65	>85	>200	>200	>250	D-39-39 Grab Method D-295-52T
fill	>35	>45	>85	>200	>200	>250	
Breaking strength lb/in. of width warp	>35	>40	>45	>200	>200	>200	
Elmendorf tear strength, lbs. warp	>0.30	>0.35	>0.30	>2.0	>2.0	>4.0	
fill	>0.15	>0.25	>0.30	>1.5	>1.5	>1.8	
Elongation, % at break warp	0	0	0	0	0	0	D-412 (modified)
fill	0	0	0	0	0	0	
Mullen hydrostatic, lb. sq. in. (Average Values—See Note 1)	60	100	160	250	250+	250	
MISCELLANEOUS PROPERTIES							
Moisture vapor permeability g/100 sq. in./24 hrs.	.38	.24	.16	.40	1.02	1.26	T.A.P.P.I. 464M-45
Water absorption % 24 hrs. at 23°C.	.64	.68	.32	.24	.10	.13	D-570 (modified)
Thermal conductivity CAL/SEC/CM²/°C/CM	1.1 x 10-4	1.7 x 10-4	1.4 x 10-4	2.3 x 10-4	3.7 x 10-4	3.2 x 10-4	
Flammability	Non-Flammable						
Service temperatures	Teflon coated glass fabrics are extremely stable at elevated temperatures. Samples heated at 250°C. (482°F.) showed no weight loss at the end of 6 months. Teflon coated glass fabrics remain pliable at temperatures as low as —87.5°C. (—100°F.). Samples thoroughly flexed when chilled to —87.5°C. showed no visible signs of cracking.						

* These data are a guide to properties and are not to be regarded as specifications.

NOTE 1 — Mullen hydrostatic: The values shown are average plant production. Occasional pinholes can be expected. Where a pinhole occurs, lower hydrostatic values will be obtained.

TEFLON COATED GLASS FABRICS AND LAMINATES

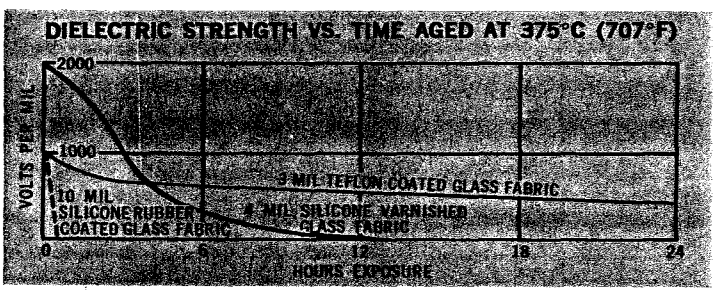
Single Ply (In Rolls or Sheets)

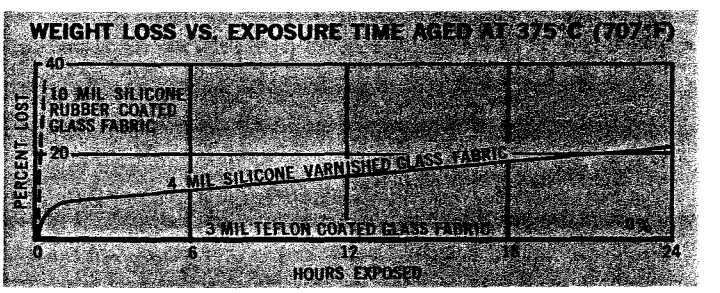
QUALITY CODE	NOMINAL THICKNESS*	WIDTH INCHES**	OZ./SQ. YD. (APPROX.)	YDS./LB. (APPROX.)
16811	.003"	¼ to 38	4.1	3.7
16812	.005"	¼ to 38	7.3	2.1
16813	.006"	¼ to 38	9.1	1.7
16814	.008"	¼ to 38	12.5	1.2
16815	.010"	¼ to 38	15.2	1.0
16816	.014"	¼ to 38	19.7	.8

Laminates (In Sheets)* 13" x 17"**

QUALITY CODE	NOMINAL THICKNESS*	OZ./SQ. YD. (APPROX.)	SQ. FT./LB.
16871-10	.010"	18	8.2
16871-15	.015"	27	5.5
16871-20	.020"	44	3.3
16871-25	.025"	59	2.7

*Usual NEMA or ASTM tolerances apply.
**Widths up to 50" may be available upon request.
***Heavier laminates can be made, and further information will be supplied on request.





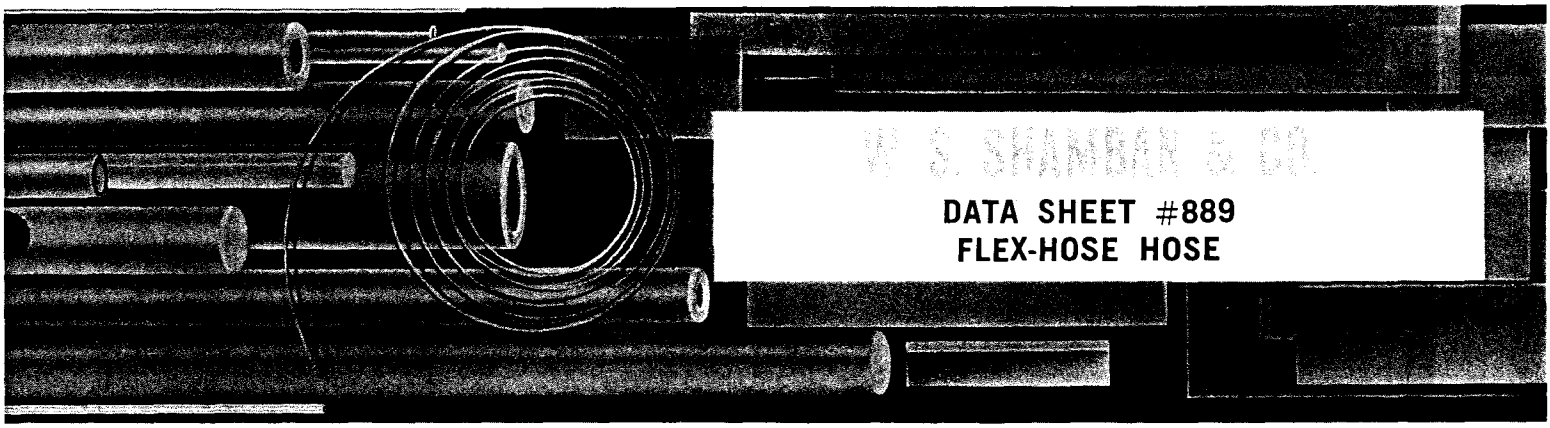
W. S. SHAMBAN & CO.

11617 W. Jefferson Blvd., Culver City, California
Phone: (Area Code 213) UP 0-6877 — TWX: 871-5220

2531 Bremer Drive, Fort Wayne, Indiana
Phone: (Area Code 219) 742-6491 — TWX: 241-2360

ADVANCED TECHNOLOGY PLASTICS • ENGINEERS • MANUFACTURERS • PROCESSORS • SHAMBAN

DISTRIBUTOR

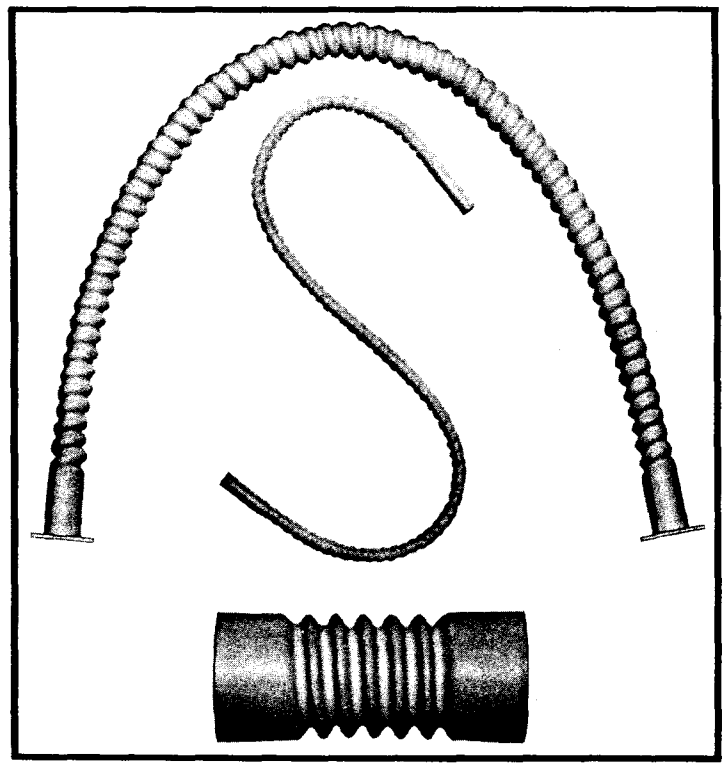


New

FLEX-HOSE

A "PIPE" FOR CORROSIVE LIQUIDS and GASES that

BENDS AROUND CORNERS



The resiliency of Flex-Hose is due to spiral convolutions permanently formed in the walls of a fluorocarbon tube. This configuration provides inside dimensional stability for bends, preventing wall collapse common to conventional metal or plastic pipe. Conventional "ells" may be eliminated in many situations. The greater wall strength of Flex-Hose is a definite advantage in vacuum applications.

VIBRATION DAMPER

In piping layouts where vibration from pumps or machinery is transmitted through solid pipe connections, a section of Flex-Hose eliminates it.

SOME FLEX-HOSE USES

- **As a piping system component in dairy, food, citrus, chemical and pharmaceutical processing plants.**
- **Laboratory and production fluid and gas transmission tubing.**
- **Vent tubing for corrosive gases.**
- **Electrical conduit in corrosive environment.**
- **Flexible joints for all piping.**
- **Liquid and gas transfer in vibration environments.**
- **Tank-car loading and unloading of corrosive liquids.**
- **Bellows—large and small diameter.**

WIDE RANGE—STANDARD DIMENSIONS

A chart of complete specifications and dimensions is shown on the back of this sheet.

FLEX-HOSE

SPECIFICATIONS AND APPLICATION DATA

FLEX - HOSE

DASH NO.	NOM. PIPE DIA.	I DIA.	W WALL	L LENGTH	E END	F FLARE	R MIN.	MAX. PRESS. P.S.I.	MAX. VACUM IN. HG.	FLOW DIA.	FLOW AREA
12	3/8	11/16	1/16	UNLIM.	*2	1 1/16	2	25	20	1/2	.196
16	1/2	53/64	1/16	UNLIM.	*2	1 3/8	2	25	20	43/64	.270
24	3/4	1 1/16	1/16	UNLIM.	*2	1 11/16	2	25	20	43/64	4.06
32	1	1 5/16	1/16	UNLIM.	*2	2	3	25	20	3/4	.738
48	1 1/2	1 15/16	1/16	UNLIM.	*2	2 7/8	4	25	20	1 5/32	1.73
64	2	2 43/64	1/16	**.36 MAX.	*2	3 5/8	8	20	20	1 5/32	2.85
96	3	3 5/32	5/64	**.36 MAX.	*2	5	14	20	20	2 1/2	6.21
128	4	4 11/32	5/64	**.10 MAX.	*2	6 3/16	20	15	20	3 11/16	10.7
192	6	6 5/8	1/64	**.10 MAX.	*2	8 7/8	36	10	20	5 7/16	24.3

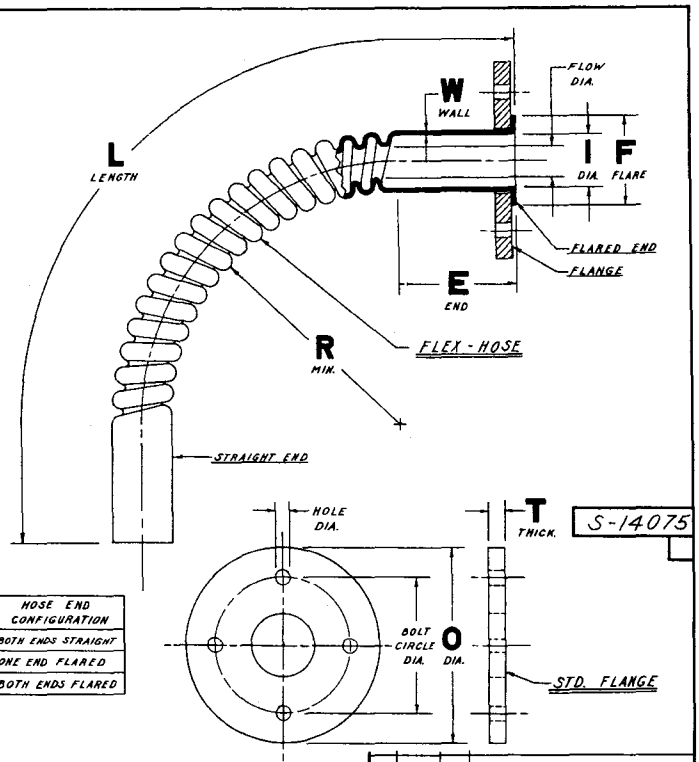
* 2 INCH END LENGTH SUPPLIED UNLESS OTHERWISE SPECIFIED.

** FOR UNFLARED END CONFIGURATION.

STD. FLANGE

DASH NO.	NOM. PIPE DIA.	O DIA.	T THICK.	NO. OF HOLES	BOLT CIRCLE DIA.	HOLE DIA.
12	3/8	3	3/32	4	2	1/4
16	1/2	3 1/2	3/32	4	2 1/2	1/4
24	3/4	3 7/8	5/64	4	2 1/2	1/4
32	1	4 1/8	1/16	4	3 1/8	3/8
48	1 1/2	5	3/64	4	3 1/8	3/8
64	2	6	3/32	4	4 3/4	3/4
96	3	7 1/2	3/32	4	6	3/4
128	4	9	13/64	8	7 1/2	3/4
192	6	11	1	8	9 1/2	1

CODE NO.	HOSE END CONFIGURATION
01	BOTH ENDS STRAIGHT
02	ONE END FLARED
03	BOTH ENDS FLARED



NOTES
1. PLASTIC AND METAL FLANGES ARE AVAILABLE UPON REQUEST. SPECIFY MATERIAL.
2. WHEN ORDERING, SPECIFY AS FOLLOWS :
EXAMPLE : S-14075 - 48 - 02 - 16 IN.
FLEX - HOSE NO.
DASH NO.
HOSE END CONFIGURATION
LENGTH
3. OTHER LENGTHS AND SIZES AVAILABLE UPON REQUEST.
4. ALL DIMENSIONS ARE IN INCHES.

REMOVE ALL BURRS AND BREAK ALL SHARP EDGES TO MAX.

UNLESS OTHERWISE NOTED LIMITS ON DIMENSIONS
.XX DECIMAL ± .03
.XXX DECIMAL ± .010
FRACTION ± 1/32
ANGLES ± 1/2°

ITEM NO.	PART NO.	NO. REQ'D.	SIZE AND DESCRIPTION
			BILL OF MATERIAL

THIS PRINT IS THE PROPERTY OF W. S. SHAMBAN & COMPANY AND SHALL NOT BE REPRODUCED WITHOUT THE WRITTEN PERMISSION OF SAID COMPANY.

DRAWN BY STARKWICK 6/29/63
CHECKED BY
APPROVED BY GUSEL 6/30/63

SCALE NONE | MATERIAL T.F.E. MAX. SPEC. ZX-43 | CHANGE

FLEX-HOSE

W. S. SHAMBAN & CO.
8501 BRIDGER DR.
FORT WAYNE, INDIANA

DWG. NO. S-14075

You are invited to write, call or wire us concerning applications requiring non-standard Flex-Hose dimensions or specifications. Our engineers have helped plant and laboratory managements solve many problems involving corrosion-resistant materials. Your inquiry will have prompt attention.

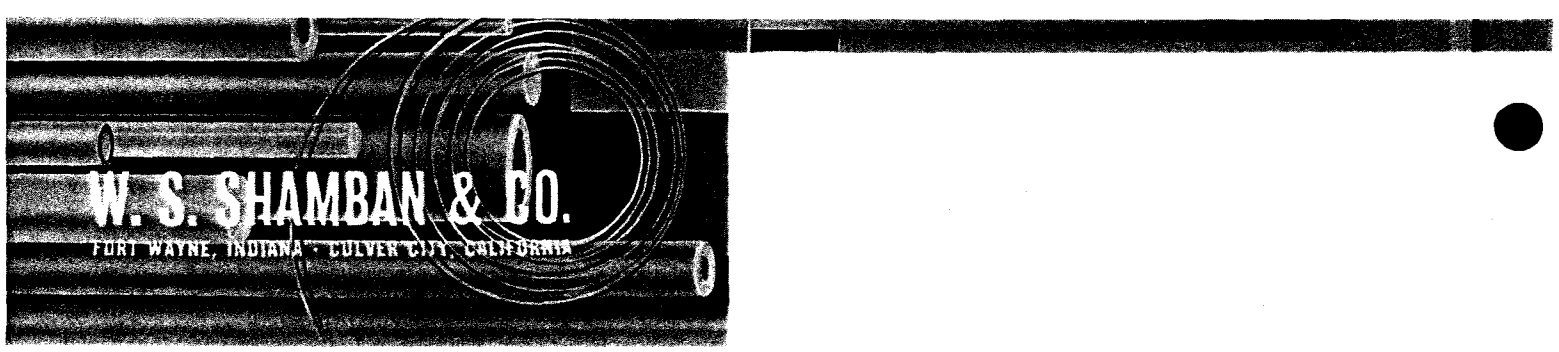
THE SHAMBAN LINE

PRODUCTS FOR THE CHEMICAL AND PROCESSING INDUSTRIES

TEFLON SEALS
TEF-E-NUZ PACKING
SAFE-T-LINE HOSE
UNIVERSAL THREAD SEAL
TEFLON LABORATORY WARE

STANDARD SHAPES-SHEETS, ROD, TUBE, SLAB, TAPE AND STRIP OF TEFLON, FLUON, NYLON, KEL-F, KYNAR, DELRIN, CELCON, HALON, LEXAN AND MERLON
ELASTOSEAL (TFE encapsulated "O" rings)

SHAMBAN'S "PROFICIENCY-IN-PLASTICS" IS AT YOUR SERVICE



SHAMBAN'S "BONDAID" ETCHANT

FOR BONDIZING FLUOROCARBONS
such as
KEL-F, TEFLON-TFE, TEFLON-FEP, FLUON, POLYFLON, HALON, KYNAR, ETC.

BONDAID ETCHANT is a stabilized dispersion of metallic sodium. Its function is to modify the surface of fluorocarbon polymers so that adhesives can be used.

Under normal circumstances there is no adequate adhesion of any material to such fluorocarbons as Teflon-TFE and Teflon-FEP, Fluon, Kel-F, Halon, Kynar, and other fluorocarbons now under development. This characteristic is inherent in the chemical nature of the fluorocarbon.

"BONDAID" ETCHANT treats the flurocarbon so that a carbonaceous film is created on the surface. Since "BONDAID" ETCHANT is easy to use, selected sections or all of the fluorocarbon material may be treated. The carbonaceous film so created is now the anchor for any applicable adhesive. The adhesive employed is selected based on the end use; thus by the use of "BONDAID" ETCHANT any fluorocarbon can be bonded to metals, plastics, glass, ceramics, textiles, wood, rubber, etc. We suggest using Shamban's "Bondaid" Epoxy adhesive described on reverse.

"BONDAID" ETCHANT is the first safe "do-it-yourself" kit for the treatment of fluorocarbon surfaces. It has a high flash point, low vapor pressure and low surface tension. The high flash point prevents ignition of the solvent if water is accidentally added to "BONDAID" ETCHANT. The low surface tension allows the "BONDAID" ETCHANT to spread and wet the surface uniformly, eliminating "dappling."

"BONDAID" ETCHANT may be adapted to spot, batch or continuous operations. For example, Teflon coated wires or tubing may be treated for cementing or encapsulation at the assembly line or in a preliminary operation. An advantage is that any section of the wire or tubing may be selected.

The same concept applies to fluorocarbon-based printed circuit boards. In addition to possible application in electronics, other industries that desire to use fluorocarbons for low friction, chemical resistance, etc., may find greater utility with "BONDAID" ETCHANT and adhesives.

Such end uses as non-sticking surfaces on furniture, tools, lathes, mills, packaging machinery, skiis, food or bakery slides, laboratories, guides, ice, paint, spray booths, glue, fertilizers, earth, etc., suggest employing "BONDAID" ETCHANT for adhering fluorocarbons. The surface, after treatment, may also be dyed or painted for identification or coding.

A complete laboratory "BONDAID" kit is available at $6.95. Each kit contains 1 oz. "BONDAID" ETCHANT and 2 oz. "BONDAID" EPOXY ADHESIVE; a mixing cup; stirring stick and applicator and a piece of emery cloth. Each kit will accommodate approximately six square feet or more.

"BONDAID" ETCHANT is available in half pints at $6.00 and pints at $9.00. Larger quantities quoted on request.
When ordering larger quantities, please specify "BONDAID" ETCHANT No. 16943. F. O. B. points are Fort Wayne, Indiana and Culver City, California.

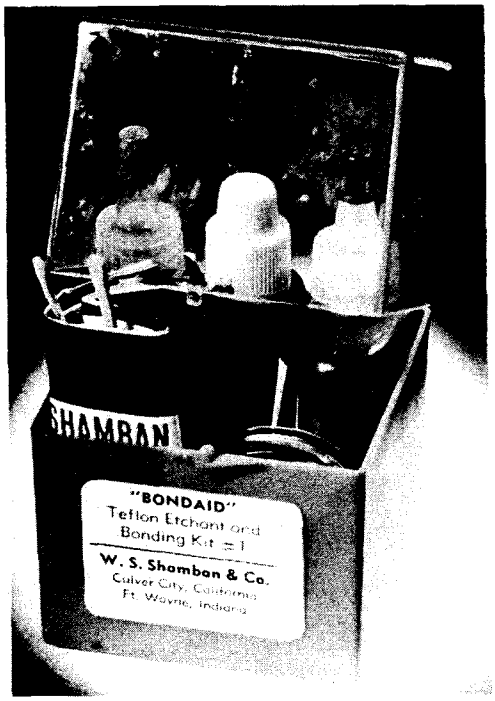
PROCEDURE FOR APPLYING "BONDAID" ETCHANT

1. **Cleaning Polymer Surface**
   Remove all dirt and grease by using perchloroethylene, acetone or similar solvent; rinse with fresh solvent and allow solvent to evaporate.
2. **Method of Application**
   a) Shake container gently and briefly, then
   b) The fluorocarbon can be dipped in the "BONDAID" ETCHANT, brushed or sprayed. Any brush can be used but only fresh solution should be used when brushing.
3. **Length of Treatment**
   Period of contact shoud be 5 - 15 seconds. Longer periods of contact do not materially increase bond strength. Exposure to air decreases the strength of the solution. Application in a dry nitrogen atmosphere will extend the life of the "BONDAID" ETCHANT solution. After removal of excess fluid the treated surface will have a light to dark brown appearance.
4. **Removing Excess Fluid**
   After treatment, rinse with water and final washing can be done with detergent. However, make sure that water cannot splash into main body of "BONDAID" ETCHANT. A violent reaction may ensue.
5. **Masking Sections**
   Any conventional masking tape may be used to isolate areas for treatment.
6. **Adhesives**
   Conventional adhesives can be used, including epoxies, phenolics, rubber, casein, silicones, etc. However, we recommend "BONDAID" EPOXY ADHESIVE.
7. **Coverage**
   One pint of "BONDAID" ETCHANT, when used under a dry nitrogen atmosphere, will treat 30 - 50 square feet of fluorocarbon surface. Actual coverage will depend on localized conditions.

SAFETY PRECAUTIONS

1. Avoid skin contact or breathing vapors. Use protective clothing and goggles.
2. Avoid direct contact of "BONDAID" ETCHANT with water, chlorinated hydrocarbons and dry ice. Do not use fire extinguishers containing carbon tetrachloride, acid or water. Use dry soda ash or dry sodium chloride or sodium carbonate for fire extinguishing purposes.
3. Equipment used for dipping should be made of steel, stainless steel, monel metal, nickel or glass. Alkali reactive metals such as zinc, aluminum and tin should never be used.

W. S. Shamban & Company, Polytex Division, assumes no obligation for liability for any advice furnished by it or for results obtained with respect to this product. All such advice is given and accepted at the buyer's risk.



SHAMBAN'S "BONDAID" EPOXY ADHESIVE

A NEW 100% EPOXY ADHESIVE especially designed to be used with "Bondaid" Etchant to bond etched surfaces of Teflon or other Fluorocarbons to themselves or to other materials.

"Bondaid" Epoxy Adhesive chemically welds etched Teflon, etc., to wood . . . plastic . . . china . . . ceramics . . . glass . . . marble . . . stone . . . iron . . . steel . . . aluminum . . . brass . . . copper . . . leather . . . neoprene . . . rubber . . . etc.

"Bondaid" Epoxy Adhesive also chemically welds these materials to themselves or to each other. May also be used to patch, plug, caulk, mend, coat, seal, etc.

The "Bondaid" Epoxy Adhesive Formula has been under development since 1949 for use in aircraft, rockets, and missiles and is now available to other fields due to popular demand for a better adhesive for use with Fluorocarbons. Epoxies are a result of Space Age research for better adhesives and we have yet to find a competitive formula which surpasses "BONDAID" Epoxy Adhesive under all conditions. Therefore, you may be assured you are using the finest product of its kind.

APPLICATION

1. Surfaces to which "BONDAID" Adhesive is to be applied must be thoroughly dry and free of grease, oil, dirt, etc.

2. For best adhesion, use fine sandpaper or emery paper (00 or 120 grit) to clean and roughen all surfaces other than Fluorocarbon surfaces previously etched with "BONDAID" Etchant.

3. Place equal amounts of "BONDAID" Epoxy Adhesive and Epoxy Hardener into small measuring cup. Stir thoroughly with clean wooden applicator stick.

4. For bonding, apply thin film of mixture to **both** surfaces, join surfaces and use weights or clamps to apply only light pressure to hold in place while curing. For patching or coating, etc., material can be applied as thick as desired. (Avoid heavy coatings on vertical surfaces because of possibility of run-off).

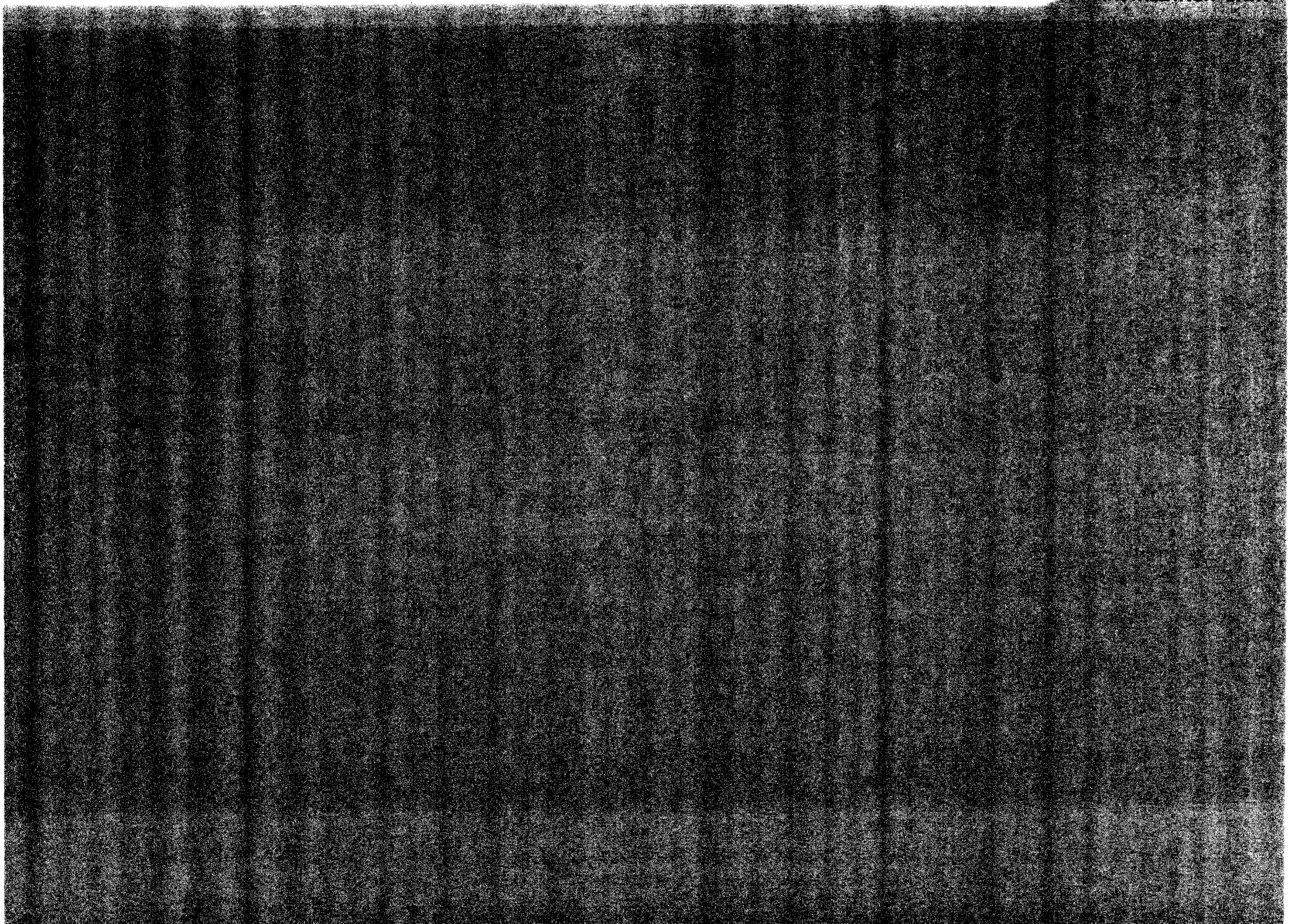
5. "BONDAID" Epoxy Adhesive cures in 8 hours at a room temperature of 70° to 80°F. To hasten cure, heat in oven or under heat lamp for one hour at 180°F. Allow to cool before using. (If temperature is below 60°F, curing time is lengthened. Do not use if temperature is below 50°F.).

6. May be thinned by pre-heating to 100°F, but pot life will be shortened. Do not attempt to add liquid thinners of any kind.

