

October 15

Mr. Johnson:

Subj: Packing for Joint Faces of Pump Cases
and similar applications.

A meeting was held Thursday afternoon, October 10, 1940 in the Restaurant and attended by members of the Shop and Engineering Department for the purpose of standardizing on suitable sheet packing for use in our pumps.

The following persons were in attendance at this meeting:
Mr. Gartman, Mr. Riley, Mr. Jurgensen, Mr. Chidley, Mr. Barratt, Mr. Leonard, Mr. Klar, Mr. Rupell, Mr. Toft, Mr. Martin, Mr. Quigley, Mr. Mason and myself.

I. ASBESTOS SHEET PACKING 1/64" THICK

This packing is now used on all multistage Pump joints and is also satisfactory for use on steam joints.

Samples of the following makes had been investigated previous to the meetings:

"Tauril" Anchorite Packing. (This was our previous standard).
#590 and #591 Belmont Packing
Johns Manville Packing
#170, #172 and #190 Vellumoid Packing
#2150 John Crane Packing.

Measuring of all these makes of packing indicates that the minimum variation that can be expected in the thickness is approximately $\pm 10\%$, which incidentally is the tolerance allowed in the Navy Specification for this type of packing. It was, therefore, decided to purchase the packing to the following specifications in the future:
.015" $\pm$.002".

Only two of the samples available came up to this specification, the No. 591 Belmont Packing and the No. 2150 John Crane Packing. As the Belmont Packing sells for \$.73¢/lb. and the Crane Packing for \$.39¢/lb. it is recommended that we purchase #2150 John Crane Packing exclusively for the time being.

This packing is not oil resistant and for oil joints it will still be necessary to purchase Johns Manville #23 or a similar type oil resistant packing.

It is also recommended that the pump casings where the above packing is used be bored theoretically with a .012" thick shim --- with necessary adjustments for mechanical conditions on the horizontal boring mills.

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II. CASING FITS

Existing fits between casing bore and diaphragms for stage pumps vary from .000" to .004" Loose for the smaller sizes, to .003" to .006" Loose for the "H" and "P" sizes. It is recommended that the drawings be changed uniformly to call for a casing bore of nominal size $\pm .0002$ " Dia., and a diaphragm size of $-.002$ " below nominal with a tolerance of $\pm .0002$ ". This will give a tolerance of .002" Loose to .006" Loose. Case ring fits will remain as at present, the bore being nominal size $\pm .002$ " , and the case ring diameter nominal size $\pm .0002$ " Dia.

III. PACKING FOR STANDARD SINGLE STAGE PUMPS AND SERIES PUMPS.

The joint faces of our standard pumps were until recently packed with .007" Manila paper. It has now been decided to substitute a better packing material in the form of a plant fibre gasket .010" thick made by Vellumoid and others. This packing is suitable for water, oil and gasoline where the temperatures do not exceed about 250°. The plant fibre gasket has considerably more compressibility than the Manila paper previously used and it is recommended that the pumps where this packing is used be bored theoretically with a .005" metal shim (with necessary adjustment for mechanical condition of boring mill). This is the same procedure as was used previously for boring the casings when using Manila paper gaskets.

J. A. Brophy

JAB:AP

B.P.copies to Messrs: Gartsen, Jurgensen, Riley, Salmon, Dockter, Martin, Chidley, Barratt, Leonard, Rupell, Klar, Dickinson, Toft, Quigley, and Mason. A. PETERSON

DE LAVAL STEAM TURBINE CO.
TRENTON, N.J.

JOINTFACE GASKETS FOR CENTRIFUGAL PUMPS.

