



PLAINTIFF'S EXHIBIT

ET-76



Interoffice Letter

To: MATERIALS SPECIFICATION
DISTRIBUTION LIST

Date: OCTOBER 25, 1988
From: MICHAEL S. WALKER Extension No.: 8098
Office: MATERIALS ENGINEERING Location: 66-1
Subject: OBSOLETION OF MS-51/A

The subject material specification is being obsoleted due to a significant increase in customers requirement that materials be asbestos free.

Please refer to Material Specification 8101 (Index 1A).

MICHAEL S. WALKER

MSW/pbk

ET-00315

MATERIAL SPECIFICATION NO. 51, 51A

Form 247 A (4-64)



D ASBESTOS SHEET WITH RUBBER BINDER

Date 7/25/72

Page 1 of 2

Superseded Date

6/5/64 (Editorial)

ed with a Non-Stick Parting Agent, Both Sides
reated with a Parting Agent, (Navy Applications)

1/4 1/8 3/32 1/16

*STOCKED
THICKNESS*

1/32 1/64

Scope:

This specification covers a compressed chrysotile asbestos sheet stock impregnated with a synthetic binder, suitable for use to temperatures up to 850°F.

Composition:

Material purchased to this specification shall be of the following composition by weight.

Asbestos	70% minimum
Binder	10% minimum
Remainder - Filler	20% maximum

These materials shall be processed to form a tough compressible sheet.

Physical Properties:

Compressibility, nominal -

At 1,000 psi	3 to 10%
5,000 psi	7 to 17%
10,000 psi	10 to 25%

Recovery after 5,000 psi load 40% minimum

Tensile Strength -

Longitudinal	3,000 psi minimum
Transverse	1,500 psi minimum

Hardness - Shore - Durometer A - 95 ± 5

Resistance to crushing - 50,000 psi minimum

Density - Per cu. in. 1.00 oz.

Chemical Resistance:

Fuel - 5 hours in ASTM Fuel B at room temperature.

Thickness increase - 15 to 35%

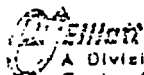
ET-00316

Oil Resistance - 5 hours in ASTM 3 oil at 300°F

Thickness increase - 20 to 50%; Tensile Loss - 40% maximum

Approved

Approved



A Division of
Carrier Corporation

Form 247 A (4-64)

MATERIAL SPECIFICATION NO. 51, 51A

SUBJECT

COMPRESSED ASBESTOS SHEET WITH RUBBER BINDER

Date 7/25/72

Page S1 of 1

Superseded Date

6/5/64

NOTE: THIS SHEET NOT TO BE SENT TO SUPPLIERS.

S1. Approved Sources for Material Specification 51:

		<u>Manufacturer</u>
S1.1	7021 Compressed Asbestos Sheet (press cured)	Garlock, Inc.
S1.2	J.C. Style 2150 Compressed Asbestos Sheet	Crane Packing Company
S1.3	#60 Service Sheet	Johns Manville Company
S1.4	#999 Wizard Sheet	U. S. Rubber Company

S2. Approved Sources for Material Specification 51A:

S2.1	150 Compressed Asbestos Sheet (ungraphited)	Melrath Supply and Gasket Company
S2.2	#61 Service Sheet	Johns Manville Company

ET-00317

Approved

Approved

Approved



SUBJECT

COMPRESSED ASBESTOS SHEET WITH RUBBER BINDER

Date 7/25/72

Page 1 of 2

Superseded Date 6/5/64

- 51 - Treated with a Non-Stick Parting Agent, Both Sides
51A - Not Treated with a Parting Agent, (Navy Applications)

1. Scope:

- 1.1 This specification covers a compressed chrysotile asbestos sheet stock impregnated with a synthetic binder, suitable for use to temperatures up to 850°F.

2. Composition:

- 2.1 Material purchased to this specification shall be of the following composition by weight.

Asbestos	70% minimum
Binder	10% minimum
Remainder - Filler	20% maximum

These materials shall be processed to form a tough compressible sheet.

3. Physical Properties:

3.1. Compressibility, nominal -

At 1,000 psi	3 to 10%
5,000 psi	7 to 17%
10,000 psi	10 to 25%

- Recovery after 5,000 psi load 40% minimum

3.2 Tensile Strength -

Longitudinal	3,000 psi minimum
Transverse	1,500 psi minimum

3. From Mat'l - Durometer A - 95 ± 5

3. ushing - 50,000 psi minimum

3. Spec 51 1. in. 1.00 oz.

- 4 Master ance:

- 1 file in ASTM Fuel B at room temperature.

increase - 15 to 35%

ET-00318

5/22/94 - 5 hours in ASTM 3 oil at 300°F

increase - 20 to 50%, Tensile Loss - 40% maximum

Approved

M. E. Hume

Approved

HA@

Approved

Y. H. Guly



SUBJECT

COMPRESSED ASBESTOS SHEET WITH RUBBER BINDER

Date 7/25/72

Page 51 of 1

Superseded Date

6/5/64

NOTE: THIS SHEET NOT TO BE SENT TO SUPPLIERS.