W. S. SHAMBAN & CO.
Polytex Division

CULVER CITY, CALIFORNIA
11617 W. JEFFERSON BLVD.
397-2195—870-6877

FORT WAYNE, INDIANA
BOX 176, BREMER ROAD
742-6491

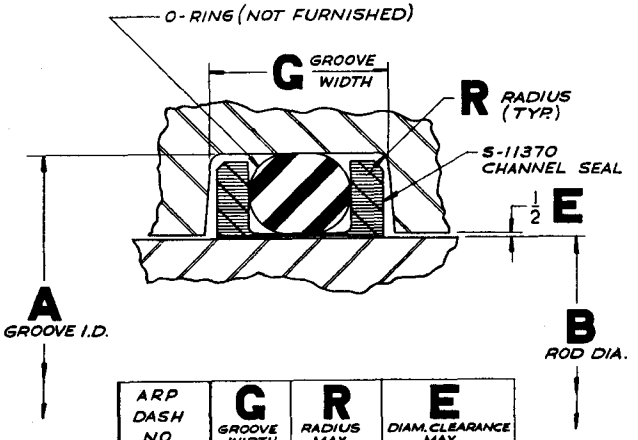


DASH NO. SEE NOTES 1 & 4 AN6227 SERIES	AN6230 SERIES	ARP 568	A DIA.	B DIA.
			±.001	±.001
		004	.190	.076
		005	.221	.108
1		006	.235	.123
2		007	.266	.154
3		008	.297	.185
4		009	.329	.217
5		010	.360	.248
6		011	.422	.310
7		012	.485	.373
			+.002 -.000	+.000 -.002
		013	.547	.435
		014	.610	.498
		015	.672	.560
		016	.735	.623
		017	.797	.685
		018	.860	.748
		019	.922	.810
		020	.985	.873
		021	1.047	.935
		022	1.110	.998
		023	1.172	1.060
		024	1.235	1.123
		025	1.297	1.185
		026	1.360	1.248
		027	1.422	1.310
		028	1.485	1.373
			±.001	±.001
8		110	.551	.373
9		111	.613	.435
10		112	.676	.498
11		113	.738	.560
12		114	.801	.623
13		115	.863	.685
14		116	.926	.748
		117	.988	.810
		118	1.051	.873
		119	1.113	.935
		120	1.182	.998
		121	1.238	1.060
		122	1.301	1.123
		123	1.363	1.185
		124	1.426	1.248
		125	1.488	1.310
		126	1.551	1.373
		127	1.613	1.435
		128	1.676	1.498
		129	1.738	1.560
		130	1.801	1.623
		131	1.863	1.685
		132	1.926	1.748
		133	1.988	1.810
		134	2.051	1.873

DASH NO. SEE NOTES 1 & 4 AN6227 SERIES	AN6230 SERIES	ARP 568	A DIA.	B DIA.
			±.001	+.000 -.002
		135	2.114	1.936
		136	2.176	1.998
		137	2.239	2.061
		138	2.301	2.123
		139	2.364	2.186
		140	2.426	2.248
		141	2.439	2.311
		142	2.551	2.373
		143	2.614	2.436
		144	2.676	2.498
		145	2.739	2.561
		146	2.801	2.623
		147	2.864	2.686
		148	2.926	2.748
		149	2.989	2.811
			±.001	+.000 -.002
15		210	.991	.748
16		211	1.053	.810
17		212	1.116	.873
18		213	1.178	.935
19		214	1.241	.998
20		215	1.303	1.060
21		216	1.366	1.123
22		217	1.428	1.185
23		218	1.491	1.248
24		219	1.553	1.310
25		220	1.616	1.373
26		221	1.678	1.435
27		222	1.741	1.498
	1	223	1.866	1.623
	2	224	1.991	1.748
	3	225	2.116	1.873
	4	226	2.241	1.998
	5	227	2.366	2.123
	6	228	2.491	2.248
	7	229	2.616	2.373
	8	230	2.741	2.498
	9	231	2.866	2.623
	10	232	2.991	2.748
	11	233	3.116	2.873
	12	234	3.241	2.998
	13	235	3.366	3.123
	14	236	3.491	3.248
	15	237	3.616	3.373
	16	238	3.741	3.498
	17	239	3.866	3.623
	18	240	3.991	3.748
	19	241	4.116	3.873
	20	242	4.241	3.998
	21	243	4.366	4.123
	22	244	4.491	4.248

DASH NO. SEE NOTES 1 & 4 AN6227 SERIES	AN6230 SERIES	ARP 568	A DIA.	B DIA.
			±.001	+.000 -.002
	23	245	4.616	4.373
	24	246	4.741	4.498
	25	247	4.866	4.623
		248	4.991	4.748
		249	5.116	4.873
		250	5.241	4.998
		251	5.366	5.123
		252	5.491	5.248
		253	5.616	5.373
		254	5.741	5.498
		255	5.866	5.623
		256	5.991	5.748
		257	6.116	5.873
		258	6.241	5.998
		259	6.491	6.248
		260	6.741	6.498
		261	6.991	6.748
		262	7.241	6.998
		263	7.491	7.248
		264	7.741	7.498
		265	7.991	7.748
		266	8.241	7.998
		267	8.491	8.248
		268	8.741	8.498
		269	8.991	8.748
		270	9.241	8.998
		271	9.491	9.248
		272	9.741	9.498
		273	9.991	9.748
		274	10.241	9.998
			±.001	+.000 -.002
28		325	1.870	1.498
29		326	1.995	1.623
30		327	2.120	1.748
31		328	2.245	1.873
32		329	2.370	1.998
33		330	2.495	2.123
34		331	2.620	2.248
35		332	2.745	2.373
36		333	2.870	2.498
37		334	2.995	2.623
38		335	3.120	2.748
39		336	3.245	2.873
40		337	3.369	2.997
41		338	3.494	3.122
42		339	3.619	3.247

DASH NO. SEE NOTES 1 & 4 AN6227 SERIES	AN6230 SERIES	ARP 568	A DIA.	B DIA.
			±.001	+.000 -.002
43		340	3.744	3.372
44		341	3.869	3.497
45		342	3.994	3.622
46		343	4.119	3.747
47		344	4.244	3.872
48		345	4.369	3.997
49		346	4.494	4.122
50		347	4.619	4.247
51		348	4.744	4.372
52		349	4.869	4.497
			±.001	+.000 -.002
88		425	4.974	4.497
53		426	5.099	4.622
54		427	5.224	4.747
55		428	5.349	4.872
56		429	5.474	4.997
57		430	5.599	5.122
58		431	5.724	5.247
59		432	5.849	5.372
60		433	5.974	5.497
61		434	6.099	5.622
62		435	6.224	5.747
63		436	6.349	5.872
64		437	6.474	5.997
65		438	6.724	6.247
66		439	6.974	6.497
67		440	7.224	6.747
68		441	7.474	6.997
69		442	7.724	7.247
70		443	7.974	7.497
71		444	8.224	7.747
72		445	8.474	7.997
73		446	8.974	8.497
74		447	9.474	8.997
75		448	9.974	9.497
76		449	10.474	9.997
77		450	10.974	10.497
78		451	11.474	10.997
79		452	11.974	11.497
80		453	12.474	11.997
81		454	12.974	12.497
82		455	13.474	12.997
83		456	13.974	13.497
84		457	14.474	13.997
85		458	14.974	14.497
86		459	15.474	14.997
87		460	15.974	15.497



ARP DASH NO.	G GROOVE WIDTH	R RADIUS MAX.	E DIAM. CLEARANCE MAX.
	+.005 -.000		
004 TO 012	.205	.015	.004
013 TO 028	.205	.015	.005
110 TO 149	.238	.015	.005
210 TO 274	.275	.025	.006
325 TO 349	.410	.035	.007
425 TO 460	.538	.035	.010

NOTES:

1. DASH NO'S OF THIS DWG. CORRESPOND TO DASH NO'S OF ARP 568. DASH NO'S OF AN SERIES "O" RINGS ARE SHOWN FOR CROSS REFERENCE ONLY.
2. GROOVE AND ROD DIM'S FOR AN 6227 DASH NO'S ARE PER MIL-P-5514, REVISION A AND B, FOR GROOVES USING 2 BACK-UP RINGS.
3. THIS DWG. INACTIVE FOR NEW DESIGN. FOR NEW DESIGN USING GROOVES PER MIL-P-5514D SEE DWG. S-12560.
4. TO ORDER SPECIFY THE ARP DASH NO. AS FOLLOWS:
   EXAMPLE: S-11370-111
   CHANNEL SEAL NO. —
   SIZE-ARP DASH NO. —

S-11370 G

ITEM NO.	PART NO.	NO. REQ.	MATERIAL, SIZE AND DESCRIPTION

REMOVE ALL BURRS AND BREAK ALL SHARP EDGES TO ——— MAX.

LIMITS ON DIMENSIONS UNLESS OTHERWISE NOTED
.XX DECIMAL = ———
.XXX DECIMAL = ———
FRACTION = ± 1/32
ANGLES = ± 1/2°

APPROVED BY [signature] 12/1/62
CHECKED BY
DRAWN BY YAMAMOTO 12/1/62

SCALE NONE | MATERIAL VIRGIN TFE SHAMBAN SPEC. 2E-55 | FINISH

CHANNEL SEAL INSTALLATION CHART

NEXT ASSY. USED ON | QTY. REQ'D.

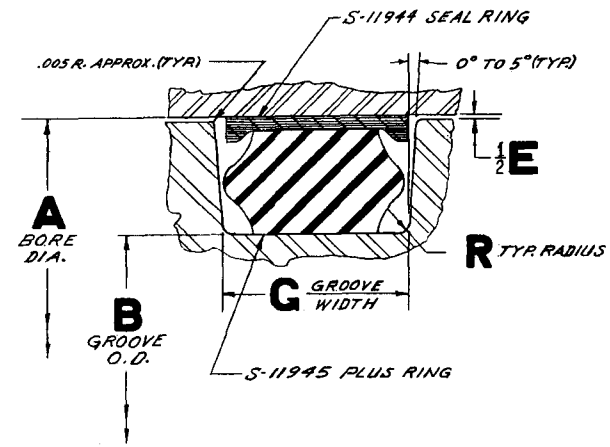
W. S. SHAMBAN & CO.
CULVER CITY, CALIFORNIA — FORT WAYNE, INDIANA

DWG. NO. S-11370 | CHANGE LTR G

DASH NO.	A BORE	B GROOVE	G WIDTH	R RADIUS	E DIAM. CLEARANCE
	+.001 −.000	+.000 −.001	+.010 −.000	±.005	
004	.190	.076			
005	.221	.108			
006	.235	.123			
007	.266	.154			
008	.297	.185	.094	.010	.004
009	.329	.217			
010	.360	.248			
011	.422	.310			
012	.485	.373			
	+.002 −.000	+.000 −.002	+.010 −.000	±.005	
110	.551	.373			
111	.613	.435			
112	.676	.498			
113	.738	.560	.141	.010	.005
114	.801	.623			
115	.863	.685			
116	.926	.748			
	+.002 −.000	+.000 −.002	+.010 −.000	±.0075	
210	.991	.748			
211	1.053	.810			
212	1.116	.873			
213	1.178	.935			
214	1.241	.998			
215	1.303	1.060	.188	.0175	.006
216	1.366	1.123			
217	1.428	1.185			
218	1.491	1.248			
219	1.553	1.310			
220	1.616	1.373			
221	1.678	1.435			
222	1.741	1.498			

DASH NO.	A BORE	B GROOVE	G WIDTH	R RADIUS	E DIAM. CLEARANCE
	+.002 −.000	+.000 −.002	+.010 −.000	±.005	
325	1.870	1.498			
326	1.995	1.623			
327	2.120	1.748			
328	2.245	1.873			
329	2.370	1.998			
330	2.495	2.123			
331	2.620	2.248			
332	2.745	2.373			
333	2.870	2.498			
334	2.995	2.623			
335	3.120	2.748			
336	3.245	2.873			
337	3.369	2.997	.281	.025	.007
338	3.494	3.122			
339	3.619	3.247			
340	3.744	3.372			
341	3.869	3.497			
342	3.994	3.622			
343	4.119	3.747			
344	4.244	3.872			
345	4.369	3.997			
346	4.494	4.122			
347	4.619	4.247			
348	4.744	4.372			
349	4.869	4.497			
	+.003 −.000	+.000 −.003	+.010 −.000		
425	4.974	4.497			
426	5.099	4.622			
427	5.224	4.747	.375		.010
428	5.349	4.872			
429	5.474	4.997			

DASH NO.	A BORE	B GROOVE	G WIDTH	R RADIUS	E DIAM. CLEARANCE
	+.003 −.000	+.000 −.003	+.010 −.000	±.005	
430	5.599	5.122			
431	5.724	5.247			
432	5.849	5.372			
433	5.974	5.497			
434	6.099	5.622			
435	6.224	5.747			
436	6.349	5.872			
437	6.474	5.997			
438	6.724	6.247			
439	6.974	6.497			
440	7.224	6.747			
441	7.474	6.997			
442	7.724	7.247			
443	7.974	7.497			
444	8.224	7.747			
445	8.474	7.997	.375	.025	.010
446	8.974	8.497			
447	9.474	8.997			
448	9.974	9.497			
449	10.474	9.997			
450	10.974	10.497			
451	11.474	10.997			
452	11.974	11.497			
453	12.474	11.997			
454	12.974	12.497			
455	13.474	12.997			
456	13.974	13.497			
457	14.474	13.997			
458	14.974	14.497			
459	15.474	14.997			
460	15.974	15.497			



6. TO ORDER - SPECIFY THE FOLLOWING:
   EXAMPLE: S-11943 - 425 - A - 1
   - PLUS SEAL NO.
   - SIZE DASH NO.
   - PLUS RING COMP'D CODE LETTER
   - SEAL RING COMP'D CODE NO.
5. FOR INSTALLATION SUGGESTIONS SEE DWG. 16-130
4. THIS DESIGN SUITABLE FOR UP TO 5000 PSI HYDRAULIC SYSTEMS
3. O.D. PLUS SEAL CONSISTS OF S-11944 SEAL RING & S-11945 PLUS RING.
2. BORE AND GROOVE DIM'S ARE PER MIL-P-5514 FOR GROOVE USING NO BACK-UP RINGS
1. DASH NUMBERS OF THIS DWG. CORRESPOND TO DASH NUMBERS OF ARP 568.

S 11943
G

PLUS SEAL SELECTION DATA

APPLICATION	TEMP. °F	PLUS RING COMPOUND	CODE	MILITARY & IND'L. SPECIFICATIONS
GENERAL PURPOSE AIR-OIL-WATER-FUELS-& HYDRAULIC SERVICE	-40° / +300°	BUNA-N 16949	A	SAE-120R-CLASS #1
AIR FORCE & NAVY J.P. & HIGH OCTANE FUELS	-65° / +180°	BUNA-N 16950	B	MIL-P-5315
SKYDROL 500-PYDRAULS CELLULUBES AND POLAR SOLVENTS	-65° / +225°	REPLACED BY CODE H	C	COMMERCIAL
AIR FORCE & NAVY HYDRAULIC FLUID MIL-O-5606	-65° / +180°	BUNA-N 16952	D	MIL-P-5516
CHLORINATED & AROMATIC SOLVENTS - STEAM AND HYDROCARBONS	-40° / +500°	VITON 16953	E	MIL-R-25897
AIR FORCE & NAVY HYDRAULIC FLUID MIL-O-5606	-65° / +275°	BUNA-N 16954	G	MIL-P-25732
SKYDROL-STEAM-WATER-AIR-DILUTE ACIDS-PHOSPHATE ESTER HYD. FLUIDS-CELLUBES.	-65° / +300°	ETHYLENE PROPYLENE 16989	H	NONE
HYDRO CARBON FLUIDS - DI-ESTER FLUID-SILICATE ESTER FLUID-PETROLEUM BASE FLUID	-80° / +350°	FLUORO SILICONE 16985	F	MIL-R-25988

SEAL RING COMPOUND PER W.S.S. SPEC. 22-53	CODE
VIRGIN TFE	1
GRAPHITE REINFORCED TFE — 16804	2
GLASS REINFORCED TFE — 16805	3
BRONZE REINFORCED TFE — 16966	4
TURCON TFE 16947	5
GLASS REINF. TURCON TFE 16981	6

REMOVE ALL BURRS AND BREAK ALL SHARP EDGES TO —— MAX.

UNLESS OTHERWISE NOTED LIMITS ON DIMENSIONS
.XX DECIMAL = ——
.XXX DECIMAL = ——
FRACTION = ± 1/32
ANGLES = ± 1/2°

NEXT ASSY. USED ON | QTY. REQ'D.

ITEM NO.	PART NO.	NO. REQ'D.	SIZE AND DESCRIPTION
			BILL OF MATERIAL

DRAWN BY	Pevin	1-6-62
CHECKED BY	Rogers	2-7-62
APPROVED BY	[illegible]	2-12-62

SCALE	MATERIAL	CHANGE
NONE	NOTED	G

O.D. PLUS SEAL INSTALLATION CHART

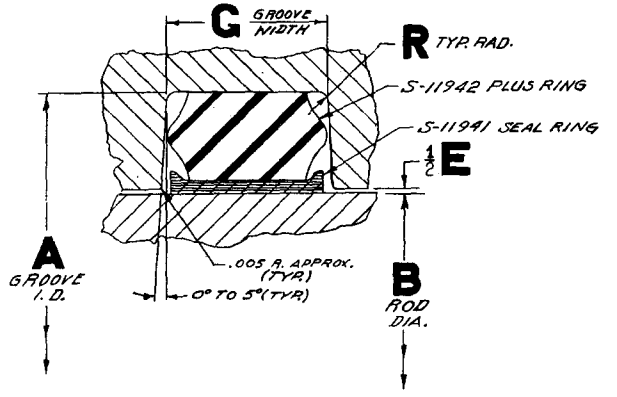
W. S. SHAMBAN & CO.
11617 WEST JEFFERSON BLVD.
CULVER CITY, CALIF.

DWG. NO. S 11943

DASH NO.	A GROOVE	B ROD	G WIDTH	R RADIUS	E DIAM. CLEARANCE
	+.001 -.000	+.000 -.001	+.010 -.000	±.005	
004	.190	.076			
005	.221	.108			
006	.235	.123			
007	.266	.154			
008	.297	.185	.094	.010	.004
009	.329	.217			
010	.360	.248			
011	.422	.310			
012	.485	.373			
	+.002 -.000	+.000 -.002	+.010 -.000	±.005	
110	.551	.373			
111	.613	.435			
112	.676	.498			
113	.738	.560	.141	.010	.005
114	.801	.623			
115	.863	.685			
116	.926	.748			
	+.002 -.000	+.000 -.002	+.010 -.000	±.0075	
210	.991	.748			
211	1.053	.810			
212	1.116	.873			
213	1.178	.935			
214	1.241	.998			
215	1.303	1.060			
216	1.366	1.123	.188	.0175	.006
217	1.428	1.185			
218	1.491	1.248			
219	1.553	1.310			
220	1.616	1.373			
221	1.678	1.435			
222	1.741	1.498			

DASH NO.	A GROOVE	B ROD	G WIDTH	R RADIUS	E DIAM. CLEARANCE
	+.002 -.000	+.000 -.002	+.010 -.000	±.005	
325	1.870	1.498			
326	1.995	1.623			
327	2.120	1.748			
328	2.245	1.873			
329	2.370	1.998			
330	2.495	2.123			
331	2.620	2.248			
332	2.745	2.373			
333	2.870	2.498			
334	2.995	2.623			
335	3.120	2.748			
336	3.245	2.873			
337	3.369	2.997	.281		.007
338	3.494	3.122			
339	3.619	3.247			
340	3.744	3.372		.025	
341	3.869	3.497			
342	3.994	3.622			
343	4.119	3.747			
344	4.244	3.872			
345	4.369	3.997			
346	4.494	4.122			
347	4.619	4.247			
348	4.744	4.372			
349	4.869	4.497			
	+.003 -.000	+.000 -.003	+.010 -.000		
425	4.974	4.497			
426	5.099	4.622			
427	5.224	4.747	.375		.010
428	5.349	4.872			
429	5.474	4.997			

DASH NO.	A GROOVE	B ROD	G WIDTH	R RADIUS	E DIAM. CLEARANCE
	+.003 -.000	+.000 -.003	+.010 -.000	±.005	
430	5.599	5.122			
431	5.724	5.247			
432	5.849	5.372			
433	5.974	5.497			
434	6.099	5.622			
435	6.224	5.747			
436	6.349	5.872			
437	6.474	5.997			
438	6.724	6.247			
439	6.974	6.497			
440	7.224	6.747			
441	7.474	6.997			
442	7.724	7.247			
443	7.974	7.497			
444	8.224	7.747			
445	8.474	7.997	.375	.025	.010
446	8.974	8.497			
447	9.474	8.997			
448	9.974	9.497			
449	10.474	9.997			
450	10.974	10.497			
451	11.474	10.997			
452	11.974	11.497			
453	12.474	11.997			
454	12.974	12.497			
455	13.474	12.997			
456	13.974	13.497			
457	14.474	13.997			
458	14.974	14.497			
459	15.474	14.997			
460	15.974	15.497			



6. TO ORDER - SPECIFY THE FOLLOWING:
   EXAMPLE: — S-11940 - 425 - A - 1
   - PLUS SEAL NO.
   - SIZE DASH NO.
   - PLUS RING COMP'D CODE LETTER
   - SEAL RING COMP'D CODE NO.
5. FOR INSTALLATION SUGGESTIONS SEE DWG. 16-130.
4. THIS DESIGN SUITABLE FOR UP TO 5000 PSI HYDRAULIC SYSTEMS.
3. I.D. PLUS SEAL CONSISTS OF S-11941 SEAL RING & S-11942 PLUS RING.
2. GROOVE & ROD DIM'S ARE PER MIL-P-5514 FOR GROOVE USING NO BACK-UP RINGS.
1. DASH NUMBERS OF THIS DWG. CORRESPOND TO DASH NUMBERS OF ARP 568.

S 11940
G

PLUS SEAL SELECTION DATA

APPLICATION	TEMP. °F	PLUS RING COMPOUND	CODE	MILITARY & IND'L SPECIFICATIONS
GENERAL PURPOSE AIR-OIL-WATER-FUELS - & HYDRAULIC SERVICE	-40°/+300°	BUNA-N 16949	A	SAE 120R-CLASS #1
AIR FORCE & NAVY J.P. & HIGH OCTANE FUELS	-65°/+180°	BUNA-N 16950	B	MIL-P-5315
SKYDROL 500-PYDRAULS CELLULUBES AND POLAR SOLVENTS	-65°/+225°	REPLACED BY CODE H	C	COMMERCIAL
AIR FORCE & NAVY HYDRAULIC FLUID MIL-O-5606	-65°/+180°	BUNA-N 16952	D	MIL-P-5516
CHLORINATED & AROMATIC SOLVENTS - STEAM AND HYDROCARBONS	-90°/+500°	VITON 16953	E	MIL-R-25897
AIR FORCE & NAVY HYDRAULIC FLUID MIL-O-5606	-65°/+275°	BUNA-N 16954	G	MIL-P-25732
SKYDROL - STEAM - WATER - AIR - DILUTE ACIDS - PHOSPHATE ESTER HYD. FLUIDS - CELLUBES	-65°/+300°	ETHYLENE PROPYLENE 16983	H	NONE
HYDRO CARBON FLUIDS - DI-ESTER FLUID - SILICATE ESTER FLUID - PETROLEUM BASE FLUID	-80°/+350°	FLUORO SILICONE 16985	F	MIL-R-25988

SEAL RING COMPOUND PER W.S.S. SPEC ZZ-53	CODE
VIRGIN TFE	1
GRAPHITE REINFORCED TFE — 16804	2
GLASS REINFORCED TFE — 16805	3
BRONZE REINFORCED TFE — 16966	4
TURCON TFE 16947	5
GLASS REINF. TURCON TFE — 16981	6

REMOVE ALL BURRS AND BREAK ALL SHARP EDGES TO —— MAX.

UNLESS OTHERWISE NOTED LIMITS ON DIMENSIONS
XX DECIMAL = ——
.XXX DECIMAL = ——
FRACTION = ± 1/32
ANGLES = ± 1/2°

NEXT ASSY. USED ON | QTY. REQ'D.

ITEM NO.	PART NO.	NO. REQ'D.	SIZE AND DESCRIPTION
			BILL OF MATERIAL

DRAWN BY	Frank	4-9-62
CHECKED BY	Roger	4-10-62
APPROVED BY	[illegible]	4-10-62

SCALE	MATERIAL	CHANGE
NONE	NOTED	G

I.D. PLUS SEAL INSTALLATION CHART

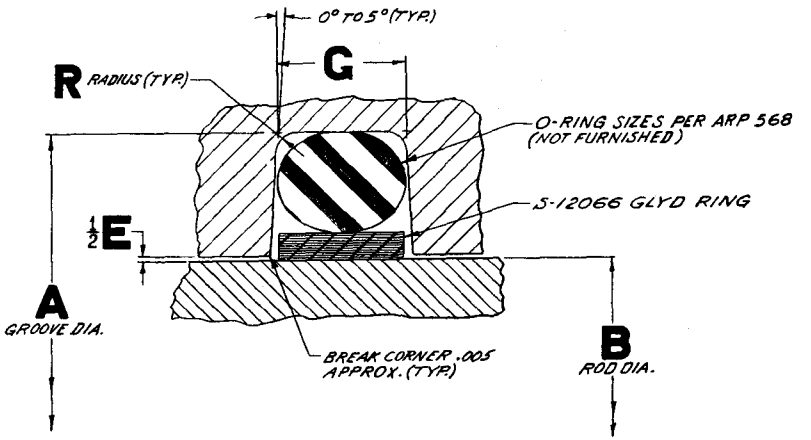
W. S. SHAMBAN & CO.
11617 WEST JEFFERSON BLVD.
CULVER CITY, CALIF.

DWG. NO. S 11940

DASH NO.	B DIA.	A DIA.	O-RING DASH NO. SEE NOTE #2
	+.000 -.001	+.001 -.000	
006	.123	.266	007
007	.154	.297	008
008	.185	.329	009
009	.217	.360	010
010	.248	.422	011
011	.310	.485	012
012	.373	.550	013
	+.000 -.002	+.002 -.000	
013	.438	.613	014
014	.501	.675	015
015	.563	.738	016
016	.626	.800	017
017	.688	.863	018
018	.751	.925	019
019	.813	.993	020
020	.881	1.055	021
021	.943	1.118	022
022	1.006	1.180	023
023	1.068	1.243	024
024	1.131	1.305	025
025	1.193	1.368	026
026	1.256	1.430	027
027	1.318	1.493	028
110	.373	.613	111
111	.435	.676	112
112	.498	.738	113
113	.560	.801	114
114	.623	.863	115
115	.685	.926	116
116	.748	.993	117
117	.815	1.056	118
118	.878	1.118	119
119	.940	1.181	120
120	1.003	1.243	121
121	1.065	1.306	122
122	1.128	1.368	123
123	1.190	1.431	124
124	1.253	1.493	125
125	1.315	1.558	126
126	1.380	1.620	127
127	1.442	1.683	128
128	1.505	1.742	129
129	1.564	1.805	130
130	1.627	1.867	131
131	1.689	1.930	132
132	1.752	1.992	133
133	1.814	2.055	134
134	1.877	2.118	135
135	1.940	2.180	136
136	2.002	2.243	137
137	2.065	2.305	138
138	2.127	2.368	139
139	2.190	2.430	140

DASH NO.	B DIA.	A DIA.	O-RING DASH NO. SEE NOTE #2
	+.000 -.002	+.002 -.000	
140	2.252	2.493	141
141	2.315	2.555	142
142	2.377	2.618	143
143	2.440	2.680	144
144	2.502	2.743	145
145	2.565	2.805	146
146	2.627	2.868	147
147	2.690	2.930	148
148	2.752	2.993	149
210	.748	1.053	211
211	.810	1.116	212
212	.873	1.178	213
213	.935	1.241	214
214	.998	1.303	215
215	1.060	1.366	216
216	1.123	1.428	217
217	1.185	1.491	218
218	1.248	1.553	219
219	1.310	1.616	220
220	1.373	1.678	221
221	1.435	1.741	222
222	1.498	1.868	223
223	1.625	1.993	224
224	1.750	2.118	225
225	1.875	2.243	226
226	2.000	2.368	227
227	2.125	2.493	228
228	2.250	2.618	229
229	2.375	2.743	230
230	2.500	2.868	231
231	2.625	2.993	232
232	2.750	3.118	233
233	2.875	3.243	234
234	3.000	3.368	235
235	3.125	3.493	236
236	3.250	3.618	237
237	3.375	3.743	238
238	3.500	3.868	239
239	3.625	3.993	240
240	3.750	4.118	241
241	3.875	4.243	242
242	4.000	4.368	243
243	4.125	4.493	244
244	4.250	4.618	245
245	4.375	4.743	246
246	4.500	4.868	247
325	1.498	1.995	326
326	1.623	2.120	327
327	1.748	2.245	328
328	1.873	2.370	329
329	1.998	2.495	330

DASH NO.	B DIA.	A DIA.	O-RING DASH NO. SEE NOTE #2
	+.000 -.002	+.002 -.000	
330	2.123	2.620	331
331	2.248	2.745	332
332	2.373	2.870	333
333	2.498	2.995	334
334	2.623	3.120	335
335	2.748	3.245	336
336	2.873	3.369	337
337	2.997	3.494	338
338	3.122	3.619	339
339	3.247	3.744	340
340	3.372	3.869	341
341	3.497	3.994	342
342	3.622	4.119	343
343	3.747	4.244	344
344	3.872	4.369	345
345	3.997	4.494	346
346	4.122	4.619	347
347	4.247	4.744	348
348	4.372	4.869	349
	+.000 -.003	+.003 -.000	
425	4.497	5.099	426
426	4.622	5.224	427
427	4.747	5.349	428
428	4.872	5.474	429
429	4.997	5.599	430
430	5.122	5.724	431
431	5.247	5.849	432
432	5.372	5.974	433
433	5.497	6.099	434
434	5.622	6.224	435
435	5.747	6.349	436
436	5.872	6.474	437



DASH NO.	G GROOVE WIDTH	R	E MAX.
	+.005 -.000		
006 TO 012	.079	.005/.015	.004
013 TO 027	.079	.005/.015	.005
110 TO 148	.112	.005/.015	.005
210 TO 246	.149	.010/.025	.006
325 TO 348	.221	.020/.030	.007
425 TO 436	.297	.020/.030	.010

NOTES

1. DASH NUMBERS OF THIS DWG. CORRESPOND TO DASH NUMBERS OF ARP 568 UNIFORM DASH NUMBERING SYSTEM FOR O-RINGS.
2. O-RING DASH NUMBERS ARE SHOWN FOR SIZE DESIGNATION ONLY. SELECTION OF O-RING ELASTOMERIC COMPOUND SHOULD BE MADE TO SUIT THE FLUID AND TEMPERATURE ENVIRONMENT OF THE HYDRAULIC OR PNEUMATIC SERVICE IN WHICH THE SEAL WILL BE USED.
3. THE SERIES "B" GLYD RING IS FURNISHED IN WEAR RESISTANT SHAMBAN TURCON (TFE COMPOUND PER SHAMBAN SPEC. 22-53) THE SERIES "B" GLYD RINGS ARE ALSO FURNISHED IN OTHER TFE MATERIALS UPON REQUEST.
4. ROD DIAMETERS ARE PER MIL-P-5514 D

S-12066 D

ITEM NO.	PART NO.	NO. REQ.	MATERIAL, SIZE AND DESCRIPTION

REMOVE ALL BURRS AND BREAK ALL SHARP EDGES TO ——— MAX.

LIMITS ON DIMENSIONS UNLESS OTHERWISE NOTED
.XX DECIMAL = ±.01
.XXX DECIMAL = ±.005
FRACTION = ± 1/32
ANGLES = ± 1/2°

APPROVED BY		11-9-62
CHECKED BY		11-9-62
DRAWN BY	FREVIS	11-8-62

SCALE	MATERIAL	FINISH
NONE	NOTED	

GLYD RING-INSTALLATION I.D. SEAL SERIES "B"

NEXT ASSY. USED ON	QTY. REQ'D.