PUMP	TYPE	THICKNESS OF SHIM TO BE USED WHEN BORING PUMP CASE	GASKET MATERIAL	REMARKS
SINGLE SUCTION SINGLE STAGE	F BF	NONE	USE: .010" THICK VELLUMOID SOFT FIBRE SHEET PACKING. TOLERANCE $\pm .002$" LIMITING TEMP. 300°F. SUITABLE FOR PACKING WATER, OIL, GREASE, GASOLINE, ORGANIC LIQUIDS & SOLVENTS. NO SHELLAC TO BE USED.	* NOTE: SHIMS LISTED ARE NOM- INAL AND MUST BE VAR- IED TO SUIT THE PHETIC- ULAR CONDITION OF THE BORING MILL.
DOUBLE SUCTION SINGLE STAGE	G.L.U.I.P. W.K.T.X.	.005"		
SINGLE SUCTION SINGLE STAGE	G.I.K	.005"		
D SERIES PUMPS DOUBLE SUCTION	2KD 2LD, 3KD	.005"		
CLOGLESS PUMP	G.I.L.P.T	.005"		
PROPELLER PUMP	GR	.005"		
MIXED FLOW PUMP	MF	.005"		
CONDENSATE PUMP	H	.005"		
MULTI-STAGE PUMPS. VOLUTE TYPE	K.S.L.A. M.S.N.G.P.B	.012"	USE: JOHN CRANE COMPRESSED ASBESTOS PACKING STYLE 2150. TOLERANCE $\pm .015$" $\pm .002$" SUITABLE FOR PACKING WATER, STEAM BRINE ALKALI AND MANY ACIDS. JOHN MANVILLE #23 SHEET .015" THICK TO BE USED FOR OIL.	
4 STAGE SERIES PUMP	415	.012"		
MULTI-STAGE DIFFU- SING VANE PUMP	I.K.L.M. N.P	.012"		
S SERIES PUMP, SIN- GLE SUCTION, 2 STAGE	215, 2K5, 2L5	.012"		

GASKETS

This standard applies to all joint surfaces. Table I lists the type of joint and the required material, and in Table II may be found a list of acceptable products for gasket material. This table will be modified from time to time as new materials are accepted.

The following specifications cover the conditions involved and the list of Table II gives trade names meeting these conditions.

Sealing Compound shall be such that it will harden and remain hard in a condition that will withstand temperatures at 850F and pressures up to 900 psi. It must be sufficiently fluid to fill in the small grooves left by machining yet still allow the joint to be tightened to a metal to metal fit.

Asbestos sheet packing shall be of uniform thickness throughout and shall conform to the following tolerances: .015" $\pm$.002" and 1/32" $\pm$.002". The quality of this material shall be such that it will withstand temperatures up to 750F and pressures up to 600 psi, and the .015 stock must be compressible to .012" to .013".

Plant fiber shall be oil and water resistant and shall have the ability to withstand temperatures up to 250F. It shall be of uniform thickness within the following tolerances, .010" $\pm$.002", .015" $\pm$.002" and 1/32" $\pm$.002", and the .010" stock must be compressible to .006" to .007".

Ring and formed gaskets shall be able to withstand 900 psi or above, but since their application is special and varies with the machine, they should be specified by the Designer.

Armco Iron and other metal gaskets shall be able to withstand temperatures up to 750F and pressures between 600 psi and 900 psi. Since these in most cases will be formed gaskets, their application and source will be supplied by the Designer.

With turbine conditions below 250 psi and 450F there should be a note on the Bill of Material as follows: "Nozzle face joint not to be lapped". A special route will be required for any job with these conditions.

Assembly drawings will indicate location, thickness and material for gaskets. Drawings need only be made for metal or other special gaskets. In all cases Bills of Material will carry the thickness and material for gaskets, however, in the case of precut types, as simple flange gaskets, which can be entirely specified by inside diameter, outside diameter, thickness and diameter of bolt circle, the Bills of Material will carry the complete dimensions. Sealing compound will not be called for on assembly drawings or Bills of Material.

Trade names will not be carried on Bills of Material for it will be left to Purchasing to procure material from any of the acceptable sources. As new materials are proposed for gaskets, samples shall first be submitted to the Engineering Department for acceptance.

NOTE: When Bills of Material for pumps call for gaskets .015" to .010" thick, shims of .010" and .005" nominal thickness respectively shall be used in boring pump cases, etc. A note should be added to the drawing as follows: "Use proper shim for boring to suit gasket called for on joint faces of pump cases".

DISTRIBUTION: - Groups I, II, III, IV, V, VI, VII

9-17-51 JCT	W. BAKER	Supersedes	STANDARD GASKETS	Page 1 of 4
		US 3-30 dated		
		12-16-47		
DATE	CK. BY	APP'D.	ALTERATIONS	DE 3-30

DE LAVAL STEAM TURBINE CO.
TRENTON, N. J.