S1. Approved Sources for Material Specification 51:

S1.1 7021 Compressed Asbestos Sheet (press cured)

Manufacturer
Garlock, Inc.

S1.2 J.C. Style 2150 Compressed Asbestos Sheet

Crane Packing Company

S1.3 #60 Service Sheet

Johns Manville Company

S1.4 #999 Wizard Sheet

U. S. Rubber Company

S2. Approved Sources for Material Specification 51A:

S2.1 150 Compressed Asbestos Sheet (ungraphited)

Melrath Supply and
Gasket Company

S2.2 #61 Service Sheet

Johns Manville Company

ET-00319

Approved

M. E. Henth

Approved

H. C. Arner

Approved

J. H. Guly

GENERAL
INTER-OFFICE LETTER

Material Specification
Distribution List

FROM William H. Rolshouse

DATE 6-5-64

OFFICE Materials Engineering

SUBJECT Material Specification 51, 51A

File Copy



Subject material specification has been revised to include Melrath Supply & Gasket Company as an approved source of material.

William H. Rolshouse
WILLIAM H. ROLSHOUSE

WHR/vb

SUBJECT

Compressed Asbestos Sheet with Rubber Binder

Date 6-5-64

Page 1 of 3

Superseded Date 4-29-64

- 51 - Graphited both sides
51A - NonGraphited (Navy Applications)

- I. Scope: This specification covers a compressed chrysotile asbestos sheet stock impregnated with a synthetic binder, suitable for use to temperatures up to 850°F.
- II. Composition: Material purchased to this specification shall be of the following composition:

Asbestos - 70% minimum by wt.
Binder - 10% minimum by wt.



These materials shall be processed to form a tough compressible sheet.

- III. Physical Properties: Acceptable materials shall have the following minimum physical properties:

Compressibility, Nominal

At 1,000 psi 3 to 10%
At 5,000 psi 7 to 17%
At 10,000 psi 10 to 25%

Recovery after 5,000 psi load 40% minimum.

Tensile Strength

Longitudinal - 3,000 psi minimum
Transverse - 1,500 psi minimum

Hardness - Shore - Durometer A - 95 ±5

Resistance to crushing - 50,000 psi minimum

- IV. Fuel Resistance:

5 hours in ASTM Fuel B at RT

Thickness Increase - 15 to 35%

- V. Oil Resistance:

5 hours in ASTM #3 Oil at 300°F.

Thickness Increase - 20 to 50%
Tensile Loss - 40% minimum

- VI. Density: Per cu. in. 1.00 oz.

ET-00321

- VII. Thickness: Available in 1/64" to 1/4". Must be specified on purchase order.

Approved

[Signature]

Approved

[Signature]

Approved



JEANNETTE, PA.

MATERIAL SPECIFICATION No. 51, 51A

Date April 29, 1964

Sheet 2 No. SHEETS 3

Title: Compressed Asbestos Sheet with Rubber Binder

V. Oil Resistance:

5 hours in ASTM #3 Oil at 300°F.

Thickness Increase - 20 to 50%
Tensile Loss - 40% minimum

VI. Density:

Per cu. in. 1.00 oz.

VII. Thickness: Available in 1/64" to 1/4". Must be specified on purchase order.

VIII. Sheet Sizes: Available in large range from 40" x 40" to 150" x 150". Must be specified on purchase order.

IX. Service Suitability: The material shall be suitable for handling steam, water, air, gases, ammonia, alkalis, gasoline, and oil at temperatures up to 850°F.

X. Standard Specifications: This material meets the requirements of the following specifications:

ASTM-D-1170 Latest Revision, Grade P-1161-A
MIL-A-17472

Approved 

Approved 

Approved _____

ET-00322

SUBJECT

Compressed Asbestos Sheet with Rubber Binder

Date 6-5-64

Page 3 of 3

Superseded Date 4-29-64

NOTE: This sheet not to be sent to suppliers.

Approved Sources:Material

7021 Compressed Asbestos Sheet

Style 2150 Compressed Asbestos Sheet

Goodyearite 106

#60 Service Sheet

#999 Wizard Sheet

125 Compressed Asbestos Sheet
(Graphited both sides - Spec. 51)150 Compressed Asbestos Sheet
(Ungraphited - Spec. 51A)Manufacturer

Garlock, Inc.

Crane Packing Company

Goodyear Tire & Rubber Company

Johns Manville Company

U. S. Rubber Company

Melrath Supply & Gasket Company

Melrath Supply & Gasket Company

ET-00323

Approved

Approved

Approved



JEANNETTE, PA.