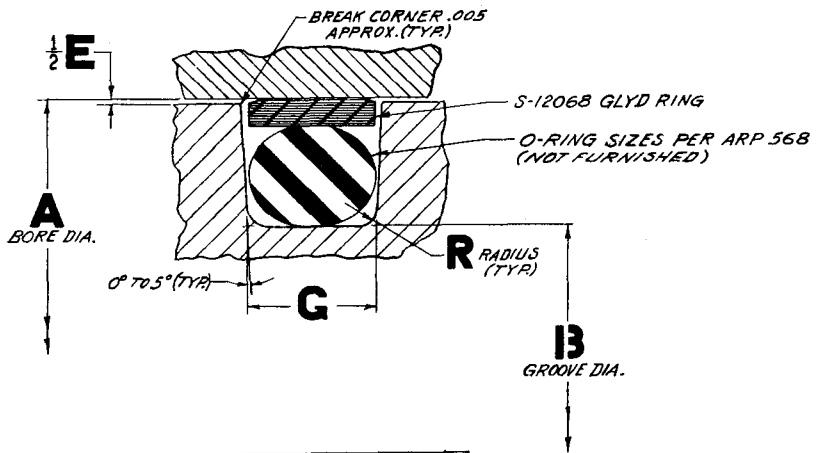
W. S. SHAMBAN & CO.
CULVER CITY, CALIFORNIA — FORT WAYNE, INDIANA

DWG. NO. S-12066 — CHANGE LTR D

DASH NO.	A DIA.	B DIA.	O-RING DASH NO. SEE NOTE #2
	+.001 -.000	+.000 -.001	
006	.235	.108	005
007	.266	.123	006
008	.297	.154	007
009	.329	.185	008
010	.360	.217	009
011	.422	.248	010
012	.485	.310	011
	+.002 -.000	+.000 -.002	
013	.550	.373	012
014	.613	.438	013
015	.675	.501	014
016	.738	.563	015
017	.800	.626	016
018	.863	.688	017
019	.925	.751	018
020	.993	.813	019
021	1.055	.881	020
022	1.118	.943	021
023	1.180	1.006	022
024	1.243	1.068	023
025	1.305	1.131	024
026	1.368	1.193	025
027	1.430	1.256	026
028	1.493	1.318	027
111	.613	.373	110
112	.676	.435	111
113	.738	.498	112
114	.801	.560	113
115	.863	.623	114
116	.926	.685	115
117	.993	.748	116
118	1.056	.815	117
119	1.118	.878	118
120	1.181	.940	119
121	1.243	1.003	120
122	1.306	1.065	121
123	1.368	1.128	122
124	1.431	1.190	123
125	1.493	1.253	124
126	1.558	1.315	125
127	1.620	1.380	126
128	1.683	1.442	127
129	1.742	1.505	128
130	1.805	1.564	129
131	1.867	1.627	130
132	1.930	1.689	131
133	1.992	1.752	132
134	2.055	1.814	133
135	2.118	1.877	134

DASH NO.	A DIA.	B DIA.	O-RING DASH NO. SEE NOTE #2
	+.002 -.000	+.000 -.002	
136	2.180	1.940	135
137	2.243	2.002	136
138	2.305	2.065	137
139	2.368	2.127	138
140	2.430	2.190	139
141	2.493	2.252	140
142	2.555	2.315	141
143	2.618	2.377	142
144	2.680	2.440	143
145	2.743	2.502	144
146	2.805	2.565	145
147	2.868	2.627	146
148	2.930	2.690	147
149	2.993	2.752	148
211	1.053	.748	210
212	1.116	.810	211
213	1.178	.873	212
214	1.241	.935	213
215	1.303	.998	214
216	1.366	1.060	215
217	1.428	1.123	216
218	1.491	1.185	217
219	1.553	1.248	218
220	1.616	1.310	219
221	1.678	1.373	220
222	1.741	1.435	221
223	1.868	1.498	222
224	1.993	1.625	223
225	2.118	1.750	224
226	2.243	1.875	225
227	2.368	2.000	226
228	2.493	2.125	227
229	2.618	2.250	228
230	2.743	2.375	229
231	2.868	2.500	230
232	2.993	2.625	231
233	3.118	2.750	232
234	3.243	2.875	233
235	3.368	3.000	234
236	3.493	3.125	235
237	3.618	3.250	236
238	3.743	3.375	237
239	3.868	3.500	238
240	3.993	3.625	239
241	4.118	3.750	240
242	4.243	3.875	241
243	4.368	4.000	242
244	4.493	4.125	243
245	4.618	4.250	244

DASH NO.	A DIA.	B DIA.	O-RING DASH NO. SEE NOTE #2
	+.002 -.000	+.000 -.002	
246	4.743	4.375	245
247	4.868	4.500	246
326	1.995	1.498	325
327	2.120	1.623	326
328	2.245	1.748	327
329	2.370	1.873	328
330	2.495	1.998	329
331	2.620	2.123	330
332	2.745	2.248	331
333	2.870	2.373	332
334	2.995	2.498	333
335	3.120	2.623	334
336	3.245	2.748	335
337	3.369	2.873	336
338	3.494	2.997	337
339	3.619	3.122	338
340	3.744	3.247	339
341	3.869	3.372	340
342	3.994	3.497	341
343	4.119	3.622	342
344	4.244	3.747	343
345	4.369	3.872	344
346	4.494	3.997	345
347	4.619	4.122	346
348	4.744	4.247	347
349	4.869	4.372	348
	+.003 -.000	+.000 -.003	
426	5.099	4.497	425
427	5.224	4.622	426
428	5.349	4.747	427
429	5.474	4.872	428
430	5.599	4.997	429
431	5.724	5.122	430
432	5.849	5.247	431
433	5.974	5.372	432
434	6.099	5.497	433
435	6.224	5.622	434
436	6.349	5.747	435
437	6.474	5.872	436



DASH NO.	G GROOVE WIDTH	R	E MAX.
	+.005 -.000		
006 TO 012	.079	.005/.015	.004
013 TO 028	.079	.005/.015	.005
111 TO 149	.112	.005/.015	.005
211 TO 247	.149	.010/.025	.006
326 TO 349	.221	.020/.030	.007
426 TO 437	.297	.020/.030	.010

NOTES:-

1. DASH NUMBERS OF THIS DWG. CORRESPOND TO DASH NUMBERS OF ARP 568 UNIFORM DASH NUMBERING SYSTEM FOR O-RINGS.
2. O-RING DASH NUMBERS ARE SHOWN FOR SIZE DESIGNATION ONLY. SELECTION OF O-RING ELASTOMERIC COMPOUND SHOULD BE MADE TO SUIT THE FLUID AND TEMPERATURE ENVIRONMENT OF THE HYDRAULIC OR PNEUMATIC SERVICE IN WHICH THE SEAL WILL BE USED.
3. THE SERIES "B" GLYD RING IS FURNISHED IN WEAR RESISTANT SHAMBAN TURCON (TFE COMPOUND PER SHAMBAN SPEC. ZZ-53) THE SERIES "B" GLYD RINGS ARE ALSO FURNISHED IN OTHER TFE MATERIALS UPON REQUEST.
4. ALL DIMENSIONS SHOWN ARE IN INCHES.
5. BORE DIAMETERS ARE PER MIL-P-5514 D.

S-12068 D

ITEM NO.	PART NO.	NO. REQ.	MATERIAL, SIZE AND DESCRIPTION

REMOVE ALL BURRS AND BREAK ALL SHARP EDGES TO ——— MAX.

LIMITS ON DIMENSIONS UNLESS OTHERWISE NOTED
.XX DECIMAL = ±
.XXX DECIMAL = ±
FRACTION = ± 1/32
ANGLES = ± 1/2°

APPROVED BY		11-13-62
CHECKED BY		11-13-62
DRAWN BY	PEEVS	11-12-62

GLYD RING - INSTALLATION O.D. SEAL SERIES "B"

SCALE	MATERIAL	FINISH
NONE	NOTED	

W. S. SHAMBAN & CO.
CULVER CITY, CALIFORNIA — FORT WAYNE, INDIANA

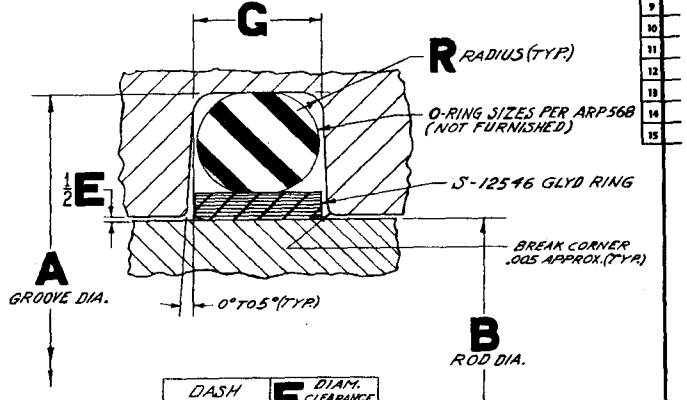
DWG. NO. S-12068 — CHANGE LTR D

NEXT ASSY. USED ON	QTY. REQ'D.

DASH NO.	G ±.005 −.000	B DIA. ±.000 −.001	A DIA. ±.001 −.000	R RADIUS MAX.	"O" RING DASH NO. SEE NOTE #2
006	.079	.125	.268	.020	007
007		.156	.299		008
008		.187	.331		009
009		.219	.362		010
010		.250	.424		011
011		.312	.487		012
012		.375	.547		013
		±.000 −.002	±.002 −.000		
013		.437	.610		014
014		.500	.672		015
015		.562	.735		016
016		.625	.797		017
017		.687	.860		018
018		.750	.922		019
019		.812	.985		020
020		.875	1.047		021
021		.937	1.110		022
022		1.000	1.172		023
023		1.062	1.235		024
024		1.125	1.298		025
025		1.188	1.360		026
026		1.250	1.422		027
027	.079	1.312	1.485		028
		±.000 −.003	±.003 −.000		
110	.112	.375	.611		111
111		.437	.674		112
112		.500	.736		113
113		.562	.799		114
114		.625	.862		115
115		.687	.924		116
116		.750	.986		117
117		.812	1.049		118
118		.875	1.111		119
119		.937	1.174		120
120		1.000	1.236		121
121		1.062	1.299		122
122		1.125	1.362		123
123		1.187	1.424		124
124		1.250	1.486		125
125		1.312	1.549		126
126		1.375	1.611		127
127		1.437	1.674		128
128		1.500	1.736		129
129		1.562	1.799		130
130		1.625	1.862		131
131		1.687	1.924		132
132		1.750	1.986		133
133		1.812	2.049		134
134		1.875	2.111		135
135		1.937	2.174		136
136		2.000	2.236		137
137		2.062	2.299		138
138		2.125	2.362		139
139		2.187	2.424		140
140		2.250	2.486		141
141		2.312	2.549		142
142		2.375	2.611		143
143		2.437	2.674		144
144	.112	2.500	2.736	.020	145

DASH NO.	G ±.005 −.000	B DIA. ±.000 −.003	A DIA. ±.003 −.000	R RADIUS MAX.	"O" RING DASH NO. SEE NOTE #2
145	.112	2.562	2.799	.020	146
146		2.625	2.862		147
147		2.687	2.924		148
148	.112	2.750	2.986	.020	149
		±.000 −.004	±.004 −.000		
210	.149	.750	1.050	.030	211
211		.812	1.113		212
212		.875	1.175		213
213		.937	1.238		214
214		1.000	1.300		215
215		1.062	1.363		216
216		1.125	1.426		217
217		1.187	1.488		218
218		1.250	1.550		219
219		1.312	1.613		220
220		1.375	1.675		221
221		1.437	1.738		222
222		1.500	1.863		223
223		1.625	1.988		224
224		1.750	2.113		225
225		1.875	2.238		226
226		2.000	2.363		227
227		2.125	2.488		228
228		2.250	2.613		229
229		2.375	2.738		230
230		2.500	2.863		231
231		2.625	2.988		232
232		2.750	3.113		233
233		2.875	3.238		234
234		3.000	3.363		235
235		3.125	3.488		236
236		3.250	3.613		237
237		3.375	3.738		238
238		3.500	3.863		239
239		3.625	3.988		240
240		3.750	4.113		241
241		3.875	4.238		242
242		4.000	4.363		243
243		4.125	4.488		244
244		4.250	4.613		245
245		4.375	4.738		246
246		4.500	4.863		247
247	.149	4.625	4.988	.030	248
		±.000 −.003	±.003 −.000		
325	.221	1.500	1.991	.050	326
326		1.625	2.116		327
327		1.750	2.241		328
328		1.875	2.366		329
329		2.000	2.491		330
330		2.125	2.616		331
331		2.250	2.741		332
332		2.375	2.866		333
333		2.500	2.991		334
334		2.625	3.116		335
335		2.750	3.241		336
336		2.875	3.366		337
337		3.000	3.491		338
338	.221	3.125	3.616	.050	339

DASH NO.	G ±.005 −.000	B DIA. ±.000 −.005	A DIA. ±.005 −.000	R RADIUS MAX.	"O" RING DASH NO. SEE NOTE #2
339	.221	3.250	3.741	.050	340
340		3.375	3.866		341
341		3.500	3.991		342
342		3.625	4.116		343
343		3.750	4.241		344
344		3.875	4.366		345
345		4.000	4.491		346
346		4.125	4.616		347
347		4.250	4.741		348
348	.221	4.375	4.866	.050	349
		±.000 −.006	±.006 −.000		
425	.297	4.500	5.093	.060	426
426		4.625	5.218		427
427		4.750	5.343		428
428		4.875	5.468		429
429		5.000	5.593		430
430		5.125	5.718		431
431		5.250	5.843		432
432		5.375	5.968		433
433		5.500	6.093		434
434		5.625	6.218		435
435		5.750	6.343		436
436		5.875	6.468		437
437		6.000	6.718		438
438		6.250	6.968		439
439		6.500	7.218		440
440		6.750	7.468		441
441		7.000	7.718		442
442		7.250	7.968		443
443		7.500	8.218		444
444		7.750	8.468		445
445		8.000	8.968		446
446		8.500	9.468		447
447		9.000	9.968		448
448		9.500	10.468		449
449		10.000	10.968		450
450		10.500	11.468		451
451		11.000	11.968		452
452		11.500	12.468		453
453		12.000	12.968		454
454		12.500	13.468		455
455		13.000	13.968		456
456		13.500	14.468		457
457		14.000	14.968		458
458		14.500	15.468		459
459	.297	15.000	15.968	.060	460



DASH NO.	E DIAM. CLEARANCE MAX.
006 TO 012	.004
013 TO 027 110 TO 129 130 TO 148	.005
210 TO 247	.008
325 TO 348	.007
425 TO 459	.008

1. DASH NUMBERS OF THIS DWG. CORRESPOND TO DASH NUMBERS OF ARP 568 UNIFORM DASH NUMBERING SYSTEM FOR O-RINGS.
2. O-RING DASH NUMBERS ARE SHOWN FOR SIZE DESIGNATION ONLY. SELECTION OF O-RING ELASTOMERIC COMPOUND SHOULD BE MADE TO SUIT THE FLUID AND TEMPERATURE ENVIRONMENT OF THE HYDRAULIC OR PNEUMATIC SERVICE IN WHICH THE SEAL WILL BE USED.
3. THE SERIES "C" GLYD RING IS FURNISHED IN WEAR RESISTANT SHAMBAN TURCON (TFE COMPOUND PER SHAMBAN SPEC. ZZ-53). SERIES "C" GLYD RINGS ARE ALSO FURNISHED IN OTHER TFE MATERIALS UPON REQUEST.
4. ALL DIMENSIONS SHOWN ARE IN INCHES.
5. THE ROD DIAMETERS ARE IN ACCORDANCE WITH RECOMMENDED INDUSTRIAL PRACTICE.

S-12546

B

REMOVE ALL BURRS AND BREAK ALL SHARP EDGES TO —— MAX.

UNLESS OTHERWISE NOTED LIMITS ON DIMENSIONS
XX DECIMAL = ——
XXX DECIMAL = ——
FRACTION = ± 1/32
ANGLES = ± 1/2°

NEXT ASSY. USED ON	QTY. REQ'D.

ITEM NO.	PART NO.	NO. REQ'D.	SIZE AND DESCRIPTION

BILL OF MATERIAL

DRAWN BY	Prems	7-26-62
CHECKED BY		
APPROVED BY	RPD	8/6/62

SCALE	MATERIAL	CHANGE
NONE	NOTED	B

GLYD RING INSTALLATION
I.D. SEAL
SERIES "C"

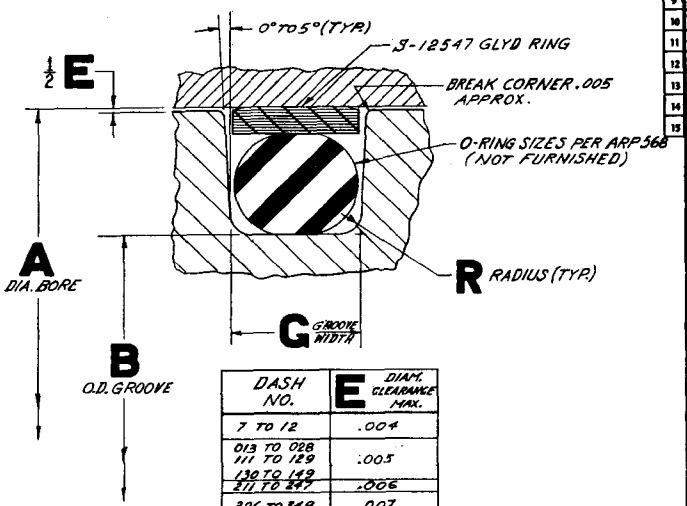
W. S. SHAMBAN & CO.
11617 WEST JEFFERSON BLVD.
CULVER CITY, CALIF.

DWG. NO. S-12546

DASH NO.	G ±.005 -.000	A DIA. ±.001 -.000	B DIA. ±.000 -.001	R RADIUS MAX.	"O" RING DASH NO. SEE NOTE #2
007	.079	.281	.139	.020	006
008		.312	.169		007
009		.344	.200		008
010		.375	.231		009
011		.437	.263		010
012		.500	.325		011
		±.002 -.000	±.000 -.002		
013		.562	.388		012
014		.625	.452		013
015		.687	.515		014
016		.750	.577		015
017		.812	.640		016
018		.875	.702		017
019		.937	.765		018
020		1.000	.827		019
021		1.062	.890		020
022		1.125	.952		021
023		1.188	1.015		022
024		1.250	1.078		023
025		1.312	1.140		024
026		1.375	1.202		025
027		1.437	1.265		026
028	.079	1.500	1.327		027
		±.003 -.000	±.000 -.003		
111	.112	.625	.388		110
112		.687	.451		111
113		.750	.513		112
114		.812	.576		113
115		.875	.638		114
116		.937	.701		115
117		1.000	.763		116
118		1.062	.826		117
119		1.125	.888		118
120		1.188	.951		119
121		1.250	1.013		120
122		1.312	1.076		121
123		1.375	1.138		122
124		1.437	1.201		123
125		1.500	1.263		124
126		1.563	1.326		125
127		1.625	1.388		126
128		1.687	1.451		127
129		1.750	1.513		128
130		1.812	1.576		129
131		1.875	1.638		130
132		1.937	1.701		131
133		2.000	1.763		132
134		2.062	1.826		133
135		2.125	1.888		134
136		2.187	1.951		135
137		2.250	2.013		136
138		2.312	2.076		137
139		2.375	2.138		138
140		2.437	2.201		139
141		2.500	2.263		140
142		2.562	2.326		141
143		2.625	2.388		142
144	.112	2.687	2.451	.020	143

DASH NO.	G ±.005 -.000	A DIA. ±.003 -.000	B DIA. ±.000 -.003	R RADIUS MAX.	"O" RING DASH NO. SEE NOTE #2
145	.112	2.750	2.513	.020	144
146		2.812	2.576		145
147		2.875	2.638		146
148		2.937	2.701		147
149	.112	3.000	2.763	.020	148
		±.004 -.000	±.000 -.004		
211	.149	1.062	.762	.030	210
212		1.125	.824		211
213		1.188	.887		212
214		1.250	.950		213
215		1.312	1.012		214
216		1.375	1.074		215
217		1.437	1.137		216
218		1.500	1.199		217
219		1.562	1.262		218
220		1.625	1.324		219
221		1.688	1.387		220
222		1.750	1.450		221
223		1.875	1.512		222
224		2.000	1.637		223
225		2.125	1.762		224
226		2.250	1.887		225
227		2.375	2.012		226
228		2.500	2.137		227
229		2.625	2.262		228
230		2.750	2.387		229
231		2.875	2.512		230
232		3.000	2.637		231
233		3.125	2.762		232
234		3.250	2.887		233
235		3.375	3.012		234
236		3.500	3.137		235
237		3.625	3.262		236
238		3.750	3.387		237
239		3.875	3.512		238
240		4.000	3.637		239
241		4.125	3.762		240
242		4.250	3.887		241
243		4.375	4.012		242
244		4.500	4.137		243
245		4.625	4.262		244
246		4.750	4.387		245
247	.149	4.875	4.512	.030	246
		±.005 -.000	±.000 -.005		
326	.221	2.000	1.509	.050	325
327		2.125	1.634		326
328		2.250	1.759		327
329		2.375	1.884		328
330		2.500	2.009		329
331		2.625	2.134		330
332		2.750	2.259		331
333		2.875	2.384		332
334		3.000	2.509		333
335		3.125	2.634		334
336		3.250	2.759		335
337		3.375	2.884		336
338		3.500	3.009		337
339	.221	3.625	3.134	.050	338

DASH NO.	G ±.005 -.000	A DIA. ±.005 -.000	B DIA. ±.000 -.005	R RADIUS MAX.	"O" RING DASH NO. SEE NOTE #2
340	.221	3.750	3.259	.050	339
341		3.875	3.384		340
342		4.000	3.509		341
343		4.125	3.634		342
344		4.250	3.759		343
345		4.375	3.884		344
346		4.500	4.009		345
347		4.625	4.134		346
348		4.750	4.259		347
349	.221	4.875	4.384	.050	348
		±.006 -.000	±.000 -.006		
426	.297	5.125	4.532	.060	425
427		5.250	4.657		426
428		5.375	4.782		427
429		5.500	4.907		428
430		5.625	5.032		429
431		5.750	5.157		430
432		5.875	5.282		431
433		6.000	5.407		432
434		6.125	5.532		433
435		6.250	5.657		434
436		6.375	5.782		435
437		6.500	5.907		436
438		6.750	6.032		437
439		7.000	6.282		438
440		7.250	6.532		439
441		7.500	6.782		440
442		7.750	7.032		441
443		8.000	7.282		442
444		8.250	7.532		443
445		8.500	7.782		444
446		9.000	8.032		445
447		9.500	8.532		446
448		10.000	9.032		447
449		10.500	9.532		448
450		11.000	10.032		449
451		11.500	10.532		450
452		12.000	11.032		451
453		12.500	11.532		452
454		13.000	12.032		453
455		13.500	12.532		454
456		14.000	13.032		455
457		14.500	13.532		456
458		15.000	14.032		457
459		15.500	14.532		458
460	.297	16.000	15.032	.060	459



DASH NO.	E DIAM. CLEARANCE MAX.
7 TO 12	.004
013 TO 028 111 TO 129 130 TO 149	.005
211 TO 247	.006
326 TO 349	.007
426 TO 460	.008

1. DASH NUMBERS OF THIS DWG. CORRESPOND TO DASH NUMBERS OF ARP 568 UNIFORM DASH NUMBERING SYSTEM FOR O-RINGS.
2. O-RING DASH NUMBERS ARE SHOWN FOR SIZE DESIGNATION ONLY. SELECTION OF O-RING ELASTOMERIC COMPOUND SHOULD BE MADE TO SUIT THE FLUID AND TEMPERATURE ENVIRONMENT OF THE HYDRAULIC OR PNEUMATIC SERVICE IN WHICH THE SEAL WILL BE USED.
3. THE SERIES "C" GLYD RING IS FURNISHED IN WEAR RESISTANT SHAMBAN TURCON (TFE COMPOUND PER SHAMBAN SPEC. ZZ-53). SERIES "C" GLYD RINGS ARE ALSO FURNISHED IN OTHER TFE MATERIALS UPON REQUEST.
4. ALL DIMENSIONS SHOWN ARE IN INCHES.
5. THE BORE DIAMETERS ARE IN ACCORDANCE WITH RECOMMENDED INDUSTRIAL PRACTICE.

S-12547

B

REMOVE ALL BURRS AND BREAK ALL SHARP EDGES TO MAX.

UNLESS OTHERWISE NOTED LIMITS ON DIMENSIONS
XX DECIMAL =
XXX DECIMAL =
FRACTION = ± 1/32
ANGLES = ± 1/2°

NEXT ASSY. USED ON | QTY. REQ'D.

ITEM NO. | PART NO. | NO. REQ'D. | SIZE AND DESCRIPTION

BILL OF MATERIAL

DRAWN BY Prems 7-25-62
CHECKED BY
APPROVED BY 8/3/62

SCALE NONE | MATERIAL NOTED | CHANGE B

GLYD RING INSTALLATION O.D. SEAL SERIES "C"

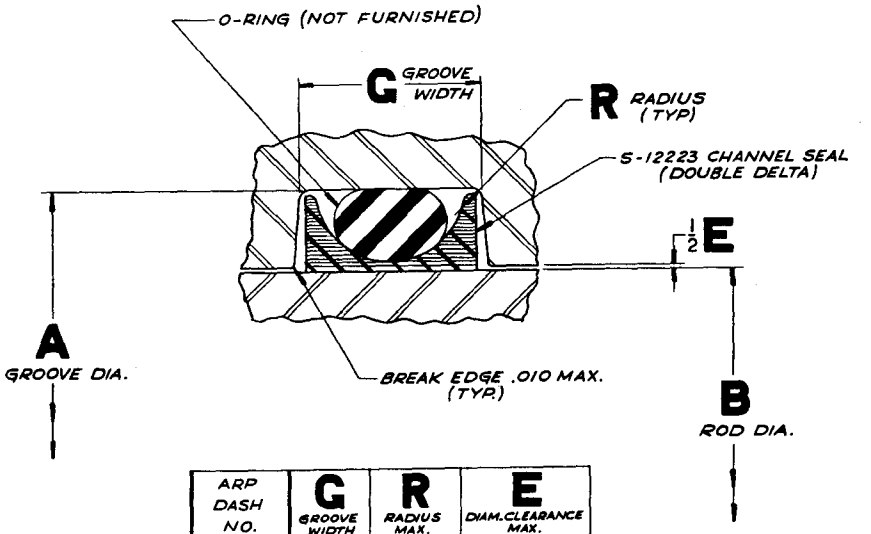
W. S. SHAMBAN & CO.
11617 WEST JEFFERSON BLVD.
CULVER CITY, CALIF.

DWG. NO. S-12547

DASH NO. SEE NOTES 1 & 5			A	B
AN6227 SERIES	AN6230 SERIES	ARP 568	DIA.	DIA.
SIZES 004-013 NOT ASSIGNED			+.002 -.000	+.000 -.002
		014	.610	.498
		015	.672	.560
		016	.735	.623
		017	.797	.685
		018	.860	.748
		019	.922	.810
		020	.985	.873
		021	1.047	.935
		022	1.110	.998
		023	1.172	1.060
		024	1.235	1.123
		025	1.297	1.185
		026	1.360	1.248
		027	1.422	1.310
		028	1.485	1.373
SIZES 110 & 111 NOT ASSIGNED			+.000 -.002	±.001
10		112	.677	.498
11		113	.739	.560
12		114	.802	.623
13		115	.864	.685
14		116	.927	.748
		117	.989	.810
		118	1.052	.873
		119	1.114	.935
		120	1.183	.998
		121	1.239	1.060
		122	1.302	1.123
		123	1.364	1.185
		124	1.427	1.248
		125	1.489	1.310
		126	1.552	1.373
		127	1.614	1.435
SIZES 128-149 NOT ASSIGNED			+.000 -.002	±.001
15		210	.992	.747
16		211	1.054	.809
17		212	1.117	.872
18		213	1.179	.934
19		214	1.242	.997
20		215	1.304	1.059
21		216	1.367	1.122
22		217	1.429	1.184
23		218	1.492	1.247
24		219	1.554	1.309
25		220	1.617	1.372
26		221	1.679	1.434
27		222	1.742	1.497
	1	223	1.867	1.622

DASH NO. SEE NOTES 1 & 5			A	B
AN6227 SERIES	AN6230 SERIES	ARP 568	DIA.	DIA.
			+.000 -.002	±.001
	2	224	1.992	1.747
	3	225	2.117	1.872
	4	226	2.242	1.997
	5	227	2.367	2.122
	6	228	2.492	2.247
	7	229	2.617	2.372
	8	230	2.742	2.497
	9	231	2.867	2.622
	10	232	2.992	2.747
	11	233	3.117	2.872
	12	234	3.242	2.997
	13	235	3.367	3.122
	14	236	3.492	3.247
	15	237	3.617	3.372
	16	238	3.742	3.497
	17	239	3.867	3.622
	18	240	3.992	3.747
	19	241	4.117	3.872
	20	242	4.242	3.997
	21	243	4.367	4.122
	22	244	4.492	4.247
	23	245	4.617	4.372
	24	246	4.742	4.497
	25	247	4.867	4.622
SIZES 248-274 NOT ASSIGNED			+.000 -.002	±.001
28		325	1.871	1.497
29		326	1.996	1.622
30		327	2.121	1.747
31		328	2.246	1.872
32		329	2.371	1.997
33		330	2.496	2.122
34		331	2.621	2.247
35		332	2.746	2.372
36		333	2.871	2.497
37		334	2.996	2.622
38		335	3.121	2.747
39		336	3.246	2.872
40		337	3.370	2.996
41		338	3.495	3.121
42		339	3.620	3.246
43		340	3.745	3.371
44		341	3.870	3.496
45		342	3.995	3.621
46		343	4.120	3.746
47		344	4.245	3.871

DASH NO. SEE NOTES 1 & 5			A	B
AN6227 SERIES	AN6230 SERIES	ARP 568	DIA.	DIA.
			+.000 -.002	±.001
48		345	4.370	3.996
49		346	4.495	4.121
50		347	4.620	4.246
51		348	4.745	4.371
52		349	4.870	4.496
			+.006 -.002	±.001
88		425	4.975	4.496
53		426	5.100	4.621
54		427	5.225	4.746
55		428	5.350	4.871
56		429	5.475	4.996
57		430	5.600	5.121
58		431	5.725	5.246
59		432	5.850	5.371
60		433	5.975	5.496
61		434	6.100	5.621
62		435	6.225	5.746
63		436	6.350	5.871
64		437	6.475	5.996
65		438	6.725	6.246
66		439	6.975	6.496
67		440	7.225	6.746
68		441	7.475	6.996
69		442	7.725	7.246
70		443	7.975	7.496
71		444	8.225	7.746
72		445	8.475	7.996
73		446	8.976	8.496
74		447	9.475	8.996
75		448	9.975	9.496
76		449	10.475	9.996
77		450	10.975	10.496
78		451	11.475	10.996
79		452	11.975	11.496
80		453	12.475	11.996
81		454	12.975	12.496
82		455	13.475	12.996
83		456	13.975	13.496
84		457	14.475	13.996
85		458	14.975	14.496
86		459	15.475	14.996
87		460	15.975	15.496



ARP DASH NO.	G GROOVE WIDTH	R RADIUS MAX.	E DIAM. CLEARANCE MAX.
	+.005 -.000		
014 TO 028	.205	.015	.005
112 TO 127	.238	.015	.005
210 TO 247	.275	.025	.006
325 TO 349	.410	.035	.007
425 TO 429	.538	.035	.008
430 TO 460	.538	.035	.010

NOTES:

1. DASH NO'S OF THIS DWG CORRESPOND TO DASH NO'S OF ARP 568. DASH NO'S OF "AN" SERIES "O" RINGS ARE SHOWN FOR CROSS REFERENCE ONLY.
2. GROOVE AND ROD DIM'S FOR AN6227 AND AN6230 DASH NO'S ARE PER MIL-P-5514, REVISION "A" AND "B", FOR GROOVES USING (2) BACK-UP RINGS.
3. GLAND DIM'S FOR ARP DASH NO'S 014 THRU 028, 117 THRU 127 AND 224 THRU 247, PERMIT DYNAMIC APPLICATIONS USING "O" RINGS NORMALLY RESTRICTED TO STATIC SEALS.
4. THIS DWG INACTIVE FOR NEW DESIGN. FOR NEW DESIGN USING GROOVES PER MIL-P-5514 D. SEE DWG S-12561.
5. TO ORDER SPECIFY THE ARP DASH NO. AS FOLLOWS:

EXAMPLE: S-12223-115
CHANNEL SEAL NO.
SIZE - ARP DASH NO.