TX0026

TABLE I

DATE	CK. BY	APP'D.	ALTERATIONS	FLUID	LOCATION	CONDITIONS	GASKET	THICKNESS (in.)	FINISH (mu in.)	REMARKS
9-17-51	JCT		Supersedes DE 3-30 dated 12-16-47	STEAM	Horizontal Joint, Case to Cover	30 psi & above	Sealing Compound	Metal- Metal	32	* The nozzle ring is to be lapped into place. When conditions are less than 450F or 250 psi, a 63 mu in. finish will be permitted and lapping will not be required. Nozzle rings carried in stock will be finished to 32 mu in.
					Below 30 psi	Below 30 psi	Sealing Compound	Metal- Metal	63	
					All conditions	All conditions	Sealing Compound	Metal- Metal	63	
					601 psi or 750F and above	601 psi or 750F and above	Armco Iron	1/32	125	
					Below 601 psi or 750F	Below 601 psi or 750F	Asbestos Sheet Packing	1/32	125	Rubber is to be used only where need for com- pressibility is great and fluid is cold.
					250 psi or 450F and above	250 psi or 450F and above	Sealing Compound	Metal- Metal	32	
					Below 250 psi or 450F	Below 250 psi or 450F	Sealing Compound	Metal- Metal	63	
					600 psi or 750F and below	600 psi or 750F and below	Asbestos Sheet Packing	1/32	125	
					600 psi or 750F and below	600 psi or 750F and below	Copper-Asbestos	1/16	125	# Glyptal, shellac, pine tar and shellac are ac- ceptable sealing var- nishes.
					900 psi or 750F and above	900 psi or 750F and above	Metal Ring Gasket	Use/ASA Dimensions	125	
					601 psi to 899 psi	601 psi to 899 psi	Raised Face with Armco Iron	1/32	125	
					Up to & includ- ing 600 psi or 750F	Up to & includ- ing 600 psi or 750F	Asbestos Sheet Packing	1/32	125	
					Steam Chest Flanges on Governor Valve & Trip Valve Covers					See Table II for list of accepted materials and trade names.

STANDARD GASKETS

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DE LAVAL STEAM TURBINE CO.

DE 3-30

TX0027

TABLE I (cont'd.)

FLUID	LOCATION	CONDITIONS	GASKET	THICKNESS (in.)	FINISH (mu in.)	REMARKS
WATER	Casing to Cover Single Stage Pumps	Low Pressure Below 300 psi	Plant Fiber	.010	125	
	Casing to Cover (multistage pumps) (Series Pumps)	High Pressure 300 psi & above	Asbestos Sheet Packing	.015	63 125	See Page 1 of this table for remarks.
	Casing Head on Multistage Pumps	Cold Water Below 200F	Asbestos Sheet Packing	.015	125	
	Series Piping	Cold Water	Rubber Gasket	1/16	125	
	IMO Pumps Main Joint	Cold Oil up to 150F	Plant Fiber	.010 & .015	125	
OIL	Governor Cover (Servomotor)	Cold Oil	Plant Fiber	.010	125	
	Gear Casing Inspection Cover	Cold Oil	Plant Fiber	1/32	250	
	Gear Casing Joint Surface	Cold Oil	#Sealing Varnish	Metal- Metal	125	
	Oil Reservoirs	Cold Oil	Plant Fiber	.010	125	
	Piping Flanges	Cold Oil	Plant Fiber	1/32	125	
	Gear Case to Oilpan	Cold Oil	Plant Fiber	1/32	250	
	Casing to Cover (Compressors)	40 psi-450F & below	Fuse Wire-or Linen Thread with Sealing Compound	---	63	
CAS						

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STANDARD GASKETS

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DATE

CK. BY

APP'D

ALTERATIONS

DE LAVAL STEAM TURBINE CO.
TRENTON N. J.

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TABLE II

Sealing Compounds

Copaltite

Usidurian may be used for sealing compound when conditions are below 400F, but in no case is it to be used behind nozzle rings for turbines.

Asbestos Sheet Packings:

Johns-Manville 60S

Durabla

Ankorite #425

John Crane #2150

McKim (Copper sheathed asbestos)

Melrath #150

Plant Fibers:

Hydrooil

Vellumoid

Melrath #1242 - "Sealtite"

9-17-51	JCT	HG BAKER by JCT	Supersedes DE 3-30 dated 12-16-47	STANDARD GASKETS.	Page 4 of 4
DATE	CK. BY	APP'D.	ALTERATIONS	DE LAVAL STEAM TURBINE CO. TRENTON, N. J.	DE 3-30