S-12223 H

ITEM NO.	PART NO.	NO. REQ.	MATERIAL, SIZE AND DESCRIPTION

REMOVE ALL BURRS AND BREAK ALL SHARP EDGES TO ——— MAX.

LIMITS ON DIMENSIONS UNLESS OTHERWISE NOTED: .XX DECIMAL = ———, .XXX DECIMAL = ———, FRACTION = ± 1/32, ANGLES = ± 1/2°

APPROVED BY Brady 11/4/62
CHECKED BY [illegible] 11/4/62
DRAWN BY S. YAMAMOTO 10-8-62

SCALE NONE | MATERIAL TURCON TFE COMPD 16947 SHAMBAN SPEC 81-53 | FINISH

NEXT ASSY. USED ON | QTY. REQ'D.

W. S. SHAMBAN & CO.
CULVER CITY, CALIFORNIA — FORT WAYNE, INDIANA

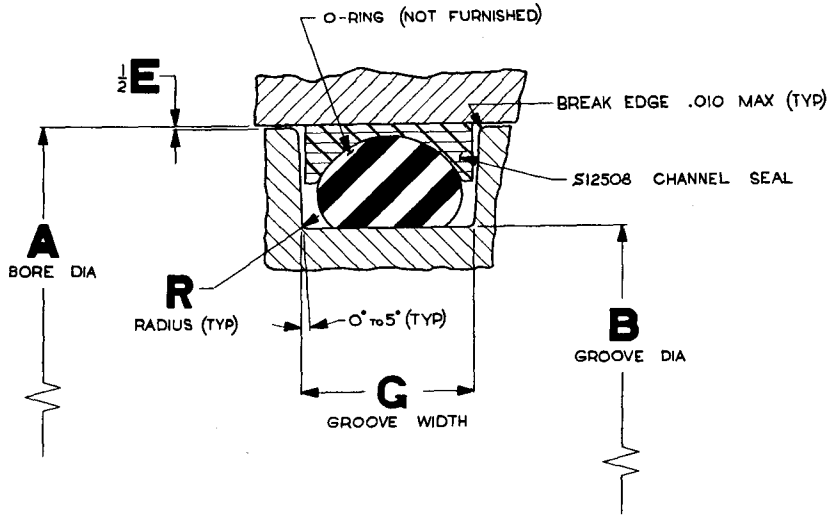
DOUBLE DELTA (CHANNEL SEAL) I.D. INSTALLATION CHART

DWG. NO. S-12223 | CHANGE LTR H

DASH NO.	A DIA	B DIA
	+.001 -.000	+.000 -.001
004	.190	.076
005	.221	.108
006	.235	.123
007	.266	.154
008	.297	.185
009	.329	.217
010	.360	.248
011	.422	.310
012	.485	.373
	+.002 -.000	+.000 -.002
013	.550	.438
014	.613	.501
015	.675	.563
016	.738	.626
017	.800	.688
018	.863	.751
019	.925	.813
020	.993	.881
021	1.055	.943
022	1.118	1.006
023	1.180	1.068
024	1.243	1.131
025	1.305	1.193
026	1.368	1.256
027	1.430	1.318
028	1.493	1.381
	+.002 -.000	+.000 -.002
110	.551	.373
111	.613	.435
112	.676	.498
113	.738	.560
114	.801	.623
115	.863	.685
116	.926	.748
117	.993	.815
118	1.056	.878
119	1.118	.940
120	1.181	1.003
121	1.243	1.065
122	1.306	1.128
123	1.368	1.190
124	1.431	1.253
125	1.493	1.315
126	1.558	1.380
127	1.620	1.442
	+.002 -.000	+.000 -.002
210	.991	.748
211	1.053	.810
212	1.116	.873

DASH NO.	A DIA	B DIA
	+.002 -.000	+.000 -.002
213	1.178	.935
214	1.241	.998
215	1.303	1.060
216	1.366	1.123
217	1.428	1.185
218	1.491	1.248
219	1.553	1.310
220	1.616	1.373
221	1.678	1.435
222	1.741	1.498
223	1.868	1.625
224	1.993	1.750
225	2.118	1.875
226	2.243	2.000
227	2.368	2.125
228	2.493	2.250
229	2.618	2.375
230	2.743	2.500
231	2.868	2.625
232	2.993	2.750
233	3.118	2.875
234	3.243	3.000
235	3.368	3.125
236	3.493	3.250
237	3.618	3.375
238	3.743	3.500
239	3.868	3.625
240	3.993	3.750
241	4.118	3.875
242	4.243	4.000
243	4.368	4.125
244	4.493	4.250
245	4.618	4.375
246	4.743	4.500
247	4.868	4.625
	+.002 -.000	+.000 -.002
325	1.870	1.498
326	1.995	1.623
327	2.120	1.748
328	2.245	1.873
329	2.370	1.998
330	2.495	2.123
331	2.620	2.248
332	2.745	2.373
333	2.870	2.498
334	2.995	2.623
335	3.120	2.748
336	3.245	2.873
337	3.369	2.997

DASH NO.	A DIA	B DIA
	+.002 -.000	+.000 -.002
338	3.494	3.122
339	3.619	3.247
340	3.744	3.372
341	3.869	3.497
342	3.994	3.622
343	4.119	3.747
344	4.244	3.872
345	4.369	3.997
346	4.494	4.122
347	4.619	4.247
348	4.744	4.372
349	4.869	4.497
	+.003 -.000	+.000 -.003
425	4.974	4.497
426	5.099	4.622
427	5.224	4.747
428	5.349	4.872
429	5.474	4.997
430	5.599	5.122
431	5.724	5.247
432	5.849	5.372
433	5.974	5.497
434	6.099	5.622
435	6.224	5.747
436	6.349	5.872
437	6.474	5.997
438	6.724	6.247
439	6.974	6.497
440	7.224	6.747
441	7.474	6.997
442	7.724	7.247
443	7.974	7.497
444	8.224	7.747
445	8.474	7.997
446	8.974	8.497
447	9.474	8.997
448	9.974	9.497
449	10.474	9.997
450	10.974	10.497
451	11.474	10.997
452	11.974	11.497
453	12.474	11.997
454	12.974	12.497
455	13.474	12.997
456	13.974	13.497
457	14.474	13.997
458	14.974	14.497
459	15.474	14.997
460	15.974	15.497



DASH NO.	G GROOVE WIDTH	R RADIUS	E DIA CLEARANCE MAX
	+.010 -.000		
004 TO 012	.207	.005 TO .015	.004
013 TO 028	.207	.005 TO .015	.005
110 TO 127	.245	.005 TO .015	.005
210 TO 247	.304	.010 TO .025	.006
325 TO 349	.424	.020 TO .030	.007
425 TO 460	.579	.020 TO .030	.010

NOTES:

1. DASH NO'S OF THIS DWG CORRESPOND TO DASH NO'S OF ARP 568 UNIFORM DASH NUMBERING SYSTEM FOR O-RINGS.
2. BORE AND GROOVE DIM'S ARE PER MIL-P-5514 REVISION C & D FOR GROOVES USING TWO (2) BACK-UP RINGS.
3. FOR GROOVES PER MIL-P-5514 REVISIONS A & B SEE DWG S12716
4. TO ORDER SPECIFY AS FOLLOWS:
   EXAMPLE; S12508 - 115
   CHANNEL SEAL NO. —
   SIZE DASH NO. —

S12508 A

ITEM NO.	PART NO.	NO. REQ.	MATERIAL, SIZE AND DESCRIPTION

REMOVE ALL BURRS AND BREAK ALL SHARP EDGES TO ——— MAX.

LIMITS ON DIMENSIONS UNLESS OTHERWISE NOTED
.XX DECIMAL = ———
.XXX DECIMAL = ———
FRACTION = ± 1/32
ANGLES = ± 1/2°

APPROVED BY		3-15-63
CHECKED BY	Brady	3/15/63
DRAWN BY	J. DEZSO	3-14-63

SCALE	MATERIAL	FINISH
NONE	TURCON TFE COMP'D 16947 SHAMBAN SPEC 7259	

DOUBLE DELTA (CHANNEL SEAL) I.D. INSTALLATION CHART

NEXT ASSY. USED ON	QTY. REQ'D.

W. S. SHAMBAN & CO.
CULVER CITY, CALIFORNIA — FORT WAYNE, INDIANA

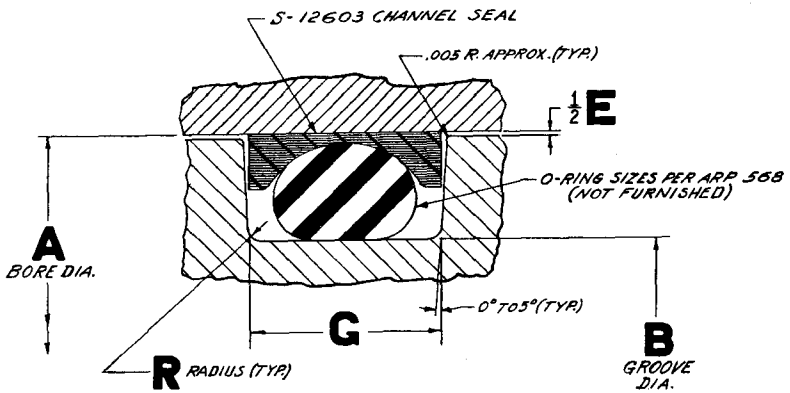
DWG. NO. S12508 — CHANGE LTR A

DASH NO.	A DIA.	B DIA.
	+.001 -.000	+.000 -.001
006	.235	.123
007	.266	.154
008	.297	.185
009	.329	.217
010	.360	.248
011	.422	.310
012	.485	.373
	+.002 -.000	+.000 -.002
013	.550	.438
014	.613	.501
015	.675	.563
016	.738	.626
017	.800	.688
018	.863	.751
019	.925	.813
020	.993	.881
021	1.055	.943
022	1.118	1.006
023	1.180	1.068
024	1.243	1.131
025	1.305	1.193
026	1.368	1.256
027	1.430	1.318
028	1.493	1.381
	+.002 -.000	+.000 -.003
110	.551	.373
111	.613	.435
112	.676	.498
113	.738	.560
114	.801	.623
115	.863	.685
116	.926	.748
117	.993	.815
118	1.056	.878
119	1.118	.940
120	1.181	1.003
121	1.243	1.065
122	1.306	1.128
123	1.368	1.190
124	1.431	1.253
125	1.493	1.315
126	1.558	1.380

DASH NO.	A DIA.	B DIA.
	+.002 -.000	+.000 -.002
127	1.620	1.442
128	1.683	1.505
129	1.742	1.564
130	1.805	1.627
131	1.867	1.689
132	1.930	1.752
133	1.992	1.814
134	2.055	1.877
135	2.118	1.940
136	2.180	2.002
137	2.243	2.065
138	2.305	2.127
139	2.368	2.190
140	2.430	2.252
141	2.493	2.315
142	2.555	2.377
143	2.618	2.440
144	2.680	2.502
145	2.743	2.565
146	2.805	2.627
147	2.868	2.690
148	2.930	2.752
149	2.993	2.815
	+.002 -.000	+.000 -.002
210	.991	.748
211	1.053	.810
212	1.116	.873
213	1.178	.935
214	1.241	.998
215	1.303	1.060
216	1.366	1.123
217	1.428	1.185
218	1.491	1.248
219	1.553	1.310
220	1.616	1.373
221	1.678	1.435
222	1.741	1.498
223	1.868	1.625
224	1.993	1.750
225	2.118	1.875
226	2.243	2.000
227	2.368	2.125

DASH NO.	A DIA.	B DIA.
	+.002 -.000	+.000 -.002
228	2.493	2.250
229	2.618	2.375
230	2.743	2.500
231	2.868	2.625
232	2.993	2.750
233	3.118	2.875
234	3.243	3.000
235	3.368	3.125
236	3.493	3.250
237	3.618	3.375
238	3.743	3.500
239	3.868	3.625
240	3.993	3.750
241	4.118	3.875
242	4.243	4.000
243	4.368	4.125
244	4.493	4.250
245	4.618	4.375
246	4.743	4.500
247	4.868	4.625
	+.002 -.000	+.000 -.002
325	1.870	1.498
326	1.995	1.623
327	2.120	1.748
328	2.245	1.873
329	2.370	1.998
330	2.495	2.123
331	2.620	2.248
332	2.745	2.373
333	2.870	2.498
334	2.995	2.623
335	3.120	2.748
336	3.245	2.873
337	3.369	2.997
338	3.494	3.122
339	3.619	3.247
340	3.744	3.372
341	3.869	3.497
342	3.994	3.622
343	4.119	3.747
344	4.244	3.872

DASH NO.	A DIA.	B DIA.
	+.002 -.000	+.000 -.002
345	4.369	3.997
346	4.494	4.122
347	4.619	4.247
348	4.744	4.372
349	4.869	4.497
	+.003 -.000	+.000 -.003
425	4.974	4.497
426	5.099	4.622
427	5.224	4.747
428	5.349	4.872
429	5.474	4.997
430	5.599	5.122
431	5.724	5.247
432	5.849	5.372
433	5.974	5.497
434	6.099	5.622
435	6.224	5.747
436	6.349	5.872
437	6.474	5.997
438	6.724	6.247
439	6.974	6.497
440	7.224	6.747
441	7.474	6.997
442	7.724	7.247
443	7.974	7.497
444	8.224	7.747
445	8.474	7.997
446	8.974	8.497
447	9.474	8.997
448	9.974	9.497
449	10.474	9.997
450	10.974	10.497
451	11.474	10.997
452	11.974	11.497
453	12.474	11.997
454	12.974	12.497
455	13.474	12.997
456	13.974	13.497
457	14.474	13.997
458	14.974	14.497
459	15.474	14.997
460	15.974	15.497



DASH NO.	G GROOVE WIDTH	R	E MAX.
	+.010 -.000		
006 TO 012	.149	.005/.015	.004
013 TO 028	.149	.005/.015	.005
110 TO 149	.183	.005/.015	.005
210 TO 247	.225	.010/.025	.006
325 TO 349	.334	.020/.030	.007
425 TO 460	.440	.020/.030	.010

S-12603

NOTES:-

1. DASH NUMBERS OF THIS DWG. CORRESPOND TO DASH NUMBERS OF ARP 568 UNIFORM DASH NUMBERING SYSTEM FOR O-RINGS.
2. BORE AND GROOVE DIM'S ARE PER MIL-P-5514C&D FOR GROOVE USING ONE BACK-UP RING.
3. FOR INSTALLATION SUGGESTIONS SEE DWG. 16-130.
4. TO ORDER SPECIFY AS FOLLOWS:-

EXAMPLE: S-12603 - 325

CHANNEL SEAL NO. —— S-12603

SIZE DASH NO. —— 325

ITEM NO.	PART NO.	NO. REQ.	MATERIAL, SIZE AND DESCRIPTION

REMOVE ALL BURRS AND BREAK ALL SHARP EDGES TO —— MAX.

LIMITS ON DIMENSIONS UNLESS OTHERWISE NOTED .XX DECIMAL = —— .XXX DECIMAL = —— FRACTION = ± 1/32 ANGLES = ± 1/2°

APPROVED BY	[illegible]	12 MAY 62
CHECKED BY	[illegible]	12/14/62
DRAWN BY	[illegible]	12-8-62

SCALE: NONE

MATERIAL: TURCON TFE COMP'D #1847 SHAMBAN SPEC. 12-55

FINISH

DOUBLE DELTA (CHANNEL SEAL) I.D. INSTALLATION CHART

W. S. SHAMBAN & CO.
CULVER CITY, CALIFORNIA — FORT WAYNE, INDIANA

DWG. NO. S-12603

CHANGE LTR

NEXT ASSY. USED ON

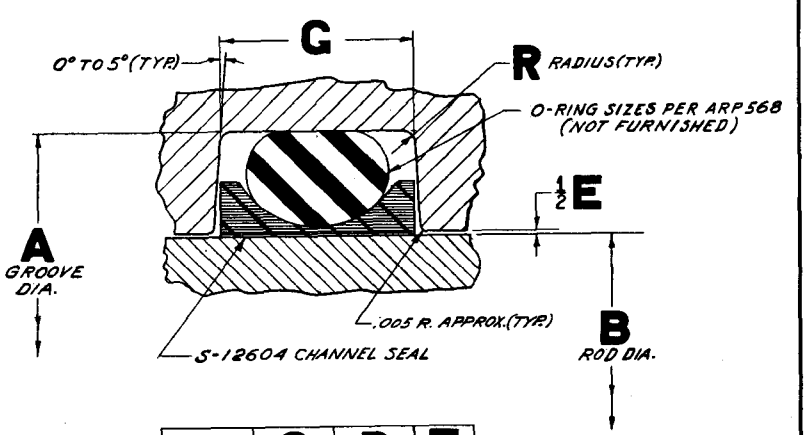
QTY. REQ'D.

DASH NO.	A DIA.	B DIA.
	+.001 -.000	+.000 -.001
006	.235	.123
007	.266	.154
008	.297	.185
009	.329	.217
010	.360	.248
011	.422	.310
012	.485	.373
	+.002 -.000	+.000 -.002
013	.550	.438
014	.613	.501
015	.675	.563
016	.738	.626
017	.800	.688
018	.863	.751
019	.925	.813
020	.993	.881
021	1.055	.943
022	1.118	1.006
023	1.180	1.068
024	1.243	1.131
025	1.305	1.193
026	1.368	1.256
027	1.430	1.318
028	1.493	1.381
	+.002 -.000	+.000 -.002
110	.551	.373
111	.613	.435
112	.676	.498
113	.738	.560
114	.801	.623
115	.863	.685
116	.926	.748
117	.993	.815
118	1.056	.878
119	1.118	.940
120	1.181	1.003
121	1.243	1.065
122	1.306	1.128
123	1.368	1.190
124	1.431	1.253
125	1.493	1.315
126	1.558	1.380

DASH NO.	A DIA.	B DIA.
	+.002 -.000	+.000 -.002
127	1.620	1.442
128	1.683	1.505
129	1.742	1.564
130	1.805	1.627
131	1.867	1.689
132	1.930	1.752
133	1.992	1.814
134	2.055	1.877
135	2.118	1.940
136	2.180	2.002
137	2.243	2.065
138	2.305	2.127
139	2.368	2.190
140	2.430	2.252
141	2.493	2.315
142	2.555	2.377
143	2.618	2.440
144	2.680	2.502
145	2.743	2.565
146	2.805	2.627
147	2.868	2.690
148	2.930	2.752
149	2.993	2.815
	+.002 -.000	+.000 -.002
210	.991	.748
211	1.053	.810
212	1.116	.873
213	1.178	.935
214	1.241	.998
215	1.303	1.060
216	1.366	1.123
217	1.428	1.185
218	1.491	1.248
219	1.553	1.310
220	1.616	1.373
221	1.678	1.435
222	1.741	1.498
223	1.868	1.625
224	1.993	1.750
225	2.118	1.875
226	2.243	2.000
227	2.368	2.125

DASH NO.	A DIA.	B DIA.
	+.002 -.000	+.000 -.002
228	2.493	2.250
229	2.618	2.375
230	2.743	2.500
231	2.868	2.625
232	2.993	2.750
233	3.118	2.875
234	3.243	3.000
235	3.368	3.125
236	3.493	3.250
237	3.618	3.375
238	3.743	3.500
239	3.868	3.625
240	3.993	3.750
241	4.118	3.875
242	4.243	4.000
243	4.368	4.125
244	4.493	4.250
245	4.618	4.375
246	4.743	4.500
247	4.868	4.625
	+.002 -.000	+.000 -.002
325	1.870	1.498
326	1.995	1.623
327	2.120	1.748
328	2.245	1.873
329	2.370	1.998
330	2.495	2.123
331	2.620	2.248
332	2.745	2.373
333	2.870	2.498
334	2.995	2.623
335	3.120	2.748
336	3.245	2.873
337	3.369	2.997
338	3.494	3.122
339	3.619	3.247
340	3.744	3.372
341	3.869	3.497
342	3.994	3.622
343	4.119	3.747
344	4.244	3.872

DASH NO.	A DIA.	B DIA.
	+.002 -.000	+.000 -.002
345	4.369	3.997
346	4.494	4.122
347	4.619	4.247
348	4.744	4.372
349	4.869	4.497
	+.003 -.000	+.000 -.003
425	4.974	4.497
426	5.099	4.622
427	5.224	4.747
428	5.349	4.872
429	5.474	4.997
430	5.599	5.122
431	5.724	5.247
432	5.849	5.372
433	5.974	5.497
434	6.099	5.622
435	6.224	5.747
436	6.349	5.872
437	6.474	5.997
438	6.724	6.247
439	6.974	6.497
440	7.224	6.747
441	7.474	6.997
442	7.724	7.247
443	7.974	7.497
444	8.224	7.747
445	8.474	7.997
446	8.974	8.497
447	9.474	8.997
448	9.974	9.497
449	10.474	9.997
450	10.974	10.497
451	11.474	10.997
452	11.974	11.497
453	12.474	11.997
454	12.974	12.497
455	13.474	12.997
456	13.974	13.497
457	14.474	13.997
458	14.974	14.497
459	15.474	14.997
460	15.974	15.497



DASH NO.	G GROOVE WIDTH	R	E MAX.
	+.010 -.000		
006 TO 012	.149	.005/.015	.004
013 TO 028	.149	.005/.015	.005
110 TO 149	.183	.005/.015	.005
210 TO 247	.225	.010/.025	.006
325 TO 349	.334	.020/.030	.007
425 TO 460	.440	.020/.030	.010

S-12604

NOTES:-

1. DASH NUMBERS OF THIS DWG. CORRESPOND TO DASH NUMBERS OF ARP 568 UNIFORM DASH NUMBERING SYSTEM FOR O-RINGS.
2. ROD AND GROOVE DIM'S ARE PER MIL-P-5514C & D FOR GROOVE USING ONE BACK-UP RING.
3. FOR INSTALLATION SUGGESTIONS SEE DWG. 16-130.
4. TO ORDER SPECIFY AS FOLLOWS:-

   EXAMPLE: S-12604 - 325

   CHANNEL SEAL NO. ——— S-12604

   SIZE DASH NO. ——— 325

ITEM NO.	PART NO.	NO. REQ.	MATERIAL, SIZE AND DESCRIPTION

REMOVE ALL BURRS AND BREAK ALL SHARP EDGES TO ——— MAX.

LIMITS ON DIMENSIONS UNLESS OTHERWISE NOTED
.XX DECIMAL = ±
.XXX DECIMAL = ±
FRACTION = ± 1/32
ANGLES = ± 1/2°

APPROVED BY	GJ	12/19/62
CHECKED BY	Brady	12/19/62
DRAWN BY	Peters	12-7-62

SCALE: NONE

MATERIAL: TURCON TFE COMPD. 1604T SHAMBAN SPEC. 22-55

FINISH

DOUBLE DELTA (CHANNEL SEAL) I.D. INSTALLATION CHART

W. S. SHAMBAN & CO.
CULVER CITY, CALIFORNIA — FORT WAYNE, INDIANA

DWG. NO. S-12604

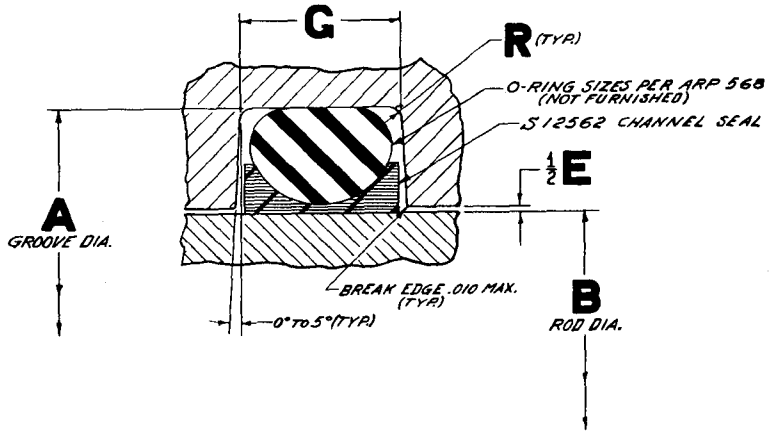
CHANGE LTR

NEXT ASSY. USED ON

QTY. REQ'D.

DASH Nº	A DIA.	B DIA.
	+.001 -.000	+.005 -.001
004	.190	.076
005	.221	.108
006	.235	.123
007	.266	.154
008	.297	.185
009	.329	.217
010	.360	.248
011	.422	.310
012	.485	.373
	+.002 -.000	+.000 -.002
110	.551	.373
111	.613	.435
112	.676	.498
113	.738	.560
114	.801	.623
115	.863	.685
116	.926	.748
210	.991	.748
211	1.053	.810
212	1.116	.873
213	1.178	.935
214	1.241	.998
215	1.303	1.060
216	1.366	1.123
217	1.428	1.185
218	1.491	1.248
219	1.553	1.310
220	1.616	1.373
221	1.678	1.435
222	1.741	1.498
325	1.870	1.498
326	1.995	1.623
327	2.120	1.748
328	2.245	1.873
329	2.370	1.998
330	2.495	2.123
331	2.620	2.248
332	2.745	2.373
333	2.870	2.498
334	2.995	2.623
335	3.120	2.748
336	3.245	2.873
337	3.369	2.997
338	3.494	3.122
339	3.619	3.247

DASH Nº	A DIA.	B DIA.
	+.003 -.000	+.003 -.003
340	3.744	3.372
341	3.869	3.497
342	3.994	3.622
343	4.119	3.747
344	4.244	3.872
345	4.369	3.997
346	4.494	4.122
347	4.619	4.247
348	4.744	4.372
349	4.869	4.497
	+.003 -.000	+.000 -.003
425	4.974	4.497
426	5.099	4.622
427	5.224	4.747
428	5.349	4.872
429	5.474	4.997
430	5.599	5.122
431	5.724	5.247
432	5.849	5.372
433	5.974	5.497
434	6.099	5.622
435	6.224	5.747
436	6.349	5.872
437	6.474	5.997
438	6.724	6.247
439	6.974	6.497
440	7.224	6.747
441	7.474	6.997
442	7.724	7.247
443	7.974	7.497
444	8.224	7.747
445	8.474	7.997
446	8.974	8.497
447	9.474	8.997
448	9.974	9.497
449	10.474	9.997
450	10.974	10.497
451	11.474	10.997
452	11.974	11.497
453	12.474	11.997
454	12.974	12.497
455	13.474	12.997
456	13.974	13.497
457	14.474	13.997
458	14.974	14.497
459	15.474	14.997
460	15.974	15.497



DASH Nº	G GROOVE WIDTH	R RADIUS MAX.	E DIAMETRAL CLEARANCE MAX.
	+.010 -.000		
004-012	.094	.005/.013	.004
110-116	.141	.005/.018	.005
210-222	.188	.010/.025	.006
325-329	.281	.020/.030	.007
425-460	.375	.020/.030	.010

NOTES:-

1. DASH NUMBERS OF THIS DWG. CORRESPOND TO DASH NUMBERS OF ARP 568 UNIFORM DASH NUMBERING SYSTEM FOR O-RINGS.
2. ROD AND GROOVE DIM'S ARE PER MIL-P-5514 REVISION C & D FOR GROOVE USING NO BACK-UP RING.
3. THESE CHANNEL SEALS MAY ALSO BE USED IN ROD & GROOVES DIMENSIONED PER MIL-P-5514 REVISION A & B.
4. FOR INSTALLATION SUGGESTIONS SEE DWG 16-130.
5. TO ORDER, SPECIFY AS FOLLOWS:-

EXAMPLE: — — — S12562 — 215

CHANNEL SEAL PART Nº

SIZE DASH Nº

S12562 A

ITEM NO.	PART NO.	NO. REQ.	MATERIAL, SIZE AND DESCRIPTION

REMOVE ALL BURRS AND BREAK ALL SHARP EDGES TO ——— MAX.

LIMITS ON DIMENSIONS UNLESS OTHERWISE NOTED: .XX DECIMAL = ———; .XXX DECIMAL = ———; FRACTION = ± 1/32; ANGLES = ± 1/2°

APPROVED BY [illegible] 8-21-63

CHECKED BY

DRAWN BY Prellis 8-6-63

SCALE NONE

MATERIAL TURCON TFE COMPD. 6947 (MANUFACT. SPEC. 12.38)

FINISH

DOUBLE DELTA (CHANNEL SEAL) I.D. INSTALLATION CHART

NEXT ASSY. USED ON

QTY. REQ'D.

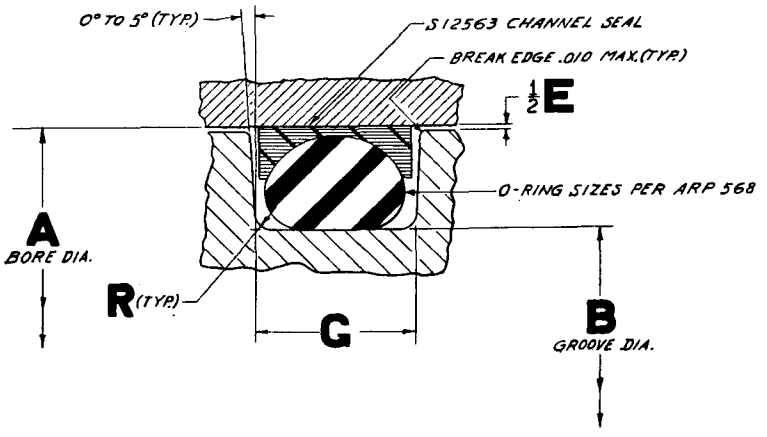
W. S. SHAMBAN & CO.
CULVER CITY, CALIFORNIA
FORT WAYNE, INDIANA

DWG. NO. S12562

CHANGE LTR A

DASH Nº	A DIA.	B DIA.
	+.001 -.000	+.000 -.001
004	.190	.076
005	.221	.108
006	.235	.123
007	.266	.154
008	.297	.185
009	.329	.217
010	.360	.248
011	.422	.310
012	.485	.373
	+.002 -.000	+.000 -.002
110	.551	.373
111	.613	.435
112	.676	.498
113	.738	.560
114	.801	.623
115	.863	.685
116	.926	.748
210	.991	.748
211	1.053	.810
212	1.116	.873
213	1.178	.935
214	1.241	.998
215	1.303	1.060
216	1.366	1.123
217	1.428	1.185
218	1.491	1.248
219	1.553	1.310
220	1.616	1.373
221	1.678	1.435
222	1.741	1.498
325	1.870	1.498
326	1.995	1.623
327	2.120	1.748
328	2.245	1.873
329	2.370	1.998
330	2.495	2.123
331	2.620	2.248
332	2.745	2.373
333	2.870	2.498
334	2.995	2.623
335	3.120	2.748
336	3.245	2.873
337	3.369	2.997
338	3.494	3.122
339	3.619	3.247

DASH Nº	A DIA.	B DIA.
	+.002 -.000	+.000 -.002
340	3.744	3.372
341	3.869	3.497
342	3.994	3.622
343	4.119	3.747
344	4.244	3.872
345	4.369	3.997
346	4.494	4.122
347	4.619	4.247
348	4.744	4.372
349	4.869	4.497
	+.003 -.000	+.000 -.003
425	4.974	4.497
426	5.099	4.622
427	5.224	4.747
428	5.349	4.872
429	5.474	4.997
430	5.599	5.122
431	5.724	5.247
432	5.849	5.372
433	5.974	5.497
434	6.099	5.622
435	6.224	5.747
436	6.349	5.872
437	6.474	5.997
438	6.724	6.247
439	6.974	6.497
440	7.224	6.747
441	7.474	6.997
442	7.724	7.247
443	7.974	7.497
444	8.224	7.747
445	8.474	7.997
446	8.974	8.497
447	9.474	8.997
448	9.974	9.497
449	10.474	9.997
450	10.974	10.497
451	11.474	10.997
452	11.974	11.497
453	12.474	11.997
454	12.974	12.497
455	13.474	12.997
456	13.974	13.497
457	14.474	13.997
458	14.974	14.497
459	15.474	14.997
460	15.974	15.497



DASH Nº	G GROOVE WIDTH	R RADIUS MAX.	E DIAMETRAL CLEARANCE
	+.010 -.000		
004 - 012	.094	.005/.015	.004
110 - 116	.141	.005/.015	.005
210 - 222	.188	.010/.020	.006
325 - 349	.281	.020/.030	.007
425 - 460	.375	.020/.030	.010

NOTES:-

1. DASH NUMBERS OF THIS DWG. CORRESPOND TO DASH NUMBERS OF ARP 568 UNIFORM DASH NUMBERING SYSTEM FOR O-RINGS.
2. BORE AND GROOVE DIMS ARE PER MIL-P-5514 REVISION C & D FOR GROOVES USING NO BACK-UP RINGS.
3. THESE CHANNEL SEALS MAY ALSO BE USED IN BORE & GROOVES DIMENSIONED PER MIL-P-5514 REVISION A & B.
4. FOR INSTALLATION SUGGESTIONS SEE DWG. 16-130.
5. TO ORDER, SPECIFY AS FOLLOWS:-

EXAMPLE: — — — S12563 — 215

CHANNEL SEAL PART Nº

SIZE DASH Nº

S12563 | A

ITEM NO.	PART NO.	NO. REQ.	MATERIAL, SIZE AND DESCRIPTION

REMOVE ALL BURRS AND BREAK ALL SHARP EDGES TO ——— MAX.

LIMITS ON DIMENSIONS UNLESS OTHERWISE NOTED
XX DECIMAL = ———
XXX DECIMAL = ———
FRACTION = ± 1/32
ANGLES = ± 1/2°

APPROVED BY — 6-21-63
CHECKED BY —
DRAWN BY Timms 6-18-63

SCALE NONE

MATERIAL TURCON TYPE CONPO 16941 SHAMBAN SPEC. 12-33

FINISH

DOUBLE DELTA (CHANNEL SEAL) O.D. INSTALLATION CHART

NEXT ASSY. USED ON	QTY. REQ'D.

W. S. SHAMBAN & CO.
CULVER CITY, CALIFORNIA
FORT WAYNE, INDIANA

DWG. NO. S12563

CHANGE LTR A

DASH NO. AN6227 SERIES	DASH NO. AN6230 SERIES	DASH NO. ARP 568	A DIA.	B DIA.
			+.001 -.000	+.000 -.001
		004	.190	.076
		005	.221	.108
1		006	.235	.123
2		007	.266	.154
3		008	.297	.185
4		009	.329	.217
5		010	.360	.248
6		011	.422	.310
7		012	.485	.373
			+.002 -.000	+.000 -.002
		013	.550	.438
		014	.613	.501
		015	.675	.563
		016	.738	.626
		017	.800	.688
		018	.863	.751
		019	.925	.813
		020	.993	.881
		021	1.055	.943
		022	1.118	1.006
		023	1.180	1.068
		024	1.243	1.131
		025	1.305	1.193
		026	1.368	1.256
		027	1.430	1.318
		028	1.493	1.381
8		110	.551	.373
9		111	.613	.435
10		112	.676	.498
11		113	.738	.560
12		114	.801	.623
13		115	.863	.685
14		116	.926	.748
		117	.993	.815
		118	1.056	.878
		119	1.118	.940
		120	1.181	1.003
		121	1.243	1.065
		122	1.306	1.128
		123	1.368	1.190
		124	1.431	1.253
		125	1.493	1.315
		126	1.558	1.380
		127	1.620	1.442
		128	1.683	1.505
		129	1.742	1.564
		130	1.805	1.627
		131	1.867	1.689
		132	1.930	1.752
		133	1.992	1.814
		134	2.055	1.877
		135	2.118	1.940
		136	2.180	2.002
		137	2.243	2.065
		138	2.305	2.127
		139	2.368	2.190
		140	2.430	2.252
		141	2.493	2.315
		142	2.555	2.377
		143	2.618	2.440
		144	2.680	2.502
		145	2.743	2.565
		146	2.805	2.627
		147	2.868	2.690
		148	2.930	2.752
		149	2.993	2.815
	15	210	.991	.748
	16	211	1.053	.810
	17	212	1.116	.873
	18	213	1.178	.935
	19	214	1.241	.998
	20	215	1.303	1.060
	21	216	1.366	1.123
	22	217	1.428	1.185
	23	218	1.491	1.248
	24	219	1.553	1.310
	25	220	1.616	1.373
	26	221	1.678	1.435
	27	222	1.741	1.498
	1	223	1.868	1.625
	2	224	1.993	1.750
			+.002 -.000	+.000 -.002
	3	225	2.118	1.875
	4	226	2.243	2.000
	5	227	2.368	2.125
	6	228	2.493	2.250
	7	229	2.618	2.375
	8	230	2.743	2.500
	9	231	2.868	2.625
	10	232	2.993	2.750
	11	233	3.118	2.875
	12	234	3.243	3.000
	13	235	3.368	3.125
	14	236	3.493	3.250
	15	237	3.618	3.375
	16	238	3.743	3.500
	17	239	3.868	3.625
	18	240	3.993	3.750
	19	241	4.118	3.875
	20	242	4.243	4.000
	21	243	4.368	4.125
	22	244	4.493	4.250
28		325	1.870	1.498
29		326	1.995	1.623
30		327	2.120	1.748
31		328	2.245	1.873
32		329	2.370	1.998
33		330	2.495	2.123
34		331	2.620	2.248
35		332	2.745	2.373
36		333	2.870	2.498
37		334	2.995	2.623
38		335	3.120	2.748
39		336	3.245	2.873
40		337	3.369	2.997
41		338	3.494	3.122
42		339	3.619	3.247
43		340	3.744	3.372
44		341	3.869	3.497
45		342	3.994	3.622
46		343	4.119	3.747
47		344	4.244	3.872
			+.002 -.000	+.000 -.002
48		345	4.369	3.997
49		346	4.494	4.122
50		347	4.619	4.247
51		348	4.744	4.372
52		349	4.869	4.497
			+.003 -.000	+.000 -.003
88		425	4.974	4.497
53		426	5.099	4.622
54		427	5.224	4.747
55		428	5.349	4.872
56		429	5.474	4.997
57		430	5.599	5.122
58		431	5.724	5.247
59		432	5.849	5.372
60		433	5.974	5.497
61		434	6.099	5.622
62		435	6.224	5.747
63		436	6.349	5.872
64		437	6.474	5.997
65		438	6.724	6.247
66		439	6.974	6.497
67		440	7.224	6.747
68		441	7.474	6.997
69		442	7.724	7.247
70		443	7.974	7.497
71		444	8.224	7.747
72		445	8.474	7.997
73		446	8.974	8.497
74		447	9.474	8.997
75		448	9.974	9.497
76		449	10.474	9.997
77		450	10.974	10.497
78		451	11.474	10.997
79		452	11.974	11.497
80		453	12.474	11.997
81		454	12.974	12.497
82		455	13.474	12.997
83		456	13.974	13.497
84		457	14.474	13.997
85		458	14.974	14.497
86		459	15.474	14.997
87		460	15.974	15.497

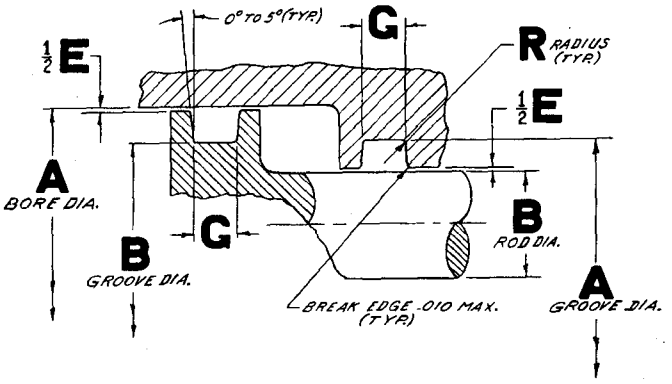
LTR.	REVISION	BY	DATE

GLAND DIMENSIONS

FOR

SHAMBAN RECIPROCATING AND STATIC SEALS

[PER MIL-P-5514D]



DASH NO.	GROOVE WIDTH G_0 NO BACK-UP RING	GROOVE WIDTH G_1 ONE BACK-UP RING	GROOVE WIDTH G_2 TWO BACK-UP RINGS	R	E MAX.
	+.010 -.000	+.010 -.000	+.010 -.000		
004 TO 012	.094	.149	.207	.005/.015	.004
013 TO 028	.094	.149	.207	.005/.015	.005
110 TO 149	.141	.183	.245	.005/.015	.005
210 TO 247	.188	.225	.304	.010/.025	.006
325 TO 349	.281	.334	.424	.020/.030	.007
425 TO 460	.375	.440	.579	.020/.030	.010

S-12601

NOTES:-

1. ALL DIMENSIONS ARE IN INCHES.
2. DIMENSIONS SHOWN ARE RECOMMENDED FOR BOTH RECIPROCATING AND STATIC APPLICATIONS.
3. REFER TO APPLICABLE SHAMBAN SEAL DRAWINGS TO DETERMINE PROPER GROOVE TO USE.
4. THIS INFORMATION MAY BE REPRODUCED FOR THE INTERNAL USE OF W.S. SHAMBAN & CO. CUSTOMERS, PROVIDING, SOURCE OF INFORMATION IS ACKNOWLEGED.
5. AERONAUTICAL RECOMMENDED PRACTICE NO. 568 DESCRIBES A STANDARD UNIFORM DASH NUMBERING SYSTEM FOR O-RINGS AN SERIES O-RING DASH NO'S SHOWN FOR CROSS REF. PURPOSES.

ITEM NO.	PART NO.	NO. REQ.	MATERIAL, SIZE AND DESCRIPTION

REMOVE ALL BURRS AND BREAK ALL SHARP EDGES TO —— MAX.

LIMITS ON DIMENSIONS UNLESS OTHERWISE NOTED .XX DECIMAL = ±—— .XXX DECIMAL = ±—— FRACTION = ± 1/32 ANGLES = ± 1/2°

APPROVED BY		11/1/62
CHECKED BY		11/1/62
DRAWN BY	PREVIS	11-6-62

SCALE: NONE | MATERIAL | FINISH

SEAL GLANDS

MIL-P-5514D

NEXT ASSY. USED ON	QTY. REQ'D.

W. S. SHAMBAN & CO.

CULVER CITY, CALIFORNIA — FORT WAYNE, INDIANA

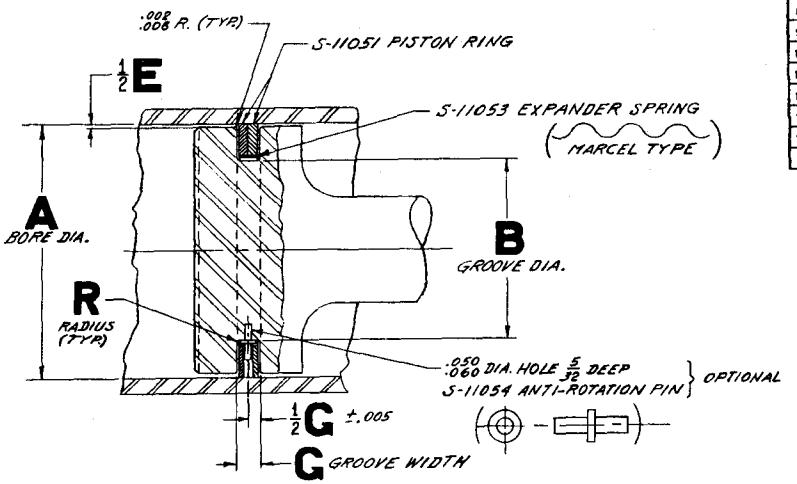
DWG. NO. S-12601

CHANGE LTR

DASH NO.	A BORE DIA.	B GROOVE DIA.	G GROOVE WIDTH	R RADIUS MAX.
	±.001	±.004	±.001	
8	.500	.254		
9	.562	.316		
10	.625	.379		
11	.687	.441		
12	.750	.442		
13	.812	.504		
14	.875	.567		
15	.937	.629		
	+.002 -.000			
16	1.000	.692		
17	1.062	.754		
18	1.125	.817		
19	1.187	.879		
20	1.250	.942		
21	1.312	1.004		
22	1.375	1.067		
23	1.437	1.005		
24	1.500	1.068		
25	1.562	1.130		
26	1.625	1.193	.126	.020
27	1.687	1.255		
28	1.750	1.318		
29	1.812	1.380		
30	1.875	1.443		
31	1.937	1.505		
32	2.000	1.568		
33	2.062	1.630		
34	2.125	1.693		
35	2.187	1.755		
36	2.250	1.818		
37	2.312	1.880		
38	2.375	1.943		
39	2.437	2.005		
40	2.500	2.068		
41	2.562	2.130		
42	2.625	2.193		
43	2.687	2.255		
44	2.750	2.318		
45	2.812	2.380		

DASH NO.	A BORE DIA.	B GROOVE DIA.	G GROOVE WIDTH	R RADIUS MAX.
	+.002 -.000	±.004	±.001	
46	2.875	2.443		
47	2.937	2.505		
48	3.000	2.568		
49	3.062	2.630		
50	3.125	2.693		
51	3.187	2.755		
52	3.250	2.818		
53	3.312	2.880		.020
	+.003 -.000			
54	3.375	2.943	.126	
55	3.437	3.005		
56	3.500	3.068		
57	3.562	3.130		
58	3.625	3.193		
59	3.687	3.255		
60	3.750	3.318		
61	3.812	3.380		
62	3.875	3.443		
63	3.937	3.505		
64	4.000	3.568		
65	4.125	3.565		
66	4.250	3.690		
67	4.375	3.815		
68	4.500	3.940		
69	4.625	4.065		
70	4.750	4.190		
71	4.875	4.315		
72	5.000	4.440		.030
73	5.125	4.565		
74	5.250	4.690	.189	
75	5.375	4.815		
76	5.500	4.940		
77	5.625	5.065		
78	5.750	5.190		
79	5.875	5.315		
80	6.000	5.440		
81	6.125	5.565		
82	6.250	5.690		
83	6.375	5.815		

DASH NO.	A BORE DIA.	B GROOVE DIA.	G GROOVE WIDTH	R RADIUS MAX.
	+.003 -.000	±.004	±.001	
84	6.500	5.940		
85	6.625	6.065		
86	6.750	6.190		
87	6.875	6.315		
88	7.000	6.440		
89	7.250	6.690	.189	.030
90	7.500	6.940		
91	7.750	7.190		
92	8.000	7.440		
93	8.500	7.940		
94	9.000	8.440		
95	9.500	8.940		



DASH NO.	E DIAM. CLEARANCE
8 - 48	.005
49 - 64	.006
65 - 71	.007
72 - 95	.008

S-11052

C

NOTES:

1. TO ORDER, SPECIFY THE FOLLOWING:-
   EXAMPLE: S-11052 — 24 — Q OR P SEE NOTE 2
   PISTON RING SET NO.
   SIZE DASH NO.
   TYPE
2. TWO TYPES OF PISTON RINGS ARE AVAILABLE:
   S-11052 TYPE Q, WITHOUT S-11054 ANTI-ROTATION PIN
   S-11052 TYPE P, WITH S-11054 ANTI-ROTATION PIN
3. THE S-11052 SERIES PISTON RING IS FURNISHED IN SETS CONSISTING OF TWO(2) S-11051 PISTON RINGS, AND ONE(1) S-11053 EXPANDER.
4. DASH NO'S OF THIS DWG. CORRESPOND TO DASH NO'S OF S-11051 PISTON RING AND S-11053 EXPANDER.

ITEM NO.	PART NO.	NO. REQ'D.	SIZE AND DESCRIPTION
	S-11054	1	MAT'L: 18-8 ANNEALED TYPE 303
	S-11053	1	MAT'L: S/S TYPE 301 FULL HARD MIL-S-5059
	S-11051	2	MAT'L: VIRGIN TFE SHAMBAN SPEC 22-53

BILL OF MATERIAL

REMOVE ALL BURRS AND BREAK ALL SHARP EDGES TO — MAX.

UNLESS OTHERWISE NOTED LIMITS ON DIMENSIONS
.XX DECIMAL = —
.XXX DECIMAL = —
FRACTION = ± 1/32
ANGLES = ± 1/2°

NEXT ASSY. USED ON

QTY. REQ'D.

DRAWN BY	Previs	9-18-62
CHECKED BY		
APPROVED BY	Johnson	9-18-62

SCALE	MATERIAL	CHANGE
NONE	NOTED	C

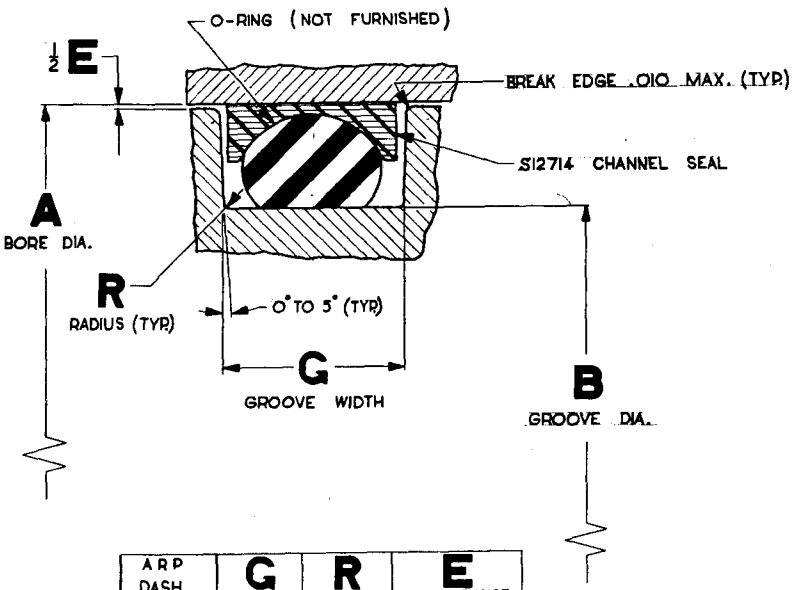
PISTON RING SET-INSTALLATION

W. S. SHAMBAN & CO.
11617 WEST JEFFERSON BLVD.
CULVER CITY, CALIF.

DWG. NO. S-11052

DASH NO. SEE NOTES 1 & 4		A	B
AN6227 SERIES	ARP 568	DIA. ±.001	DIA. +.002 −.000
-1	006	.250	.137
-2	007	.281	.168
-3	008	.312	.199
-4	009	.344	.231
-5	010	.375	.262
-6	011	.4375	.3245
-7	012	.500	.387
-8	110	.5625	.3835
-9	111	.625	.446
-10	112	.6875	.5085
-11	113	.750	.571
-12	114	.8125	.6335
-13	115	.875	.696
-14	116	.9375	.7585
-15	210	1.001	.756
-16	211	1.063	.818
-17	212	1.126	.881
-18	213	1.188	.943
-19	214	1.251	1.006
-20	215	1.313	1.068
-21	216	1.376	1.131
-22	217	1.438	1.193
-23	218	1.501	1.256
-24	219	1.563	1.318
-25	220	1.626	1.381
-26	221	1.688	1.443
-27	222	1.751	1.506
-28	325	1.876	1.502
-29	326	2.001	1.627
-30	327	2.126	1.752
-31	328	2.251	1.877
-32	329	2.376	2.002
-33	330	2.501	2.127
-34	331	2.626	2.252
-35	332	2.751	2.377
-36	333	2.876	2.502
-37	334	3.001	2.627
-38	335	3.126	2.752
-39	336	3.251	2.877
-40	337	3.377	3.003
-41	338	3.502	3.128
-42	339	3.627	3.253
-43	340	3.752	3.378

DASH NO. SEE NOTES 1 & 4		A	B
AN6227 SERIES	ARP 568	DIA. ±.001	DIA. +.002 −.000
-44	341	3.877	3.503
-45	342	4.002	3.628
-46	343	4.127	3.753
-47	344	4.252	3.878
-48	345	4.377	4.003
-49	346	4.502	4.128
-50	347	4.627	4.253
-51	348	4.752	4.378
-52	349	4.877	4.503
-68	425	5.003	4.524
-53	426	5.128	4.649
-54	427	5.253	4.774
-55	428	5.378	4.899
-56	429	5.503	5.024
-57	430	5.628	5.149
-58	431	5.753	5.274
-59	432	5.878	5.399
-60	433	6.003	5.524
-61	434	6.128	5.649
-62	435	6.253	5.774
-63	436	6.378	5.899
-64	437	6.503	6.024
-65	438	6.753	6.274
-66	439	7.003	6.524
-67	440	7.253	6.774
-68	441	7.503	7.024
-69	442	7.753	7.274
-70	443	8.003	7.524
-71	444	8.253	7.774
-72	445	8.503	8.024
-73	446	9.003	8.524
-74	447	9.503	9.024
-75	448	10.003	9.524
-76	449	10.503	10.024
-77	450	11.003	10.524
-78	451	11.503	11.024
-79	452	12.003	11.524
-80	453	12.503	12.024
-81	454	13.003	12.524
-82	455	13.503	13.024
-83	456	14.003	13.524
-84	457	14.503	14.024
-85	458	15.003	14.524
-86	459	15.503	15.024
-87	460	16.003	15.524



ARP DASH NO.	G GROOVE WIDTH +.005 −.000	R RADIUS MAX.	E DIA. CLEARANCE MAX.
006 TO 012	.138	.015	.005
110 TO 116	.171	.015	.005
210 TO 222	.208	.025	.006
325 TO 349	.311	.035	.007
425 TO 429	.408	.035	.008
430 TO 460	.408	.035	.010

S12714 B

NOTES:

1. DASH NO'S OF THIS DWG CORRESPOND TO DASH NO'S OF ARP 568. DASH NO'S OF "AN" SERIES O-RINGS ARE SHOWN FOR CROSS REFERENCE ONLY.
2. BORE AND GROOVE DIM'S FOR AN6227 DASH NO'S ARE PER MIL-P-5514 REVISION "A" AND "B", FOR GROOVES USING (1) BACK-UP RING.
3. THIS DWG INACTIVE FOR NEW DESIGN. FOR NEW DESIGN USING GROOVES PER MIL-P-5514D SEE DWG S12508.
4. TO ORDER - SPECIFY THE ARP DASH NO. AS FOLLOWS:
   EXAMPLE: S12714 - 115
   CHANNEL SEAL NO. —
   SIZE - ARP DASH NO. —

ITEM NO.	PART NO.	NO. REQ.	MATERIAL, SIZE AND DESCRIPTION

REMOVE ALL BURRS AND BREAK ALL SHARP EDGES TO ——— MAX.

LIMITS ON DIMENSIONS UNLESS OTHERWISE NOTED: .XX DECIMAL ±, .XXX DECIMAL ±, FRACTION ± 1/32, ANGLES ± 1/2°

APPROVED BY		3-4-63
CHECKED BY		3/6/63
DRAWN BY	J. DEZSO	3-6-63

DOUBLE DELTA (CHANNEL SEAL) I.D. INSTALLATION CHART

SCALE	MATERIAL	FINISH
NONE	TURCON TFE COMP'D 16947 SHAMBAN SPEC 22-30	

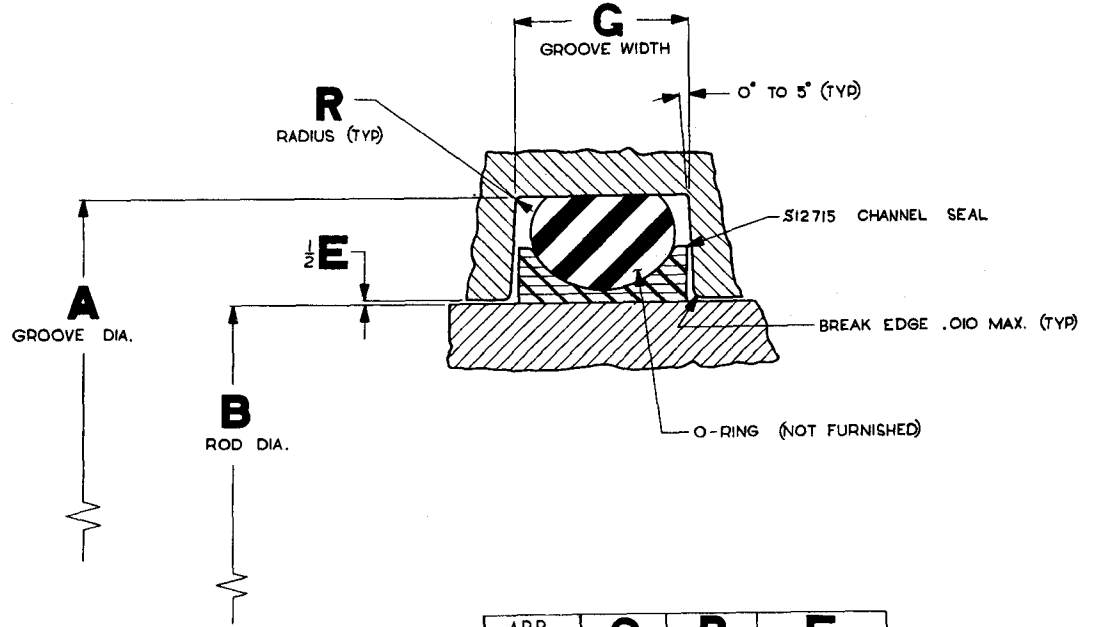
NEXT ASSY. USED ON	QTY. REQ'D.

W. S. SHAMBAN & CO.
CULVER CITY, CALIFORNIA — FORT WAYNE, INDIANA

DWG. NO. S12714 — CHANGE LTR B

DASH NO. SEE NOTES 1 & 4		A	B
AN6227 SERIES	ARP 568	DIA. +.000 -.002	DIA. ±.001
1	006	.236	.123
2	007	.267	.154
3	008	.298	.185
4	009	.330	.217
5	010	.361	.248
6	011	.423	.310
7	012	.486	.373
8	110	.552	.373
9	111	.614	.435
10	112	.677	.498
11	113	.739	.560
12	114	.802	.623
13	115	.864	.685
14	116	.927	.748
15	210	.992	.747
16	211	1.054	.809
17	212	1.117	.872
18	213	1.179	.934
19	214	1.242	.997
20	215	1.304	1.059
21	216	1.367	1.122
22	217	1.429	1.184
23	218	1.492	1.247
24	219	1.554	1.309
25	220	1.617	1.372
26	221	1.679	1.434
27	222	1.742	1.497
28	325	1.871	1.497
29	326	1.996	1.622
30	327	2.121	1.747
31	328	2.246	1.872
32	329	2.371	1.997
33	330	2.496	2.122
34	331	2.621	2.247
35	332	2.746	2.372
36	333	2.871	2.497
37	334	2.996	2.622
38	335	3.121	2.747
39	336	3.246	2.872
40	337	3.370	2.996
41	338	3.495	3.121
42	339	3.620	3.246
43	340	3.745	3.371

DASH NO. SEE NOTES 1 & 4		A	B
AN6227 SERIES	ARP 568	DIA. +.000 -.002	DIA. ±.001
44	341	3.870	3.496
45	342	3.995	3.621
46	343	4.120	3.746
47	344	4.245	3.871
48	345	4.370	3.996
49	346	4.495	4.121
50	347	4.620	4.246
51	348	4.745	4.371
52	349	4.870	4.496
88	425	4.975	4.496
53	426	5.100	4.621
54	427	5.225	4.746
55	428	5.350	4.871
56	429	5.475	4.996
57	430	5.600	5.121
58	431	5.725	5.246
59	432	5.850	5.371
60	433	5.975	5.496
61	434	6.100	5.621
62	435	6.225	5.746
63	436	6.350	5.871
64	437	6.475	5.996
65	438	6.725	6.246
66	439	6.975	6.496
67	440	7.225	6.746
68	441	7.475	6.996
69	442	7.725	7.246
70	443	7.975	7.496
71	444	8.225	7.746
72	445	8.475	7.996
73	446	8.975	8.496
74	447	9.475	8.996
75	448	9.975	9.496
76	449	10.475	9.996
77	450	10.975	10.496
78	451	11.475	10.996
79	452	11.975	11.496
80	453	12.475	11.996
81	454	12.975	12.496
82	455	13.475	12.996
83	456	13.975	13.496
84	457	14.475	13.996
85	458	14.975	14.496
86	459	15.475	14.996
87	460	15.975	15.496



ARP DASH NO.	G GROOVE WIDTH +.005 -.000	R RADIUS MAX.	E DIA. CLEARANCE MAX.
006 to 012	.138	.015	.005
110 to 116	.171	.015	.005
210 to 222	.208	.025	.006
325 to 349	.311	.035	.007
425 to 429	.408	.035	.008
430 to 460	.408	.035	.010

NOTES:
1. DASH NO'S OF THIS DWG CORRESPOND TO DASH NO'S OF ARP 568. DASH NO'S OF "AN" SERIES O-RINGS ARE SHOWN FOR CROSS REFERANCE ONLY.
2. ROD & GROOVE DIM'S FOR AN6227 DASH NO'S ARE PER MIL-P-5514 REVISIONS "A" & "B", FOR GROOVES USING (1) BACK-UP RING.
3. THIS DWG INACTIVE FOR NEW DESIGN. FOR NEW DESIGN USING GROOVES PER MIL-P-5514D SEE DWG S12604.
4. TO ORDER SPECIFY THE ARP DASH NO. AS FOLLOWS:
   EXAMPLE: S12715 - 115
   CHANNEL SEAL NO. —— S12715
   SIZE - ARP DASH NO. —— 115

C
S12715

ITEM NO.	PART NO.	NO. REQ.	MATERIAL, SIZE AND DESCRIPTION

REMOVE ALL BURRS AND BREAK ALL SHARP EDGES TO ——— MAX.

LIMITS ON DIMENSIONS UNLESS OTHERWISE NOTED
.XX DECIMAL = ±
.XXX DECIMAL = ±
FRACTION = ± 1/32
ANGLES = ± 1/2°

APPROVED BY	3/13/63
CHECKED BY	3/19/63
DRAWN BY	J. DEZSO 3-12-63

SCALE	MATERIAL	FINISH
NONE	TURCON TFE COMP'D 16947 SHAMBAN SPEC. 3253	———

DOUBLE DELTA (CHANNEL SEAL) I.D. INSTALLATION CHART

NEXT ASSY. USED ON	QTY. REQ'D.

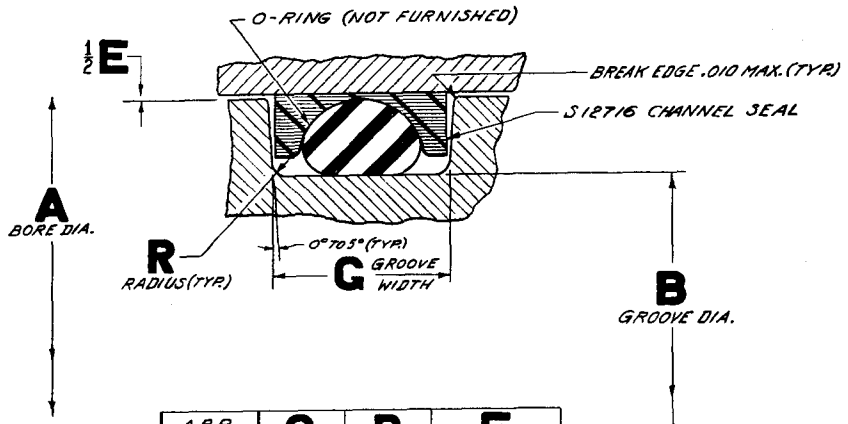
W. S. SHAMBAN & CO.
CULVER CITY, CALIFORNIA — FORT WAYNE, INDIANA

DWG. NO. S12715 — CHANGE LTR C

DASH NO. SEE NOTES 1 & 5			A	B
AN6227 SERIES	AN6230 SERIES	ARP 568	DIA.	DIA.
			±.001	+.002 −.000
8		110	.5625	.3835
9		111	.625	.446
10		112	.6875	.5085
11		113	.750	.571
12		114	.8125	.6335
13		115	.875	.696
14		116	.9375	.7585
			±.001	+.002 −.000
15		210	1.001	.756
16		211	1.063	.818
17		212	1.126	.881
18		213	1.188	.943
19		214	1.251	1.006
20		215	1.313	1.068
21		216	1.376	1.131
22		217	1.438	1.193
23		218	1.501	1.256
24		219	1.563	1.318
25		220	1.626	1.381
26		221	1.688	1.443
27		222	1.751	1.506
	1	223	1.876	1.631
	2	224	2.001	1.756
	3	225	2.126	1.881
	4	226	2.251	2.006
	5	227	2.376	2.131
	6	228	2.501	2.256
	7	229	2.626	2.381
	8	230	2.751	2.506
	9	231	2.876	2.631
	10	232	3.001	2.756
	11	233	3.126	2.881
	12	234	3.251	3.006
	13	235	3.376	3.131
	14	236	3.501	3.256
	15	237	3.626	3.381

DASH NO. SEE NOTES 1 & 5			A	B
AN6227 SERIES	AN6230 SERIES	ARP 568	DIA.	DIA.
			±.001	+.002 −.000
	16	238	3.751	3.506
	17	239	3.876	3.631
	18	240	4.001	3.756
	19	241	4.126	3.881
	20	242	4.251	4.006
	21	243	4.376	4.131
	22	244	4.501	4.256
	23	245	4.626	4.381
	24	246	4.751	4.506
	25	247	4.876	4.631
			±.001	+.002 −.000
28		325	1.876	1.502
29		326	2.001	1.627
30		327	2.126	1.752
31		328	2.251	1.877
32		329	2.376	2.002
33		330	2.501	2.127
34		331	2.626	2.252
35		332	2.751	2.377
36		333	2.876	2.502
37		334	3.001	2.627
38		335	3.126	2.752
39		336	3.251	2.877
40		337	3.377	3.003
41		338	3.502	3.128
42		339	3.627	3.253
43		340	3.752	3.378
44		341	3.877	3.503
45		342	4.002	3.628
46		343	4.127	3.753
47		344	4.252	3.878
48		345	4.377	4.003
49		346	4.502	4.128
50		347	4.627	4.253
51		348	4.752	4.378
52		349	4.877	4.503

DASH NO. SEE NOTES 1 & 5			A	B
AN6227 SERIES	AN6230 SERIES	ARP 568	DIA.	DIA.
			±.001	+.002 −.000
88		425	5.003	4.524
53		426	5.128	4.649
54		427	5.253	4.774
55		428	5.378	4.899
56		429	5.503	5.024
57		430	5.628	5.149
58		431	5.753	5.274
59		432	5.878	5.399
60		433	6.003	5.524
61		434	6.128	5.649
62		435	6.253	5.774
63		436	6.378	5.899
64		437	6.503	6.024
65		438	6.753	6.274
66		439	7.003	6.524
67		440	7.253	6.774
68		441	7.503	7.024
69		442	7.753	7.274
70		443	8.003	7.524
71		444	8.253	7.774
72		445	8.503	8.024
73		446	9.003	8.524
74		447	9.503	9.024
75		448	10.003	9.524
76		449	10.503	10.024
77		450	11.003	10.524
78		451	11.503	11.024
79		452	12.003	11.524
80		453	12.503	12.024
81		454	13.003	12.524
82		455	13.503	13.024
83		456	14.003	13.524
84		457	14.503	14.024
85		458	15.003	14.524
86		459	15.503	15.024
87		460	16.003	15.524



ARP DASH NO.	G GROOVE WIDTH	R RADIUS MAX.	E DIAM. CLEARANCE MAX.
	+.005 −.000		
110 TO 116	.238	.015	.005
210 TO 247	.275	.025	.006
325 TO 349	.410	.035	.007
425 TO 429	.538	.035	.008
430 TO 460	.538	.035	.010

NOTES:

1. DASH NO'S OF THIS DWG CORRESPOND TO DASH NO'S OF ARP 568. DASH NO'S OF "AN" SERIES O-RINGS ARE SHOWN FOR CROSS REFERENCE ONLY.
2. BORE AND GROOVE DIM'S FOR AN6227 AND AN6230 DASH NO'S ARE PER MIL-P-5514 REVISION "A" AND "B", FOR GROOVES USING (2) BACK-UP RINGS.
3. GLAND DIM'S FOR ARP DASH NO'S 223 THRU 247 PERMIT DYNAMIC APPLICATIONS USING O-RINGS NORMALLY RESTRICTED TO STATIC SEALS.
4. THIS DWG INACTIVE FOR NEW DESIGN. FOR NEW DESIGN USING GROOVES PER MIL-P-5514 D SEE DWG S12508.
5. TO ORDER SPECIFY THE ARP DASH NO. AS FOLLOWS:
   EXAMPLE: S12716 - 115
   CHANNEL SEAL NO. —
   SIZE-ARP DASH NO. —

S12716 C

ITEM NO.	PART NO.	NO. REQ.	MATERIAL, SIZE AND DESCRIPTION

REMOVE ALL BURRS AND BREAK ALL SHARP EDGES TO ——— MAX.

LIMITS ON DIMENSIONS UNLESS OTHERWISE NOTED
.XX DECIMAL = ———
.XXX DECIMAL = ———
FRACTION = ± 1/32
ANGLES = ± 1/2°

APPROVED BY	[illegible]	3/1/63
CHECKED BY	Grady	3/1/63
DRAWN BY	Travis	3-5-63

SCALE	MATERIAL	FINISH
	TURCON TFE COMPD 16947 SHAMBAN SPEC 20-55	

DOUBLE DELTA (CHANNEL SEAL) I.D. INSTALLATION CHART

W. S. SHAMBAN & CO.
CULVER CITY, CALIFORNIA — FORT WAYNE, INDIANA

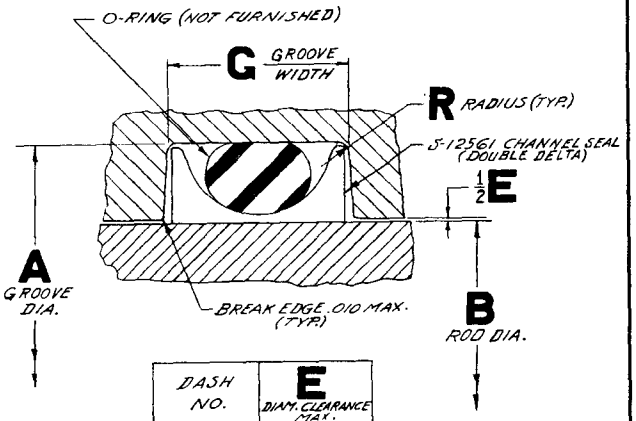
DWG. NO. S12716 — CHANGE LTR C

NEXT ASSY. USED ON — QTY. REQ'D.

DASH NO.	A GROOVE	B ROD	G WIDTH	R RADIUS
	+.002 -.000	+.000 -.002	+.010 -.000	±.005
014	.613	.501		
015	.675	.563		
016	.738	.626		
017	.800	.688		
018	.863	.751		
019	.925	.813		
020	.993	.881		
021	1.055	.943	.207	
022	1.118	1.006		
023	1.180	1.068		
024	1.243	1.131		
025	1.305	1.193		
026	1.368	1.256		
027	1.430	1.318		
028	1.493	1.381		
	+.002 -.000	+.000 -.002	+.010 -.000	.010
112	.676	.498		
113	.738	.560		
114	.801	.623		
115	.863	.685		
116	.926	.748		
117	.993	.815		
118	1.056	.878		
119	1.118	.940		
120	1.181	1.003	.245	
121	1.243	1.065		
122	1.306	1.128		
123	1.368	1.190		
124	1.431	1.253		
125	1.495	1.315		
126	1.558	1.380		
127	1.620	1.442		
	+.002 -.000	+.000 -.002	+.010 -.000	±.0075
210	.991	.748		
211	1.053	.810		
212	1.116	.873		
213	1.178	.935		
214	1.241	.998		
215	1.303	1.060		
216	1.366	1.123		
217	1.428	1.185		
218	1.491	1.248		
219	1.553	1.310	.304	.0175
220	1.616	1.373		
221	1.678	1.435		
222	1.741	1.498		
223	1.868	1.625		
224	1.993	1.750		
225	2.118	1.875		
226	2.243	2.000		
227	2.368	2.125		
228	2.493	2.250		
229	2.618	2.375		

DASH NO.	A GROOVE	B ROD	G WIDTH	R RADIUS
	+.002 -.000	+.000 -.002	+.010 -.000	±.0075
230	2.743	2.500		
231	2.868	2.625		
232	2.993	2.750		
233	3.118	2.875		
234	3.243	3.000		
235	3.368	3.125		
236	3.493	3.250		
237	3.618	3.375		
238	3.743	3.500		
239	3.868	3.625	.304	.0175
240	3.993	3.750		
241	4.118	3.875		
242	4.243	4.000		
243	4.368	4.125		
244	4.493	4.250		
245	4.618	4.375		
246	4.743	4.500		
247	4.868	4.625		
	+.002 -.000	+.000 -.002	+.010 -.000	±.005
325	1.870	1.498		
326	1.995	1.623		
327	2.120	1.748		
328	2.245	1.873		
329	2.370	1.998		
330	2.495	2.123		
331	2.620	2.248		
332	2.745	2.373		
333	2.870	2.498		
334	2.995	2.623		
335	3.120	2.748		
336	3.245	2.873		
337	3.369	2.997	.424	.025
338	3.494	3.122		
339	3.619	3.247		
340	3.744	3.372		
341	3.869	3.497		
342	3.994	3.622		
343	4.119	3.747		
344	4.244	3.872		
345	4.369	3.997		
346	4.494	4.122		
347	4.619	4.247		
348	4.744	4.372		
349	4.869	4.497		
	+.003 -.000	+.000 -.003	+.010 -.000	±.005
425	4.974	4.497		
426	5.099	4.622		
427	5.224	4.747	.579	.025
428	5.349	4.872		
429	5.474	4.997		

DASH NO.	A GROOVE	B ROD	G WIDTH	R RADIUS
	+.003 -.000	+.000 -.003	+.010 -.000	±.005
430	5.599	5.122		
431	5.724	5.247		
432	5.849	5.372		
433	5.974	5.497		
434	6.099	5.622		
435	6.224	5.747		
436	6.349	5.872		
437	6.474	5.997		
438	6.724	6.247		
439	6.974	6.497		
440	7.224	6.747		
441	7.474	6.997		
442	7.724	7.247		
443	7.974	7.497		
444	8.224	7.747		
445	8.474	7.997	.579	.025
446	8.974	8.497		
447	9.474	8.997		
448	9.974	9.497		
449	10.474	9.997		
450	10.974	10.497		
451	11.474	10.997		
452	11.974	11.497		
453	12.474	11.997		
454	12.974	12.497		
455	13.474	12.997		
456	13.974	13.497		
457	14.474	13.997		
458	14.974	14.497		
459	15.474	14.997		
460	15.974	15.497		



DASH NO.	E DIAM. CLEARANCE MAX.
014 TO 127	.005
210 TO 247	.006
325 TO 349	.007
425 TO 460	.010

NOTES:
1. DASH NO'S OF THIS DWG CORRESPOND TO DASH NO'S OF ARP 568 UNIFORM DASH NUMBERING SYSTEM FOR O-RINGS.
2. GROOVE AND ROD DIM'S ARE PER MIL-P-5514 REVISION C&D FOR GROOVES USING TWO(2) BACK-UP RINGS.
3. FOR GROOVES PER MIL-P-5514 REVISION A&B SEE DWG. S-12223.
4. TO ORDER SPECIFY AS FOLLOWS:-

EXAMPLE: S-12561 - 115
CHANNEL SEAL NO. — SIZE DASH NO.

S-12561 B

ITEM NO.	PART NO.	NO. REQ.	MATERIAL, SIZE AND DESCRIPTION

REMOVE ALL BURRS AND BREAK ALL SHARP EDGES TO ——— MAX.

LIMITS ON DIMENSIONS UNLESS OTHERWISE NOTED
.XX DECIMAL = ±——
.XXX DECIMAL = ±——
FRACTION = ± 1/32
ANGLES = ± 1/2°

APPROVED BY	[illegible]	10/31/62
CHECKED BY	[illegible]	10/31/62
DRAWN BY	[illegible]	10-29-62

SCALE: NONE
MATERIAL: TURCON TFE COMPD #16947 SHAMBAN SPEC. 22-59
FINISH:

DOUBLE DELTA (CHANNEL SEAL) I.D. INSTALLATION CHART

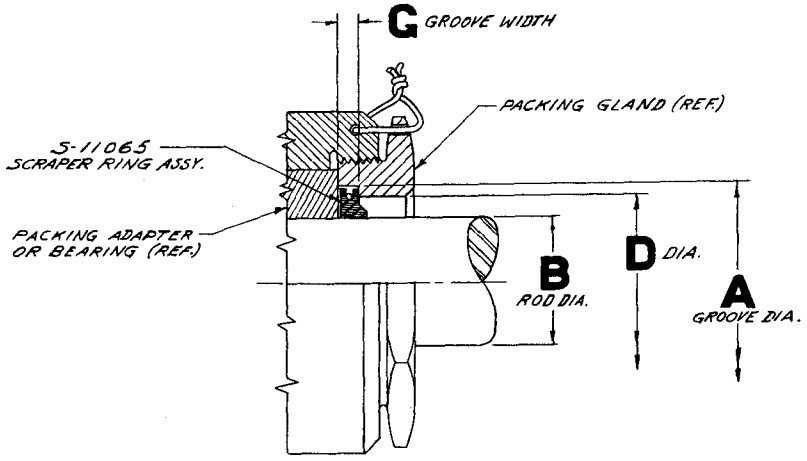
NEXT ASSY. USED ON | QTY. REQ'D.

W. S. SHAMBAN & CO.
CULVER CITY, CALIFORNIA — FORT WAYNE, INDIANA

DWG. NO. S-12561 | CHANGE LTR B

DASH NO.	B ROD	A GROOVE	G WIDTH	D
	+.000 -.002	+.010 -.000	+.010 -.000	+.010 -.000
-3/8	.373	.636		.523
-7/16	.435	.697		.585
-1	.498	.760		.652
-2	.560	.823		.715
-3	.623	.885		.777
-4	.685	.948		.839
-5	.748	1.010		.902
-6	.810	1.052		.954
-7	.873	1.114		1.017
-8	.935	1.177		1.079
-9	.998	1.239		1.141
-10	1.060	1.302		1.204
-11	1.123	1.364	.104	1.267
-12	1.185	1.427		1.329
-13	1.248	1.489		1.391
-14	1.310	1.614		1.485
-15	1.373	1.677		1.547
-16	1.435	1.739		1.610
-17	1.498	1.802		1.673
-18	1.623	1.927		1.798
-19	1.748	2.052		1.923
-20	1.873	2.177		2.048
-21	1.998	2.302		2.205
-22	2.123	2.427		2.330
-23	2.248	2.552		2.455
-24	2.373	2.677		2.580
-25	2.498	2.802		2.705
-26	2.623	2.989	.119	2.861
-27	2.748	3.114		2.986
-28	2.873	3.239		3.111
-29	2.997	3.364		3.236
-30	3.122	3.489		3.361
-31	3.247	3.614		3.486
-32	3.372	3.739		3.611
-33	3.497	3.864		3.736
-34	3.622	3.989		3.861
-35	3.747	4.114		3.986

DASH NO.	B ROD	A GROOVE	G WIDTH	D
	+.000 -.002	+.010 -.000	+.010 -.000	+.010 -.000
-36	3.872	4.239	.119	4.111
-37	3.997	4.427	.135	4.267
-38	4.122	4.552		4.392
-39	4.247	4.677		4.517
-40	4.372 +.000 -.003	4.802		4.642
-41	4.497	4.927		4.767
-42	4.622	5.052		4.892
-43	4.747	5.177		5.017
-44	4.872	5.302		5.142
-45	4.997	5.427		5.267
-46	5.122	5.552		5.392
-47	5.247	5.677		5.517
-48	5.372	5.802		5.642
-49	5.497	5.927		5.767
-50	5.622	6.104	.151	5.923
-51	5.747	6.239		6.049
-52	5.872	6.364		6.173
-53	5.997	6.489		6.299
-54	6.247	6.739		6.549
-55	6.497	6.989		6.799
-56	6.747	7.239		7.049
-57	6.997	7.489		7.299
-58	7.247	7.739		7.549
-59	7.497	7.989		7.799
-60	7.747	8.239		8.049
-61	7.997	8.489		8.299
-62	8.497	8.989		8.799
-63	8.997	9.489		9.299
-64	9.497	9.989		9.799
-65	9.997	10.489		10.299
-66	10.497	10.989		10.799
-67	10.997	11.489		11.299
-68	11.497	11.989		11.799
-69	11.997	12.489	.166	12.299
-70	12.497	12.989		12.799
-71	12.997	13.489		13.299



NOTES:

1. DASH NO'S 1 THRU 71 OF THIS DWG. CORRESPOND TO DASH NO'S OF MS 28776.
2. THIS INSTALLATION COMPLIES WITH ARMY-NAVY AERONAUTICAL DESIGN STD. AND 10075.
3. SCRAPER RING ASSY. MAY BE INSTALLED IN ONE PIECE GLAND AS WELL AS IN TWO PART GLAND SHOWN ABOVE.
4. SCRAPER RINGS ARE AVAILABLE IN VIRGIN TFE, TFE COMPOUNDS OR NYLON PER MIL-M-20693 SHAMBAN SPEC. ZZ-53.
5. TO ORDER SPECIFY AS FOLLOWS:-
   EXAMPLE: S-11065-25-1
   - PART NO.
   - DASH NO. (2 1/2 DIA. ROD)
   - MATERIAL CODE

S-11065 K

MATERIAL PER W.S.S. SPEC. ZZ-53	CODE
VIRGIN TFE	1
BRONZE REINFORCED TFE - 16966	4
TURCON - WEAR RESISTANT TFE - 16947	5
NYLON PER MIL-M-20693	Y

ITEM NO.	PART NO.	NO. REQ'D.	SIZE AND DESCRIPTION
			BILL OF MATERIAL

REMOVE ALL BURRS AND BREAK ALL SHARP EDGES TO —— MAX.

UNLESS OTHERWISE NOTED LIMITS ON DIMENSIONS
.XX DECIMAL = ——
.XXX DECIMAL = ——
FRACTION = ± 1/32
ANGLES = ± 1/2°

NEXT ASSY. USED ON | QTY. REQ'D.

DRAWN BY Frewis 9-29-62
CHECKED BY
APPROVED BY Hopton 9-29-62

SCALE: NONE | MATERIAL: NOTED SEE NOTE 4 | CHANGE: K

SCRAPER RING INSTALLATION

W. S. SHAMBAN & CO.
11617 WEST JEFFERSON BLVD.
CULVER CITY, CALIF.

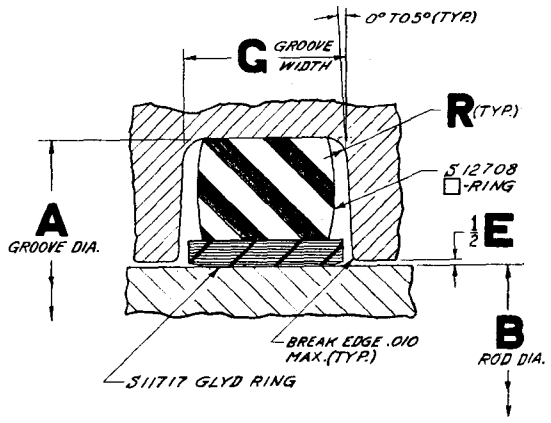
DWG. NO. S-11065

FORM NO. 102 (REV. 6-60)

DASH NO.	A DIA.	B DIA.	□-RING DASH NO. SEE NOTE *2
	+.001 -.000	+.000 -.001	
006	.268	.125	007
007	.299	.156	008
008	.331	.187	009
009	.362	.219	010
010	.424	.250	011
011	.487	.312	012
012	.547	.375	013
	+.005 -.000	+.000 -.002	
013	.610	.437	014
014	.672	.500	015
015	.735	.562	016
016	.797	.625	017
017	.860	.687	018
018	.922	.750	019
019	.985	.812	020
020	1.047	.875	021
021	1.110	.937	022
022	1.172	1.000	023
023	1.235	1.062	024
024	1.298	1.125	025
025	1.360	1.188	026
026	1.422	1.250	027
027	1.485	1.312	028
	+.003 -.000	+.000 -.003	
110	.611	.375	111
111	.674	.437	112
112	.736	.500	113
113	.799	.562	114
114	.862	.625	115
115	.924	.687	116
116	.986	.750	117
117	1.049	.812	118
118	1.111	.875	119
119	1.174	.937	120
120	1.236	1.000	121
121	1.299	1.062	122
122	1.362	1.125	123
123	1.424	1.187	124
124	1.486	1.250	125
125	1.549	1.312	126
126	1.611	1.375	127
127	1.674	1.437	128
128	1.736	1.500	129
129	1.799	1.562	130
130	1.862	1.625	131
131	1.924	1.687	132
132	1.986	1.750	133

DASH NO.	A DIA.	B DIA.	□-RING DASH NO. SEE NOTE *2
	+.003 -.000	+.000 -.003	
133	2.049	1.812	134
134	2.111	1.875	135
135	2.174	1.937	136
136	2.236	2.000	137
137	2.299	2.062	138
138	2.362	2.125	139
139	2.424	2.187	140
140	2.486	2.250	141
141	2.549	2.312	142
142	2.611	2.375	143
143	2.674	2.437	144
144	2.736	2.500	145
145	2.799	2.562	146
146	2.862	2.625	147
147	2.924	2.687	148
148	2.986	2.750	149
	+.004 -.000	+.000 -.004	
210	1.050	.750	211
211	1.113	.812	212
212	1.175	.875	213
213	1.238	.937	214
214	1.300	1.000	215
215	1.363	1.062	216
216	1.426	1.125	217
217	1.488	1.187	218
218	1.550	1.250	219
219	1.613	1.312	220
220	1.675	1.375	221
221	1.738	1.437	222
222	1.863	1.500	223
223	1.988	1.625	224
224	2.113	1.750	225
225	2.238	1.875	226
226	2.363	2.000	227
227	2.488	2.125	228
228	2.613	2.250	229
229	2.738	2.375	230
230	2.863	2.500	231
231	2.988	2.625	232
232	3.113	2.750	233
233	3.238	2.875	234
234	3.363	3.000	235
235	3.488	3.125	236
236	3.613	3.250	237
237	3.738	3.375	238
238	3.863	3.500	239
239	3.988	3.625	240

DASH NO.	A DIA.	B DIA.	□-RING DASH NO. SEE NOTE *2
	+.004 -.000	+.000 -.004	
240	4.113	3.750	241
241	4.238	3.875	242
242	4.363	4.000	243
243	4.488	4.125	244
244	4.613	4.250	245
245	4.738	4.375	246
246	4.863	4.500	247
247	4.988	4.625	248
	+.005 -.000	+.000 -.005	
325	1.991	1.500	326
326	2.116	1.625	327
327	2.241	1.750	328
328	2.366	1.875	329
329	2.491	2.000	330
330	2.616	2.125	331
331	2.741	2.250	332
332	2.866	2.375	333
333	2.991	2.500	334
334	3.116	2.625	335
335	3.241	2.750	336
336	3.366	2.875	337
337	3.491	3.000	338
338	3.616	3.125	339
339	3.741	3.250	340
340	3.866	3.375	341
341	3.991	3.500	342
342	4.116	3.625	343
343	4.241	3.750	344
344	4.366	3.875	345
345	4.491	4.000	346
346	4.616	4.125	347
347	4.741	4.250	348
348	4.866	4.375	349
	+.006 -.000	+.000 -.006	
425	5.093	4.500	426
426	5.218	4.625	427
427	5.343	4.750	428
428	5.468	4.875	429
429	5.593	5.000	430
430	5.718	5.125	431
431	5.843	5.250	432
432	5.968	5.375	433
433	6.093	5.500	434
434	6.218	5.625	435
435	6.343	5.750	436
436	6.468	5.875	437



DASH NO.	G GROOVE WIDTH	R RADIUS MAX.	E DIAM. CLEARANCE MAX.
	+.002 -.000		
006 – 012	.094	.020	.004
013 – 027	.094	.020	.005
110 – 148	.141	.020	.005
210 – 247	.188	.030	.006
325 – 348	.281	.050	.007
425 – 436	.375	.060	.008

□-RING COMPOUNDS

APPLICATION	TEMP. °F	COMPOUND	CODE	MILITARY & IND'L SPECIFICATIONS
GENERAL PURPOSE AIR-OIL-WATER-FUELS & HYDRAULIC SERVICE.	-40° / +300°	BUNA-N 16949	A	SAE-120R-CLASS 1
AIR FORCE & NAVY J.P. & HIGH OCTANE FUELS.	-65° / +180°	BUNA-N 16950	B	MIL-P-5315
SKYDROL 500-PYDRAULS CELLUBES & POLAR SOLVENTS.	-65° / 4225	BUTYL 16951	C	COMMERCIAL
AIR FORCE & NAVY HYDRAULIC FLUID MIL-O-5606	-65° / +180°	BUNA-N 16952	D	MIL-P-5516
CHLORINATED & AROMATIC SOLVENTS - STEAM & HYDROCARBONS.	-40° / +500°	VITON 16953	E	MIL-R-25897
AIR FORCE & NAVY HYDRAULIC FLUID MIL-O-5606	-65° / +275°	BUNA-N 16954	G	MIL-P-25732
SKYDROL-STEAM-WATER AIR-DILUTE ACIDS-PHOSPHATE ESTER HYD. FLUIDS-CELLUBES	-65° / +300°	ETHYLENE PROPYLENE 16989	H	NONE

GLYD RING COMPOUNDS — SEE NOTE 3

COMPOUND PER W.S.S. SPEC. ZZ-53	CODE
VIRGIN TFE	1
GRAPHITE REINFORCED TFE - 16804	2
GLASS REINFORCED TFE - 16805	3
BRONZE REINFORCED TFE - 16966	4
GLASS REINF. TURCON TFE - 16981	6

S12727

1. DASH NUMBERS OF THIS DWG. CORRESPOND TO DASH NUMBERS OF ARP 568 UNIFORM DASH NUMBERING SYSTEM FOR O-RINGS.
2. □-RING DASH NUMBERS ARE SHOWN FOR SIZE DESIGNATION ONLY. SELECTION OF □-RING ELASTOMERIC COMPOUND SHOULD BE MADE TO SUIT THE FLUID AND TEMPERATURE ENVIRONMENT OF THE HYDRAULIC OR PNEUMATIC SERVICE IN WHICH THE SEAL WILL BE USED.
3. THE SERIES "D" GLYD RING IS FURNISHED IN TURCON-SHAMBAN WEAR RESISTANT TFE (TFE COMPOUND PER SHAMBAN SPEC. ZZ-53). SERIES "D" GLYD RINGS ARE ALSO FURNISHED IN OTHER MATERIALS UPON REQUEST. (SEE NOTE 6)
4. THE ROD DIAMETERS ARE IN ACCORDANCE WITH RECOMMENDED INDUSTRIAL PRACTICE.
5. GLYD RING SEAL SET CONSISTS OF (1) S11717 GLYD RING & (1) S12708 □-RING
6. TO ORDER SPECIFY AS FOLLOWS:-

EXAMPLE: ——— S12727 - 215 - A - (4)

- GLYD RING SEAL SET NO.
- SIZE DASH NO.
- □-RING COMP'D CODE LETTER
- IF GLYD RING COMPOUND OTHER THAN TURCON IS REQUIRED, SPECIFY CODE NO.

ITEM NO.	PART NO.	NO. REQ.	MATERIAL, SIZE AND DESCRIPTION

REMOVE ALL BURRS AND BREAK ALL SHARP EDGES TO ——— MAX.

LIMITS ON DIMENSIONS UNLESS OTHERWISE NOTED .XX DECIMAL = ——— .XXX DECIMAL = ——— FRACTION = ± 1/32 ANGLES = ± 1/2°

APPROVED BY	S-12-63
CHECKED BY	
DRAWN BY	Previs 4-23-63

NEXT ASSY. USED ON	QTY. REQ'D.

SCALE	MATERIAL	FINISH
NONE	SEE NOTE 3	

GLYD RING INSTL. I.D. SEAL SERIES "D"

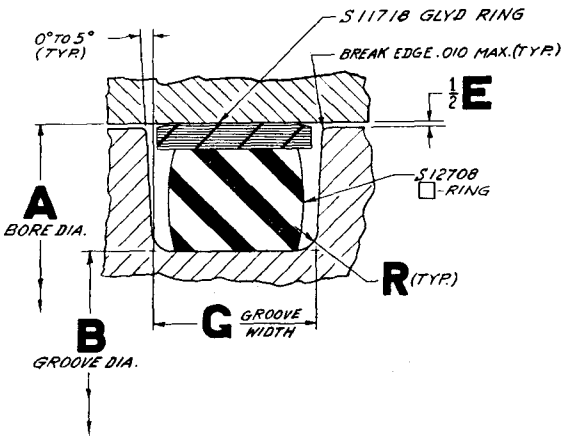
W. S. SHAMBAN & CO. CULVER CITY, CALIFORNIA FORT WAYNE, INDIANA

DWG. NO. S12727 CHANGE LTR

DASH NO.	A DIA.	B DIA.	□-RING DASH NO. SEE NOTE #2
	+.001 -.000	+.000 -.001	
007	.281	.139	006
008	.312	.169	007
009	.344	.200	008
010	.375	.231	009
011	.437	.263	010
012	.500	.325	011
	+.002 -.000	+.000 -.002	
013	.562	.388	012
014	.625	.452	013
015	.687	.515	014
016	.750	.577	015
017	.812	.640	016
018	.875	.702	017
019	.937	.765	018
020	1.000	.827	019
021	1.062	.890	020
022	1.125	.952	021
023	1.188	1.015	022
024	1.250	1.078	023
025	1.312	1.140	024
026	1.375	1.202	025
027	1.437	1.265	026
028	1.500	1.327	027
	+.003 -.000	+.000 -.003	
111	.625	.388	110
112	.687	.451	111
113	.750	.513	112
114	.812	.576	113
115	.875	.638	114
116	.937	.701	115
117	1.000	.763	116
118	1.062	.826	117
119	1.125	.888	118
120	1.188	.951	119
121	1.250	1.013	120
122	1.312	1.076	121
123	1.375	1.138	122
124	1.437	1.201	123
125	1.500	1.263	124
126	1.563	1.326	125
127	1.625	1.388	126
128	1.687	1.451	127
129	1.750	1.513	128
130	1.812	1.576	129
131	1.875	1.638	130
132	1.937	1.701	131
133	2.000	1.763	132

DASH NO.	A DIA.	B DIA.	□-RING DASH NO. SEE NOTE #2
	+.003 -.000	+.000 -.003	
134	2.062	1.826	133
135	2.125	1.888	134
136	2.187	1.951	135
137	2.250	2.013	136
138	2.312	2.076	137
139	2.375	2.138	138
140	2.437	2.201	139
141	2.500	2.263	140
142	2.562	2.326	141
143	2.625	2.388	142
144	2.687	2.451	143
145	2.750	2.513	144
146	2.812	2.576	145
147	2.875	2.638	146
148	2.937	2.701	147
149	3.000	2.763	148
	+.004 -.000	+.000 -.004	
211	1.062	.762	210
212	1.125	.824	211
213	1.188	.887	212
214	1.250	.950	213
215	1.312	1.012	214
216	1.375	1.074	215
217	1.437	1.137	216
218	1.500	1.199	217
219	1.562	1.262	218
220	1.625	1.324	219
221	1.688	1.387	220
222	1.750	1.450	221
223	1.875	1.512	222
224	2.000	1.637	223
225	2.125	1.762	224
226	2.250	1.887	225
227	2.375	2.012	226
228	2.500	2.137	227
229	2.625	2.262	228
230	2.750	2.387	229
231	2.875	2.512	230
232	3.000	2.637	231
233	3.125	2.762	232
234	3.250	2.887	233
235	3.375	3.012	234
236	3.500	3.137	235
237	3.625	3.262	236
238	3.750	3.387	237
239	3.875	3.512	238
240	4.000	3.637	239

DASH NO.	A DIA.	B DIA.	□-RING DASH NO. SEE NOTE #2
	+.004 -.000	+.000 -.004	
241	4.125	3.762	240
242	4.250	3.887	241
243	4.375	4.012	242
244	4.500	4.137	243
245	4.625	4.262	244
246	4.750	4.387	245
247	4.875	4.512	246
248	5.000	4.637	247
	+.005 -.000	+.000 -.005	
326	2.000	1.509	325
327	2.125	1.634	326
328	2.250	1.759	327
329	2.375	1.884	328
330	2.500	2.009	329
331	2.625	2.134	330
332	2.750	2.259	331
333	2.875	2.384	332
334	3.000	2.509	333
335	3.125	2.634	334
336	3.250	2.759	335
337	3.375	2.884	336
338	3.500	3.009	337
339	3.625	3.134	338
340	3.750	3.259	339
341	3.875	3.384	340
342	4.000	3.509	341
343	4.125	3.634	342
344	4.250	3.759	343
345	4.375	3.884	344
346	4.500	4.009	345
347	4.625	4.134	346
348	4.750	4.259	347
349	4.875	4.384	348
	+.006 -.000	+.000 -.006	
426	5.125	4.532	425
427	5.250	4.657	426
428	5.375	4.782	427
429	5.500	4.907	428
430	5.625	5.032	429
431	5.750	5.157	430
432	5.875	5.282	431
433	6.000	5.407	432
434	6.125	5.532	433
435	6.250	5.657	434
436	6.375	5.782	435
437	6.500	5.907	436



DASH NO.	G GROOVE WIDTH	R RADIUS MAX.	E DIAM. CLEARANCE MAX.
	+.005 -.000		
007 – 012	.094	.020	.004
013 – 028	.094	.020	.005
111 – 149	.141	.020	.005
211 – 248	.188	.030	.006
326 – 349	.281	.050	.007
426 437	.375	.060	.008

□-RING COMPOUNDS

APPLICATION	TEMP. °F	COMPOUND	CODE	MILITARY & IND'L SPECIFICATIONS
GENERAL PURPOSE AIR-OIL-WATER-FUELS & HYDRAULIC SERVICE.	-40° / +300°	BUNA-N 16949	A	SAE-120R-CLASS 1
AIR FORCE & NAVY J.P. & HIGH OCTANE FUELS.	-65° / +180°	BUNA-N 16950	B	MIL-P-5315
SKYDROL 500 - PYDRAULS CELLUBES & POLAR SOLVENTS.	-65° / +225°	BUTYL 16951	C	COMMERCIAL
AIR FORCE & NAVY HYDRAULIC FLUID MIL-O-5606	-65° / +180°	BUNA-N 16952	D	MIL-P-5516
CHLORINATED & AROMATIC SOLVENTS - STEAM & HYDROCARBONS	-40° / +500°	VITON 16953	E	MIL-R-25897
AIR FORCE & NAVY HYDRAULIC FLUID MIL-O-5606	-65° / +275°	BUNA-N 16954	G	MIL-P-25732
SKYDROL - STEAM - WATER AIR - DILUTE ACIDS - PHOSPHATE ESTER HYD. FLUIDS - CELLUBES	-65° / +300°	ETHYLENE PROPYLENE 16989	H	NONE

GLYD RING COMPOUNDS ← SEE NOTE 3

COMPOUND PER W.S.S. SPEC. ZZ-53	CODE
VIRGIN TFE	1
GRAPHITE REINFORCED TFE — 16804	2
GLASS REINFORCED TFE — 16805	3
BRONZE REINFORCED TFE — 16966	4
GLASS REINF. TURCON TFE — 16981	6

S12728

1. DASH NUMBERS OF THIS DWG. CORRESPOND TO DASH NUMBERS OF ARP 568 UNIFORM DASH NUMBERING SYSTEM FOR O-RINGS.
2. □-RING DASH NUMBERS ARE SHOWN FOR SIZE DESIGNATION ONLY. SELECTION OF □-RING ELASTOMERIC COMPOUND SHOULD BE MADE TO SUIT THE FLUID AND TEMPERATURE ENVIRONMENT OF THE HYDRAULIC OR PNEUMATIC SERVICE IN WHICH THE SEAL WILL BE USED.
3. THE SERIES "D" GLYD RING IS FURNISHED IN TURCON - SHAMBAN WEAR RESISTANT TFE (TFE COMPOUND PER SHAMBAN SPEC. ZZ-53). SERIES "D" GLYD RINGS ARE ALSO FURNISHED IN OTHER MATERIALS UPON REQUEST. (SEE NOTE 6)
4. THE BORE DIAMETERS ARE IN ACCORDANCE WITH RECOMMENDED INDUSTRIAL PRACTICE.
5. GLYD RING SEAL SET CONSISTS OF (1) S11718 GLYD RING & (1) S12708 □-RING
6. TO ORDER SPECIFY AS FOLLOWS:-

EXAMPLE: —— —— S12728 – 215 – A – (4)

- GLYD RING SEAL SET NO.
- SIZE DASH NO.
- □-RING COMP'D CODE LETTER
- IF GLYD RING COMPOUND OTHER THAN TURCON IS REQUIRED, SPECIFY CODE NO.

ITEM NO.	PART NO.	NO. REQ.	MATERIAL, SIZE AND DESCRIPTION

REMOVE ALL BURRS AND BREAK ALL SHARP EDGES TO ——— MAX.

LIMITS ON DIMENSIONS UNLESS OTHERWISE NOTED .XX DECIMAL = ——— .XXX DECIMAL = ——— FRACTION = ± 1/32 ANGLES = ± 1/2°

APPROVED BY: [signature] 5-20-63

CHECKED BY:

DRAWN BY: Travis 4-23-63

NEXT ASSY. USED ON	QTY. REQ'D.

SCALE	MATERIAL	FINISH
NONE	SEE NOTE 3	

GLYD RING INSTL. O.D. SEAL SERIES "D"

W. S. SHAMBAN & CO. CULVER CITY, CALIFORNIA FORT WAYNE, INDIANA

DWG. NO. S12728

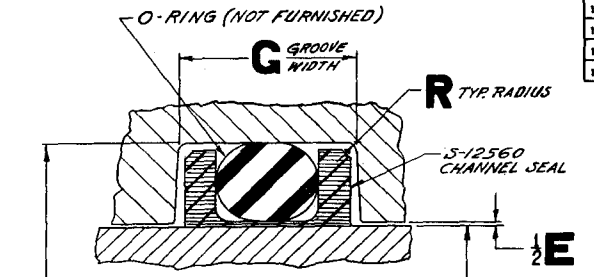
CHANGE LTR

DASH NO.	A GROOVE	B ROD	G WIDTH	R RADIUS
	+.001 -.000	+.000 -.001	+.010 -.000	±.005
004	.190	.076		
005	.221	.108		
006	.235	.123		
007	.266	.154		
008	.297	.185	.207	.010
009	.329	.217		
010	.360	.248		
011	.422	.310		
012	.485	.373		
	+.002 -.000	+.000 -.002	+.010 -.000	
013	.547	.435		
014	.610	.498		
015	.672	.560		
016	.735	.623		
017	.797	.685		
018	.860	.748		
019	.922	.810		
020	.985	.873	.207	.010
021	1.047	.935		
022	1.110	.998		
023	1.172	1.060		
024	1.235	1.123		
025	1.297	1.185		
026	1.360	1.248		
027	1.422	1.310		
028	1.485	1.373		
	+.002 -.000	+.000 -.002	+.010 -.000	±.005
110	.551	.373		
111	.613	.435		
112	.676	.498		
113	.738	.560		
114	.801	.623		
115	.863	.685		
116	.926	.748		
117	.988	.810		
118	1.051	.873		
119	1.113	.935		
120	1.182	.998		
121	1.238	1.060		
122	1.301	1.123	.245	.010
123	1.363	1.185		
124	1.426	1.248		
125	1.488	1.310		
126	1.551	1.373		
127	1.613	1.435		
128	1.676	1.498		
129	1.738	1.560		
130	1.801	1.623		
131	1.863	1.685		
132	1.926	1.748		
133	1.988	1.810		
134	2.051	1.873		

DASH NO.	A GROOVE	B ROD	G WIDTH	R RADIUS
	+.002 -.000	+.000 -.003	+.010 -.000	±.005
135	2.114	1.936		
136	2.176	1.998		
137	2.239	2.061		
138	2.301	2.123		
139	2.364	2.186		
140	2.426	2.248		
141	2.439	2.311		
142	2.551	2.373	.245	.010
143	2.614	2.436		
144	2.676	2.498		
145	2.739	2.561		
146	2.801	2.623		
147	2.864	2.868		
148	2.926	2.748		
149	2.989	2.811		
	+.002 -.000	+.000 -.002	+.010 -.000	±.0175
210	.991	.748		
211	1.053	.810		
212	1.116	.873		
213	1.178	.935		
214	1.241	.998		
215	1.303	1.060		
216	1.366	1.123		
217	1.428	1.185		
218	1.491	1.248		
219	1.553	1.310		
220	1.616	1.373		
221	1.678	1.435		
222	1.741	1.498		
223	1.866	1.623		
224	1.991	1.748		
225	2.116	1.873		
226	2.241	1.998		
227	2.366	2.123	.304	.0175
228	2.491	2.248		
229	2.616	2.373		
230	2.741	2.498		
231	2.866	2.623		
232	2.991	2.748		
233	3.116	2.873		
234	3.241	2.998		
235	3.366	3.123		
236	3.491	3.248		
237	3.616	3.373		
238	3.741	3.498		
239	3.866	3.623		
240	3.991	3.748		
241	4.116	3.873		
242	4.241	3.998		
243	4.366	4.123		
244	4.491	4.248		
245	4.616	4.373		

DASH NO.	A GROOVE	B ROD	G WIDTH	R RADIUS
	+.008 -.000	+.000 -.002	+.010 -.000	±.0075
246	4.741	4.498		
247	4.866	4.623		
	+.003 -.000	+.000 -.003		
248	4.991	4.748		
249	5.116	4.873		
250	5.241	4.998		
251	5.366	5.123		
252	5.491	5.248		
253	5.616	5.373		
254	5.741	5.498		
255	5.866	5.623		
256	5.991	5.748		
257	6.116	5.873		
258	6.241	5.998		
259	6.491	6.248	.304	.0175
260	6.741	6.498		
261	6.991	6.748		
262	7.241	6.998		
263	7.491	7.248		
264	7.741	7.498		
265	7.991	7.748		
266	8.241	7.998		
267	8.491	8.248		
268	8.741	8.498		
269	8.991	8.748		
270	9.241	8.998		
271	9.491	9.248		
272	9.741	9.498		
273	9.991	9.748		
274	10.241	9.998		
	+.002 -.000	+.000 -.002	+.010 -.000	±.005
325	1.870	1.498		
326	1.995	1.623		
327	2.120	1.748		
328	2.245	1.873		
329	2.370	1.998		
330	2.495	2.123		
331	2.620	2.248		
332	2.745	2.373		
333	2.870	2.498		
334	2.995	2.623	.424	.025
335	3.120	2.748		
336	3.245	2.873		
337	3.369	2.997		
338	3.494	3.122		
339	3.619	3.247		
340	3.744	3.372		
341	3.869	3.497		
342	3.994	3.622		
343	4.119	3.747		
344	4.244	3.872		

DASH NO.	A GROOVE	B ROD	G WIDTH	R RADIUS
	+.003 -.000	+.000 -.002	+.010 -.000	±.005
345	4.369	3.997		
346	4.494	4.122		
347	4.619	4.247	.424	.025
348	4.744	4.372		
349	4.869	4.497		
	+.003 -.000	+.000 -.003	+.010 -.000	±.005
425	4.974	4.497		
426	5.099	4.622		
427	5.224	4.747		
428	5.349	4.872		
429	5.474	4.997		
430	5.599	5.122		
431	5.724	5.247		
432	5.849	5.372		
433	5.974	5.497		
434	6.099	5.622		
435	6.224	5.747		
436	6.349	5.872		
437	6.474	5.997		
438	6.724	6.247		
439	6.974	6.497		
440	7.224	6.747		
441	7.474	6.997		
442	7.724	7.247	.579	.025
443	7.974	7.497		
444	8.224	7.747		
445	8.474	7.997		
446	8.974	8.497		
447	9.474	8.997		
448	9.974	9.497		
449	10.474	9.997		
450	10.974	10.497		
451	11.474	10.997		
452	11.974	11.497		
453	12.474	11.997		
454	12.974	12.497		
455	13.474	12.997		
456	13.974	13.497		
457	14.474	13.997		
458	14.974	14.497		
459	15.474	14.997		
460	15.974	15.497		



DASH NO.	E DIAM. CLEARANCE MAX.
004 - 012	.004
013 - 149	.005
210 - 274	.006
325 - 349	.007
425 - 460	.010

NOTES:

1. DASH NO'S OF THIS DWG. CORRESPOND TO DASH NO'S OF ARP 568 UNIFORM DASH NUMBERING SYSTEM FOR O-RINGS.
2. GROOVE AND ROD DIM'S FOR DASH NO'S 004 TO 012 INCL., 110 TO 116 INCL., 210 TO 222 INCL. AND 325 TO 460 INCL. ARE PER MIL-P-5514 REVISION C & D FOR GROOVES USING 2 BACK-UP RINGS.
3. FOR GROOVES PER MIL-P-5514 REVISION A & B SEE S-11370
4. TO ORDER SPECIFY THE FOLLOWING:
   EXAMPLE: S-12560 - 110
   CHANNEL SEAL NO.
   SIZE DASH NO.

S-12560 B

REMOVE ALL BURRS AND BREAK ALL SHARP EDGES TO ___ MAX.

UNLESS OTHERWISE NOTED LIMITS ON DIMENSIONS
.XX DECIMAL = ___
.XXX DECIMAL = ___
FRACTION = ± 1/32
ANGLES = ± 1/2°

NEXT ASSY. USED ON | QTY. REQ'D.

ITEM NO.	PART NO.	NO. REQ'D.	SIZE AND DESCRIPTION

BILL OF MATERIAL

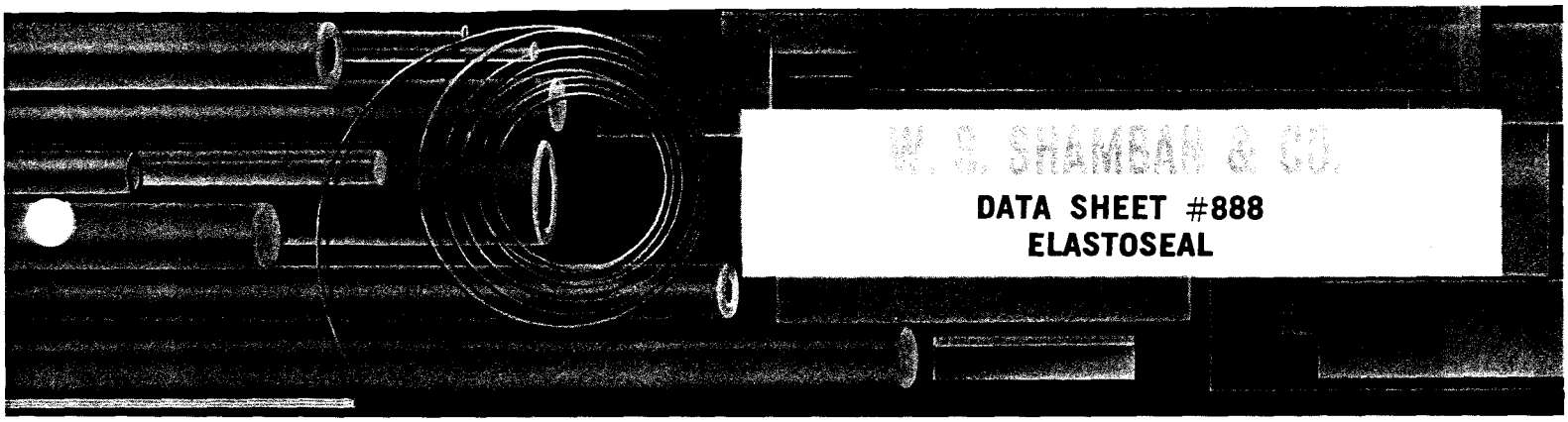
DRAWN BY Dennis 9/24/62
CHECKED BY
APPROVED BY 9/24/62

SCALE	MATERIAL	CHANGE
NONE	VIRGIN TFE SHAMBAN SPEC. 22-53	B

CHANNEL SEAL INSTALLATION CHART

W. S. SHAMBAN & CO.
11617 WEST JEFFERSON BLVD.
CULVER CITY, CALIF.

DWG. NO. S-12560

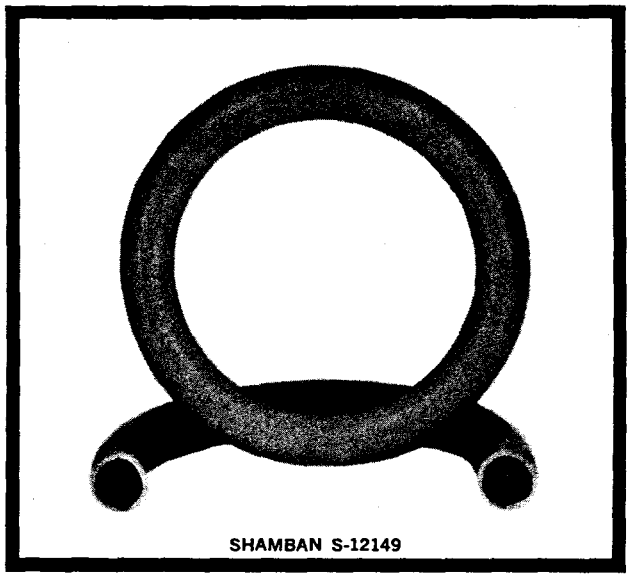


DATA SHEET #888
ELASTOSEAL

ELASTOSEAL*

A NEW TEFLON-ENCAPSULATED RUBBER "O" RING FOR EFFICIENT SEALING OF CORROSIVE LIQUIDS AND GASES

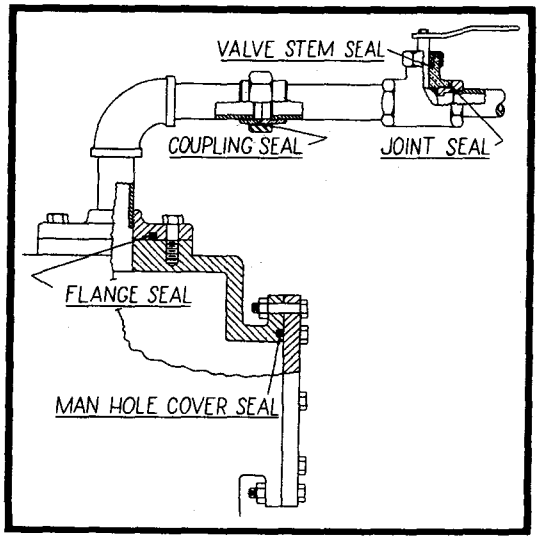
ELASTOSEAL combines the excellent chemical resistant properties of Teflon with the resilience, sealing security and low cost of rubber O-rings. It offers new possibilities for economy and efficiency in the design of equipment for handling liquids and gases, and for the maintenance of this type of equipment. This combination of properties has not, until now, been available at a practical cost.



SHAMBAN S-12149

ADVANTAGES

- **Safe sealing for corrosive acids, alkalis, solvents, etc.**
- **No contamination of contained liquids.**
- **Can be easily installed with or without groove or gland.**
- **Safe for temperatures from −65°F to +450°F.**
- **Combines resiliency of rubber with the chemical resistance of Teflon.**
- **Low cost and long effective life.**
- **Chemically inert—wide range of uses.**



APPLICATIONS

ELASTOSEALS ARE RECOMMENDED FOR THESE AND RELATED INDUSTRIES

Chemical	Petrochemical
Pharmaceutical	Fertilizer
Food processing	Bio-chemical
Dairy products	Solvents

For seals in piping systems and equipment such as . . .

Pumps	Stills
Valves	Centrifuges
Pressure Vessels	Filters
Hydraulic systems	Pneumatic systems

*SHAMBAN TRADEMARK

A NEW CONCEPT FOR "O" RING APPLICATIONS

With the development of low cost production methods for combining Teflon with rubber in a standard "O" ring the problem of sealing corrosive liquids and gases has been practically solved.

The wide range of chemical compatability of Teflon has long been recognized, but it lacks the resiliency essential to a proper seal material.

O-rings made of various types of rubber are resilient and widely used in many seal applications. They work perfectly in all installations where the contained liquid or gas does not attack rubber and thus deteriorate the seals.

Shamban engineers devised a method of encapulating standard rubber O-rings within a flexible sheath of Teflon. The capsule retains the resilience of the enclosed rubber ring while providing a permanent barrier between the rubber and the contained liquid or gas. The result is a practical O-ring for sealing corrosive liquids or gases, something that has not heretofore been available.

Actually the new Elastoseal ring can be used in practically any application where standard rubber O-rings are adaptable, either as original equipment or replacement. However, it was designed for seals where the corrosive properties of the liquid or gas made the use of rubber impossible or where contamination of the contents by rubber is objectionable. Teflon is inert and does not contaminate on contact.

STANDARD SIZES AVAILABLE FROM STOCK

Elastoseals are available from stock in most standard sizes. Unless otherwise specified the encapsulated rings are made of BUNA N rubber. However, Elastoseals can be furnished with rings made of any standard type of rubber. (Specify S-12149 per drawings and specifications.)

Elastoseals are also available with resilient metal cores. (Reference Part No. S-12813)

Shamban engineers welcome inquiries concerning unique or difficult seal problems where modifications of the Elastoseal principle may seem adaptable. Such applications might include gaskets, tank seals and seals of large size or irregular shape.

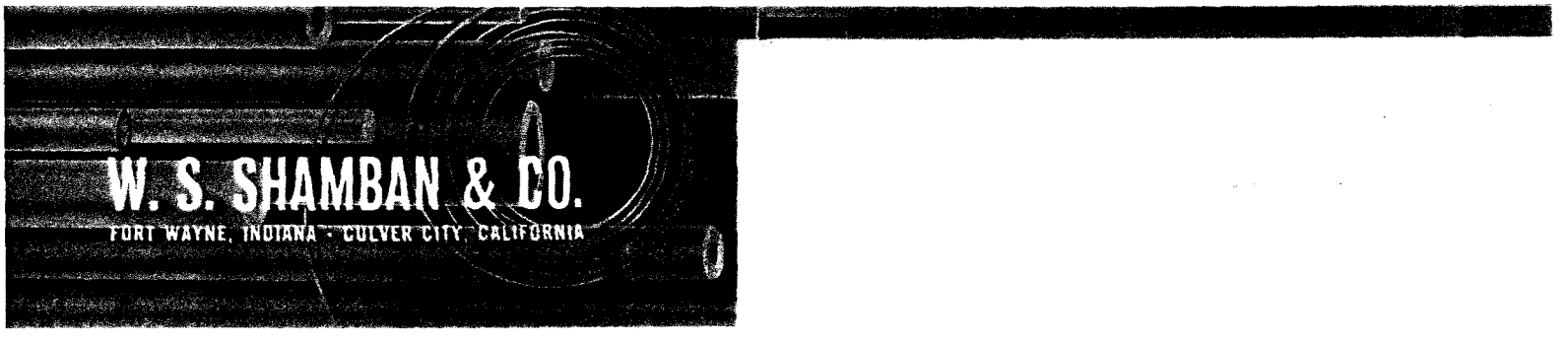
THE SHAMBAN LINE

PRODUCTS FOR THE CHEMICAL AND PROCESSING INDUSTRIES

TEFLON SEALS
TEF-E-NUZ PACKING
SAFE-T-LINE HOSE
UNIVERSAL THREAD SEAL
TEFLON LABORATORY WARE

STANDARD SHAPES-SHEETS, ROD,
TUBE, SLAB, TAPE, AND STRIP OF TEFLON,
FLUON, NYLON, KEL-F, KYNAR, DELRIN, CELCON,
HALON, LEXAN AND MERLON

SHAMBAN'S "PROFICIENCY-IN-PLASTICS" IS AT YOUR SERVICE



DASH NO.	A DIA.	B DIA.
ARP	MEAN	ACTUAL ±
013	.566	.426 .005
014	.629	.489
015	.691	.551
016	.754	.614
017	.816	.676
018	.879	.739 .005
019	.941	.801 .006
020	1.004	.864
021	1.066	.926
022	1.129	.989
023	1.191	1.051
024	1.254	1.114
025	1.316	1.176
026	1.379	1.239
027	1.441	1.301
028	1.504	1.364 .006

DASH NO.	A DIA.	B DIA.
ARP	MEAN	ACTUAL ±
110	.568	.362 .005
111	.630	.424
112	.693	.487
113	.755	.549
114	.818	.612
115	.880	.674
116	.943	.737 .005
117	1.005	.799 .006
118	1.068	.862
119	1.130	.924
120	1.193	.987
121	1.255	1.049
122	1.318	1.112
123	1.380	1.174
124	1.443	1.237
125	1.505	1.299
126	1.568	1.362
127	1.630	1.424
128	1.693	1.487 .006
129	1.755	1.549 .010
130	1.818	1.612
131	1.880	1.674
132	1.943	1.737
133	2.005	1.799
134	2.068	1.862
135	2.131	1.925
136	2.193	1.987
137	2.256	2.050
138	2.318	2.112
139	2.381	2.175 .010

DASH NO.	A DIA.	B DIA.
ARP	MEAN	ACTUAL ±
140	2.443	2.237 .010
141	2.506	2.300
142	2.568	2.362
143	2.631	2.425
144	2.693	2.487
145	2.756	2.550
146	2.818	2.612 .010
147	2.881	2.675 .015
148	2.943	2.737
149	3.006	2.800 .015

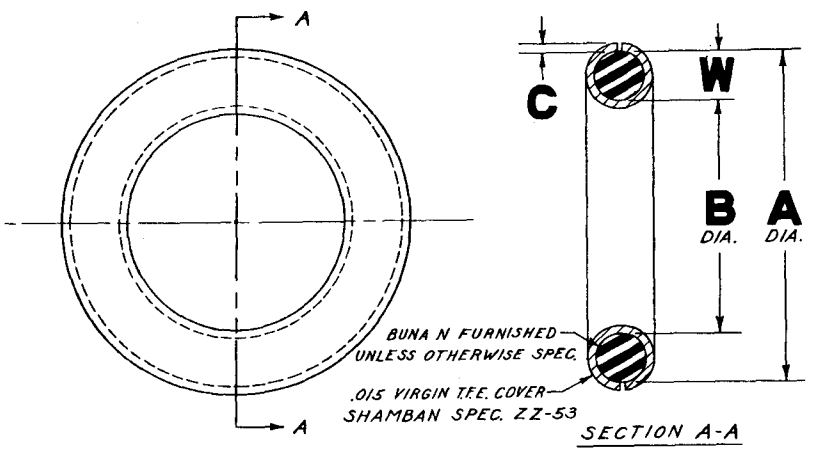
210	1.012	.734 .006
211	1.074	.796
212	1.137	.859
213	1.199	.921
214	1.262	.984
215	1.324	1.046
216	1.387	1.109
217	1.449	1.171
218	1.512	1.234
219	1.574	1.296
220	1.637	1.359
221	1.699	1.421
222	1.762	1.484 .006
223	1.887	1.609 .010
224	2.012	1.734
225	2.137	1.859
226	2.262	1.984
227	2.387	2.109
228	2.512	2.234
229	2.637	2.359
230	2.763	2.484
231	2.887	2.609 .010
232	3.012	2.734 .015
233	3.137	2.859
234	3.262	2.984
235	3.387	3.109
236	3.512	3.234
237	3.637	3.359
238	3.762	3.484
239	3.887	3.609
240	4.012	3.734
241	4.137	3.859
242	4.262	3.984
243	4.387	4.109
244	4.512	4.234
245	4.637	4.359 .015

DASH NO.	A DIA.	B DIA.
ARP	MEAN	ACTUAL ±
246	4.762	4.484 .015
247	4.887	4.609
248	5.012	4.734
249	5.137	4.859
250	5.262	4.984 .015
251	5.387	5.109 .023
252	5.512	5.234
253	5.637	5.359
254	5.762	5.484
255	5.887	5.609
256	6.012	5.734
257	6.137	5.859
258	6.262	5.984
259	6.512	6.234
260	6.762	6.484
261	7.012	6.734
262	7.262	6.984 .023
263	7.512	7.234 .030
264	7.762	7.484
265	8.012	7.734
266	8.262	7.984
267	8.512	8.234
268	8.762	8.484
269	9.012	8.734
270	9.262	8.984
271	9.512	9.234
272	9.762	9.484
273	10.012	9.734
274	10.262	9.984 .030

325	1.895	1.475 .010
326	2.020	1.600
327	2.145	1.725
328	2.270	1.850
329	2.395	1.975
330	2.520	2.100
331	2.645	2.225
332	2.770	2.350
333	2.895	2.475
334	3.020	2.600 .010
335	3.145	2.725 .015
336	3.270	2.850
337	3.395	2.975
338	3.520	3.100
339	3.645	3.225
340	3.770	3.350
341	3.895	3.475 .015

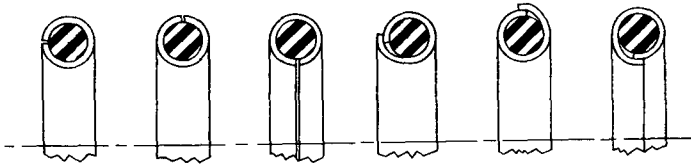
DASH NO.	A DIA.	B DIA.
ARP	MEAN	ACTUAL ±
342	4.020	3.600 .015
343	4.145	3.725
344	4.270	3.850
345	4.395	3.975
346	4.520	4.100
347	4.645	4.225
348	4.770	4.350
349	4.895	4.475 .015

425	5.025	4.475 .015
426	5.150	4.600
427	5.275	4.725
428	5.400	4.850
429	5.525	4.975 .015
430	5.650	5.100 .023
431	5.775	5.225
432	5.900	5.350
433	6.025	5.475
434	6.150	5.600
435	6.275	5.725
436	6.400	5.850
437	6.525	5.957
438	6.775	6.225
439	7.025	6.475
440	7.275	6.725
441	7.525	6.975 .023
442	7.775	7.225 .030
443	8.025	7.475
444	8.275	7.725
445	8.525	7.975
446	9.025	8.475
447	9.525	8.975
448	10.025	9.475
449	10.525	9.975
450	11.025	10.475
451	11.525	10.975
452	12.025	11.475
453	12.525	11.975
454	13.025	12.475
455	13.525	12.975
456	14.025	13.475
457	14.525	13.975
458	15.025	14.475
459	15.525	14.975
460	16.025	15.475 .030



SECTION A-A

TYPES OF SEAMS



S-12149 C

DASH NUMBER	W	C
13-28	.070± .003	.015
110-149	.103 ± .003	.015
210-274	.139 ± .004	.015
325-349	.210± .005	.015
425-460	.275± .006	.015

PATENTED

NOTES:
1. DASH NUMBERS OF THIS DRAWING CORRESPOND TO ARP 568 UNIFORM DASH NUMBERING SYSTEM FOR O-RINGS.
2. DIMENSIONS "A", "B" & "W" ARE STANDARD O-RING DIMENSIONS.
3. TO ORDER SPECIFY AS FOLLOWS:
   EXAMPLE: S-12149 - 245 - 1A
   ELASTOSEAL NO. — SIZE DASH NO. — TYPE OF SEAM

LTR.	CHANGE	BY	DATE
C	REDRAWN	AJS	5/6/63

REMOVE ALL BURRS AND BREAK ALL SHARP EDGES TO MAX.

UNLESS OTHERWISE NOTED LIMITS ON DIMENSIONS
.XX DECIMAL =
.XXX DECIMAL =
FRACTION = ± 1/32
ANGLES = ± 1/2°

NEXT ASSY. USED ON | QTY. REQ'D.

ITEM NO.	PART NO.	NO. REQ'D.	SIZE AND DESCRIPTION

BILL OF MATERIAL

DRAWN BY	STAREWICH	5/15/63
CHECKED BY	STAREWICH	5/15/63
APPROVED BY	GUGEL	5/16/63

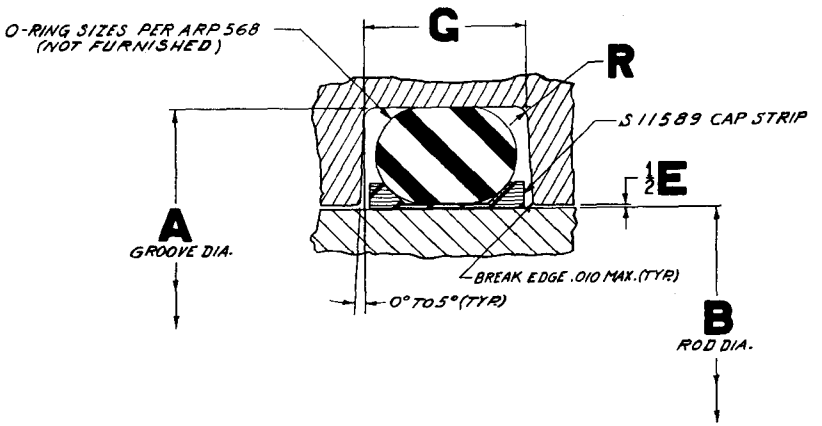
SCALE	MATERIAL	CHANGE	
NONE	NOTED	C	ELASTOSEAL

W. S. SHAMBAN & CO.
2531 BREMER DR.
FORT WAYNE, INDIANA

DWG. NO. S-12149

DASH NO.	A DIA.	B DIA.
	+.001 -.000	+.000 -.001
004	.190	.076
005	.221	.108
006	.235	.123
007	.266	.154
008	.297	.185
009	.329	.217
010	.360	.248
011	.422	.310
012	.485	.373
	+.002 -.000	+.000 -.002
110	.551	.373
111	.613	.435
112	.676	.498
113	.738	.560
114	.801	.623
115	.863	.685
116	.926	.748
210	.991	.748
211	1.053	.810
212	1.116	.873
213	1.178	.935
214	1.241	.998
215	1.303	1.060
216	1.366	1.123
217	1.428	1.185
218	1.491	1.248
219	1.553	1.310
220	1.616	1.373
221	1.678	1.435
222	1.741	1.498
325	1.870	1.498
326	1.995	1.623
327	2.120	1.748
328	2.245	1.873
329	2.370	1.998
330	2.495	2.123
331	2.620	2.248
332	2.745	2.373
333	2.870	2.498
334	2.995	2.623
335	3.120	2.748
336	3.245	2.873
337	3.369	2.997
338	3.494	3.122
339	3.619	3.247

DASH NO.	A DIA.	B DIA.
	+.002 -.000	+.000 -.002
340	3.744	3.372
341	3.869	3.497
342	3.994	3.622
343	4.119	3.747
344	4.244	3.872
345	4.369	3.997
346	4.494	4.122
347	4.619	4.247
348	4.744	4.372
349	4.869	4.497
	+.003 -.000	+.000 -.003
425	4.974	4.497
426	5.099	4.622
427	5.224	4.747
428	5.349	4.872
429	5.474	4.997
430	5.599	5.122
431	5.724	5.247
432	5.849	5.372
433	5.974	5.497
434	6.099	5.622
435	6.224	5.747
436	6.349	5.872
437	6.474	5.997
438	6.724	6.247
439	6.974	6.497
440	7.224	6.747
441	7.474	6.997
442	7.724	7.247
443	7.974	7.497
444	8.224	7.747
445	8.474	7.997
446	8.974	8.497
447	9.474	8.997
448	9.974	9.497
449	10.474	9.997
450	10.974	10.497
451	11.474	10.997
452	11.974	11.497
453	12.474	11.997
454	12.974	12.497
455	13.474	12.997
456	13.974	13.497
457	14.474	13.997
458	14.974	14.497
459	15.474	14.997
460	15.974	15.497



DASH NO.	G GROOVE WIDTH	R RADIUS MAX.	E DIAMETRAL CLEARANCE MAX.
	+.010 -.000		
004 – 012	.094	.005/.015	.004
110 – 116	.141	.005/.015	.005
210 – 222	.188	.010/.020	.006
325 – 349	.281	.020/.030	.007
425 – 460	.375	.020/.030	.010

NOTES:–

1. DASH NUMBERS OF THIS DWG. CORRESPOND TO DASH NO'S OF ARP 568 UNIFORM DASH NUMBERING SYSTEM FOR O-RINGS.
2. ROD AND GROOVE DIM'S ARE PER MIL-P-5514 REVISION C & D FOR GROOVES USING NO BACK-UP RINGS.
3. FOR INSTALLATION SUGGESTIONS SEE DWG. 16-130.
4. TO ORDER - SPECIFY AS FOLLOWS:

EXAMPLE: S 11589 — 325
CAP STRIP NO. —— S 11589
SIZE DASH NO. —— 325

S11589 D

ITEM NO.	PART NO.	NO. REQ.	MATERIAL, SIZE AND DESCRIPTION

REMOVE ALL BURRS AND BREAK ALL SHARP EDGES TO ——— MAX.

LIMITS ON DIMENSIONS UNLESS OTHERWISE NOTED
.XX DECIMAL = ±.01
.XXX DECIMAL = ±.005
FRACTION = ± 1/32
ANGLES = ± 1/2°

APPROVED BY	[signature]	7-5-63
CHECKED BY		
DRAWN BY	Previs	7-3-63

NEXT ASSY. USED ON	QTY. REQ'D.

SCALE: NONE
MATERIAL: VIRGIN TFE SHAMBAN SPEC. SS-33
FINISH:

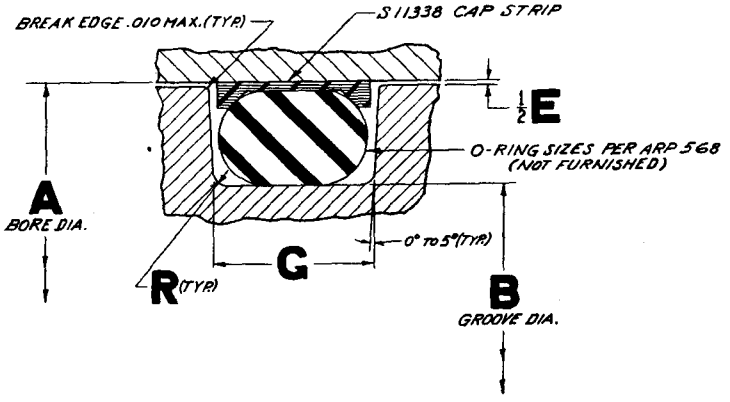
W. S. SHAMBAN & CO.
CULVER CITY, CALIFORNIA — FORT WAYNE, INDIANA

I.D. CAP STRIP INSTALLATION CHART

DWG. NO. S11589
CHANGE LTR D

DASH NO.	A DIA.	B DIA.
	+.001 -.000	+.000 -.007
004	.190	.076
005	.221	.108
006	.235	.123
007	.266	.154
008	.297	.185
009	.329	.217
010	.360	.248
011	.422	.310
012	.485	.373
	+.002 -.000	+.000 -.008
110	.551	.373
111	.613	.435
112	.676	.498
113	.738	.560
114	.801	.623
115	.863	.685
116	.926	.748
210	.991	.748
211	1.053	.810
212	1.116	.873
213	1.178	.935
214	1.241	.998
215	1.303	1.060
216	1.366	1.123
217	1.428	1.185
218	1.491	1.248
219	1.553	1.310
220	1.616	1.373
221	1.678	1.435
222	1.741	1.498
325	1.870	1.498
326	1.995	1.623
327	2.120	1.748
328	2.245	1.873
329	2.370	1.998
330	2.495	2.123
331	2.620	2.248
332	2.745	2.373
333	2.870	2.498
334	2.995	2.623
335	3.120	2.748
336	3.245	2.873
337	3.369	2.997
338	3.494	3.122
339	3.619	3.247

DASH NO.	A DIA.	B DIA.
	+.002 -.000	+.000 -.002
340	3.744	3.372
341	3.869	3.497
342	3.994	3.622
343	4.119	3.747
344	4.244	3.872
345	4.369	3.997
346	4.494	4.122
347	4.619	4.247
348	4.744	4.372
349	4.869	4.497
	+.003 -.000	+.000 -.003
425	4.974	4.497
426	5.099	4.622
427	5.224	4.747
428	5.349	4.872
429	5.474	4.997
430	5.599	5.122
431	5.724	5.247
432	5.849	5.372
433	5.974	5.497
434	6.099	5.622
435	6.224	5.747
436	6.349	5.872
437	6.474	5.997
438	6.724	6.247
439	6.974	6.497
440	7.224	6.747
441	7.474	6.997
442	7.724	7.247
443	7.974	7.497
444	8.224	7.747
445	8.474	7.997
446	8.974	8.497
447	9.474	8.997
448	9.974	9.497
449	10.474	9.997
450	10.974	10.497
451	11.474	10.997
452	11.974	11.497
453	12.474	11.997
454	12.974	12.497
455	13.474	12.997
456	13.974	13.497
457	14.474	13.997
458	14.974	14.497
459	15.474	14.997
460	15.974	15.497



DASH NO.	G GROOVE WIDTH	R RADIUS MAX.	E DIAMETRAL CLEAR. MAX.
	+.010 -.000		
004-012	.094	.005/.015	.004
110-116	.141	.005/.015	.005
210-222	.188	.010/.020	.006
325-349	.281	.020/.030	.007
425-460	.375	.020/.030	.010

NOTES:-

1. DASH NUMBERS OF THIS DWG. CORRESPOND TO DASH NO'S OF ARP 568 UNIFORM DASH NUMBERING SYSTEM FOR O-RINGS.
2. BORE AND GROOVE DIM'S ARE PER MIL-P-5514 REVISION C & D FOR GROOVES USING NO BACK-UP RINGS.
3. FOR INSTALLATION SUGGESTIONS SEE DWG. 16-130.
4. TO ORDER - SPECIFY AS FOLLOWS:

EXAMPLE: S11338 — 325
CAP STRIP NO.
SIZE DASH NO.

S11338 J

ITEM NO.	PART NO.	NO. REQ.	MATERIAL, SIZE AND DESCRIPTION

REMOVE ALL BURRS AND BREAK ALL SHARP EDGES TO ——— MAX.

LIMITS ON DIMENSIONS UNLESS OTHERWISE NOTED
.XX DECIMAL = ———
.XXX DECIMAL = ———
FRACTION = ± 1/32
ANGLES = ± 1/2°

APPROVED BY		6-2-65
CHECKED BY		
DRAWN BY	Prehy	5-26-65

SCALE: NONE
MATERIAL: VIRGIN TFE SHAMBAN SPEC. EE-93
FINISH:

O.D. CAP STRIP INSTALLATION CHART

NEXT ASSY. USED ON | QTY. REQ'D.

W. S. SHAMBAN & CO.
CULVER CITY, CALIFORNIA — FORT WAYNE, INDIANA

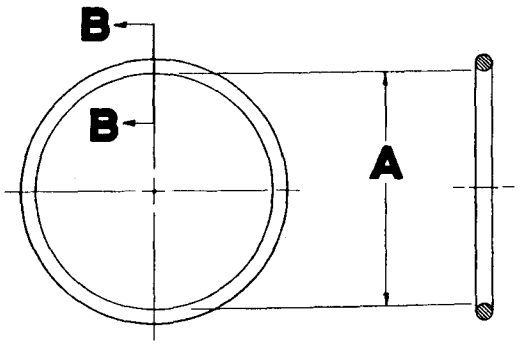
DWG. NO. S11338 | CHANGE LTR J

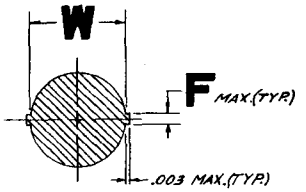
DASH NO.	A DIA.
	±.004
005	.101
	±.005
006	.114
007	.145
008	.176
009	.208
010	.239
011	.301
012	.364
013	.426
014	.489
015	.551
016	.614
017	.676
018	.739
	±.006
019	.801
020	.864
021	.926
022	.989
023	1.051
024	1.114
025	1.176
026	1.239
027	1.301
028	1.364
	±.005
110	.364
111	.424
112	.487
113	.549
114	.612
115	.674
116	.737
	±.006
117	.799
118	.862
119	.924
120	.987
121	1.049
122	1.112
123	1.174
124	1.237
125	1.299
126	1.362
127	1.424
128	1.487
	±.010
129	1.549
130	1.612
131	1.674
132	1.737
133	1.799

DASH NO.	A DIA.
	±.010
134	1.862
135	1.925
136	1.987
137	2.050
138	2.112
139	2.175
140	2.237
141	2.300
142	2.362
143	2.425
144	2.487
145	2.550
146	2.612
	±.015
147	2.675
148	2.737
149	2.800
	±.006
210	.734
211	.796
212	.859
213	.921
214	.984
215	1.046
216	1.109
217	1.171
218	1.234
219	1.296
220	1.359
221	1.421
222	1.484
	±.010
223	1.609
224	1.734
225	1.859
226	1.984
227	2.109
228	2.234
229	2.359
230	2.484
231	2.609
	±.015
232	2.734
233	2.859
234	2.984
235	3.109
236	3.234
237	3.359
238	3.484
239	3.609
240	3.734
241	3.859

DASH NO.	A DIA.
	±.015
242	3.894
243	4.109
244	4.234
245	4.359
246	4.484
247	4.609
248	4.734
249	4.859
250	4.984
	±.023
251	5.109
252	5.234
253	5.359
254	5.484
255	5.609
256	5.734
257	5.859
258	5.984
259	6.234
260	6.484
261	6.734
262	6.984
	±.030
263	7.234
264	7.484
265	7.734
266	7.984
267	8.234
268	8.484
269	8.734
270	8.984
271	9.234
272	9.484
273	9.734
274	9.984
	±.010
325	1.475
326	1.600
327	1.725
328	1.850
329	1.975
330	2.100
331	2.225
332	2.350
333	2.475
334	2.600
	±.015
335	2.725
336	2.850
337	2.975
338	3.100
339	3.225

DASH NO.	A DIA.
	±.015
340	3.350
341	3.475
342	3.600
343	3.725
344	3.850
345	3.975
346	4.100
347	4.225
348	4.350
349	4.475
425	4.475
426	4.600
427	4.725
428	4.850
429	4.975
	±.023
430	5.100
431	5.225
432	5.350
433	5.475
434	5.600
435	5.725
436	5.850
437	5.975
438	6.225
439	6.475
440	6.725
441	6.975
	±.030
442	7.225
443	7.475
444	7.725
445	7.975
446	8.475
447	8.975
448	9.475
449	9.975
450	10.475
451	10.975
452	11.475
453	11.975
454	12.475
455	12.975
456	13.475
457	13.975
458	14.475
459	14.975
460	15.475





SECTION B-B ENLARGED

DASH NO.	W DIA.		F MAX.
005-018	.070	±.003	.030
019-028	.070	±.003	.035
110-149	.103	±.003	.040
210-274	.139	±.004	.050
325-349	.210	±.005	.062
425-460	.275	±.006	.062

NOTES:

1. DASH NO'S & DIMENSIONS OF THIS DWG. ARE IDENTICAL TO DASH NO'S & DIMENSIONS OF ARP 568.
2. THESE TFE O-RINGS ARE INTENDED FOR GENERAL PURPOSE APPLICATIONS. FOR APPLICATIONS REQUIRING CLOSE TOLERANCES AND IMPROVED SURFACE FINISH SEE W.S.S. PRECISION TFE O-RING DWG. NO. S 11214.

S11732 D

ITEM NO.	PART NO.	NO. REQ.	MATERIAL, SIZE AND DESCRIPTION

REMOVE ALL BURRS AND BREAK ALL SHARP EDGES TO ——— MAX.

LIMITS ON DIMENSIONS UNLESS OTHERWISE NOTED
.XX DECIMAL = ———
.XXX DECIMAL = ———
FRACTION = ± 1/32
ANGLES = ± 1/2°

APPROVED BY		5-14-63
CHECKED BY		
DRAWN BY	Proms	5-14-63

SCALE	MATERIAL	FINISH
NONE	VIRGIN TFE SHAMBAN SPEC. 2-63	125

O-RING PACKING GENERAL PURPOSE

NEXT ASSY. USED ON	QTY. REQ'D.

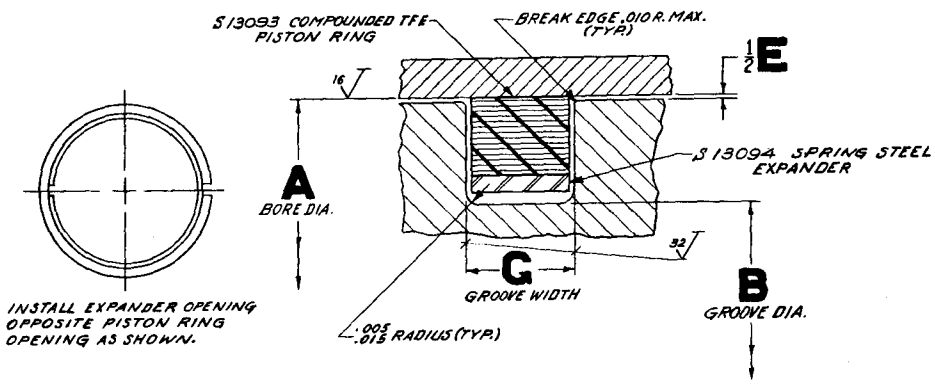
W. S. SHAMBAN & CO.
CULVER CITY, CALIFORNIA — FORT WAYNE, INDIANA

DWG. NO. S11732 — CHANGE LTR D

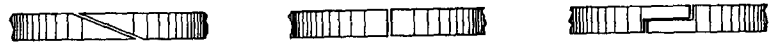
DASH NO.	A BORE DIA.	B GROOVE DIA.
	+.003 -.000	±.005
12	.750	.469
13	.812	.531
14	.875	.594
15	.937	.656
16	1.000	.719
17	1.062	.781
18	1.125	.844
19	1.187	.906
20	1.250	.969
21	1.312	1.000
22	1.375	1.063
23	1.437	1.125
24	1.500	1.188
25	1.562	1.250
26	1.625	1.313
27	1.687	1.375
28	1.750	1.438
29	1.812	1.500
30	1.875	1.563
31	1.937	1.625
32	2.000	1.688
33	2.062	1.750
34	2.125	1.813
35	2.187	1.875
36	2.250	1.938
37	2.312	2.000
38	2.375	2.063
39	2.437	2.125

DASH NO.	A BORE DIA.	B GROOVE DIA.
	+.003 -.006	±.005
40	2.500	2.188
41	2.562	2.250
42	2.625	2.313
43	2.687	2.375
44	2.750	2.438
45	2.812	2.500
46	2.875	2.563
47	2.937	2.625
48	3.000	2.688
	+.005 -.008	+.005 -.010
49	3.062	2.562
50	3.125	2.625
51	3.187	2.687
52	3.250	2.750
53	3.312	2.812
54	3.375	2.875
55	3.437	2.937
56	3.500	3.000
57	3.562	3.062
58	3.625	3.125
59	3.687	3.187
60	3.750	3.250
61	3.812	3.312
62	3.875	3.375
63	3.937	3.437
64	4.000	3.500
66	4.125	3.595
68	4.250	3.720
70	4.375	3.845
72	4.500	3.970
74	4.625	4.095
76	4.750	4.220
78	4.875	4.345
80	5.000	4.470

DASH NO.	A BORE DIA.	B GROOVE DIA.
	+.006 -.010	+.005 -.015
82	5.125	4.500
84	5.250	4.625
86	5.375	4.750
88	5.500	4.875
90	5.625	5.000
92	5.750	5.125
94	5.875	5.250
96	6.000	5.375
98	6.125	5.500
100	6.250	5.625
102	6.375	5.750
104	6.500	5.875
106	6.625	6.000
108	6.750	6.125
110	6.875	6.250
112	7.000	6.375
116	7.250	6.375
120	7.500	6.625
124	7.750	6.875
128	8.000	7.125
136	8.500	7.625
144	9.000	8.125
152	9.500	8.625
160	10.000	9.125
168	10.500	9.500
176	11.000	10.000
184	11.500	10.500
192	12.000	11.000
200	12.500	11.500
208	13.000	12.000
216	13.500	12.500
224	14.000	13.000
232	14.500	13.500
240	15.000	14.000
248	15.500	14.500
256	16.000	15.000



DASH NO.	G GROOVE WIDTH		DASH NO.	E DIAM. CLEARANCE
8 - 48	.125	+.005 -.000	8 - 48	.010
49 - 80	.187		49 - 80	.015
82 - 112	.250		82 - 256	.020
116 - 160	.312			
168 - 256	.375	+.005 -.000		



TYPE A ANGLE CUT

TYPE B STRAIGHT CUT

TYPE C STEP CUT

TO ORDER, SPECIFY AS FOLLOWS:-

EXAMPLE: S13095 — 64 — A

- 64 — PISTON RING SET
- 64 — SIZE DASH NO.
- A — TYPE

NOTES:-

1. THE S13095 SERIES PISTON RING IS FURNISHED IN SETS CONSISTING OF ONE (1) S13093 PISTON RING AND ONE (1) S13094 EXPANDER.
2. THREE TYPES OF PISTON RINGS ARE AVAILABLE AS ILLUSTRATED:- TYPE A (ANGLE CUT), TYPE B (STRAIGHT CUT) AND TYPE C (STEP CUT).
3. S13093 PISTON RINGS ARE FURNISHED IN A TFE MATERIAL SPECIALLY COMPOUNDED BY SHAMBAN FOR LUBRICATION-FREE GAS COMPRESSOR SERVICE. VIRGIN TFE (TEFLON) AND OTHER TFE COMPOUNDS ARE ALSO AVAILABLE.
4. S13095 SERIES PISTON RINGS REPLACE S 12507 SERIES PISTON RINGS FOR NEW DESIGN
5. "E" DIAM. CLEARENCES SHOWN ARE MAX. RECOMMENDED UNLESS WEAR RINGS ARE USED. WHEN WEAR RINGS ARE USED "E" MAY BE INCREASED UP TO 200%

S13095 A

ITEM NO.	PART NO.	NO. REQ.	MATERIAL, SIZE AND DESCRIPTION

REMOVE ALL BURRS AND BREAK ALL SHARP EDGES TO ——— MAX.

LIMITS ON DIMENSIONS UNLESS OTHERWISE NOTED
XX DECIMAL = ———
XXX DECIMAL = ———
FRACTION = ± 1/32
ANGLES = ± 1/2°

APPROVED BY — 9-18-63
CHECKED BY —
DRAWN BY — 9-17-63

SCALE	MATERIAL	FINISH
NONE		

PISTON RING SET-INSTALLATION

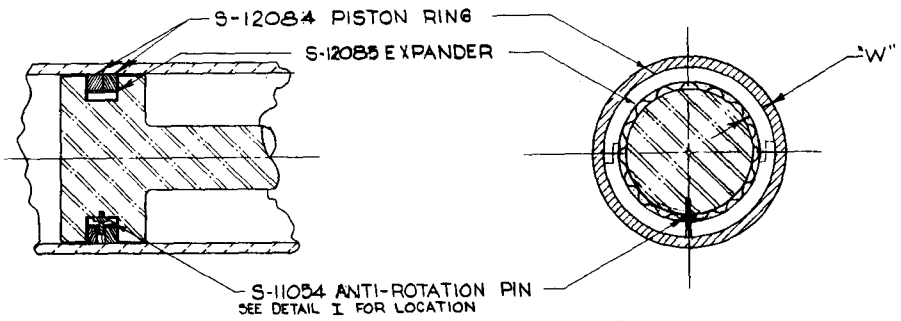
NEXT ASSY. USED ON	QTY. REQ'D.

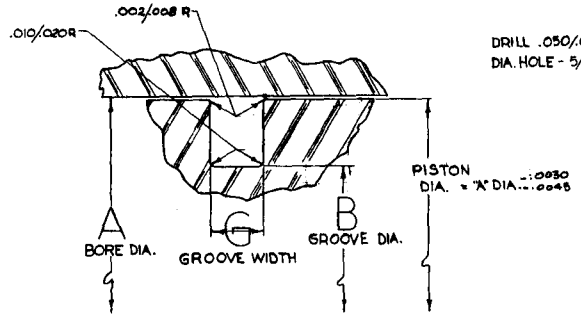
W. S. SHAMBAN & CO.
CULVER CITY, CALIFORNIA — FORT WAYNE, INDIANA

DWG. NO. S13095 — CHANGE LTR A

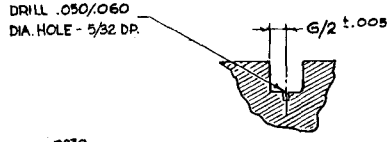
S-12083 SET DASH NO.	A BORE DIA.	B GROOVE DIA.	G WIDTH	NOMINAL "W" DIM.
	+.001 -.000	+.004 -.004	+.001 -.001	
012	.485	.289	.126	1/16
109	+.002 -.000	+.004 -.004	+.001 -.001	3/32
110	.551	.305		
111	.613	.367	.126	
112	.676	.430		
113	.738	.428		
114	.801	.491		1/4
115	.863	.553		
116	.926	.616		
210	.991	.681		
211	1.053	.743		1/8
212	1.116	.806		
213	1.178	.868		
214	1.241	.931		
215	1.303	.993		
216	1.366	1.056		
217	1.428	.994		
218	1.491	1.057		
219	1.553	1.119	.126	
220	1.616	1.182		
221	1.678	1.244		
222	1.741	1.307		
325	1.870	1.436		
326	1.995	1.561		
327	2.120	1.685		3/16
328	2.245	1.811		
329	2.370	1.936		
330	2.495	2.061		
331	2.620	2.186		
332	2.745	2.311		
333	2.870	2.436		
334	2.995	2.561		
335	3.120	2.686		
336	3.245	2.811		
337	3.369	2.935		
338	3.494	3.060		

S-12083 SET DASH NO.	A BORE DIA.	B GROOVE DIA.	G WIDTH	NOMINAL "W" DIM.
	+.002 -.000	+.004 -.004	+.001 -.001	
339	3.619	3.185	.126	5/16
340	3.744	3.310		
341	3.869	3.435		
342	3.994	3.560		
343	4.119	3.559		
344	4.244	3.684		
345	4.369	3.809		
346	4.494	3.934		1/4
347	4.619	4.059		
348	4.744	4.188		
349	4.869	4.309		
	+.003 -.000	+.004 -.004	+.001 -.001	
425	4.974	3.414	.189	
426	5.099	4.539		
427	5.224	4.664		
428	5.349	4.789		
429	5.474	4.914		
430	5.599	5.039		
431	5.724	5.164		
432	5.849	5.289		
433	5.974	5.414		
434	6.099	5.539		
435	6.224	5.664		1/4
436	6.349	5.789		
437	6.474	5.914		
438	6.724	6.164		
439	6.974	6.414		
440	7.224	6.664		
441	7.474	6.914		
442	7.724	7.164		
443	7.974	7.414		
444	8.224	7.664		
445	8.474	7.914		
446	8.974	8.414		
447	9.474	8.914		





ENLARGED GROOVE DETAIL



DETAIL I

S-12083
B

6. WHEN ORDERING SPECIFY THE FOLLOWING:
   EXAMPLE: S-12083 - 114 - Q OR P } SEE NOTE 5
   PISTON RING SET NO. — SIZE DASH NO. — TYPE
5. TWO TYPES PISTON RING ARE AVAILABLE
   S-12083 TYPE Q; WITHOUT S-11054 ANTI-ROTATION PIN.
   S-12085 TYPE P; WITH S-11054 ANTI-ROTATION PIN.
4. THE S-12083 SERIES PISTON RING IS FURNISHED IN SETS CONSISTING OF TWO(2) S-12084 PISTON RING, AND ONE(1) S-12085 EXPANDER.
3. DASH NOS. OF THIS DRAWING CORRESPOND TO DASH NO'S. OF S-12084 PISTON RING AND S-12085 EXPANDER.
2. DASH NOS. OF THIS DRAWING CORRESPOND TO UNIVERSAL DASH NOS. PER MIL-P-5514D (A2)
1. BORE DIMENSIONS (ONLY) CONFORM TO BORE DIMENSIONS OF MIL-P-5514D (A2)

GENERAL NOTES

ITEM NO.	PART NO.	NO. REQ'D.	SIZE AND DESCRIPTION
	S-11054		MATL: 18-8 ANNEALED TYPE 303
(A1)	S-12085		MATL: S/S TYPE 301. FULL HARD MIL-S-6049
	S-12084		MATL: KELON "T" (TEFLON PER AMS 3651)

BILL OF MATERIAL

REMOVE ALL BURRS AND BREAK ALL SHARP EDGES TO MAX.

UNLESS OTHERWISE NOTED LIMITS ON DIMENSIONS
.XX DECIMAL = ±
.XXX DECIMAL = ±
FRACTION = ± 1/32
ANGLES = ± 1/2°

DRAWN BY	WRIGHT-HNY	5/21/61
CHECKED BY		
APPROVED BY		6/7/61

SCALE	MATERIAL	CHANGE
NONE	NOTED	B

PISTON RING SET (BORE PER MIL-P-5514)

W. S. SHAMBAN & CO.
11617 WEST JEFFERSON BLVD.
CULVER CITY, CALIF.

DWG. NO. S-12083

NEXT ASSY. USED ON | QTY. REQ'D.

DATE | BY | CHANGE | LTR.