MATERIAL SPECIFICATION No. 51, 51A

Date April 29, 1964

Sheet 1 No. SHEETS 3

Title: Compressed Asbestos Sheet with Rubber Binder



- 51 - Graphited both sides
51A - NonGraphited (Navy Applications)

I. Scope: This specification covers a compressed chrysotile asbestos sheet stock impregnated with a synthetic binder, suitable for use to temperatures up to 850°F.

II. Composition: Material purchased to this specification shall be of the following composition:

Asbestos - 70% minimum by wt.
Binder - 10% minimum by wt.

These materials shall be processed to form a tough compressible sheet.

III. Physical Properties: Acceptable materials shall have the following minimum physical properties:

Compressibility, Nominal

At 1,000 psi	3 to 10%
At 5,000 psi	7 to 17%
At 10,000 psi	10 to 25%

Recovery after 5,000 psi load 40% minimum.

Tensile Strength

Longitudinal - 3,000 psi minimum
Transverse - 1,500 psi minimum

Hardness - Shore - Durometer A - 95 ±5

Resistance to crushing - 50,000 psi minimum

IV. Fuel Resistance:

5 hours in ASTM Fuel B at RT

Thickness Increase - 15 to 35%

Approved J. H. [Signature]

Approved J. A. [Signature]

Approved _____

ET-00324



JEANNETTE, PA.

MATERIAL SPECIFICATION No. 51, 51A

Date April 29, 1964

Sheet 3 No. SHEETS 3

Title: Compressed Asbestos Sheet with Rubber Binder

Note: This sheet not to be sent to suppliers.



Approved Sources:

Material

7021 Compressed Asbestos Sheet

Style 2150 Compressed Asbestos Sheet

Goodyearite 106

#60 Service Sheet

#999 Wizard Sheet

Manufacturer

Garlock, Inc.

Crane Packing Company

Goodyear Tire & Rubber Co.

Johns Manville Company

U. S. Rubber Company

Approved

Approved

Approved

ET-00325

TO: Material Specification

Distribution List

File Copy

Material Specification

No. 51, 51A

J. H. Bradbury

June 13, 1957

This revision of specification 51 covers commercial quality compressed asbestos and rubber sheet packing (graphited and non-graphited). Specification 89 is rendered obsolete.



J. H. BRADBURY

ET-00326

ELLIOTT COMPANY

JEANNETTE, PA.

**MATERIAL SPECIFICATION No. 51, 51A**Commercial Quality Compressed Asbestos
and Rubber Sheet Packing51 - Graphited Both Sides
51A - Non-Graphited (Navy Applications)

Date Revised - June 13, 1957

Sheet 1

No. SHEETS 1

PHYSICAL PROPERTIES:-

Longitudinal Tensile Strength	5,000 psi, min.
Transverse Tensile Strength	2,000 psi, min.
Compressive Strength	40,000 psi, min.

CHEMICAL ANALYSIS:-

Asbestos	75% by wt., min.
Synthetic Rubber	10% by wt., min.

Tolerance: A tolerance of 10% is allowed on thickness less than 1/8" and 5% on greater thickness.

REMARKS:-

This material may be used up to 850°F. for gaskets on steam and water services and for all other gasket purposes where bolting or closure standards permit a relatively inelastic gasket.

Approved

Approved

Approved

ET-00327

Spec

J.C. STYLE 2150
COMPRESSED ASBESTOS SHEET PACKING

TENSILE STRENGTH

With the grain.....4700 Lbs.per sq.in.
Across the grain.....2300 Lbs.per sq.in.
Average.....3500 Lbs.per sq.in.

COMPRESSION

12% $\pm$ 4% on sheet 1/16"thk.at 5000 Lbs.Pres.
per square inch for one minute using 1/4"
diameter foot with 5 lbs.pre-load. Recovery
after compression..40% minimum, based on
compressed thickness.

FLEXIBILITY

Without cracking,J.C.Style 2150 will bend
180° over a rod whose diameter is four times
the thickness of the sheet.

DENSITY

1.00 oz.per cubic inch.

OIL RESISTANCE

Swelling in A.S.T.M. #1 oil,5 hrs.at 300°F..
16% max.
Percent of original tensile after oil test..
60% min.

FUEL RESISTANCE

Swelling in A.S.T.M.#1 Fuel,5 hrs.at room
temperature....25% max.
Swelling in A.S.T.M.#2 Fuel,5 hrs.at room
temperature....38% max.

STANDARD THICKNESSES

1/64",1/32",1/16",3/32",1/8"

SHEET SIZES

150" x 150"	50" x 50"	60" x 120"
120" x 120"	40" x 40"	40" x 120"
75" x 75"	75" x 150"	50" x 150"
60" x 60"		50" x 75"

APPROXIMATE WEIGHTS PER SHEET

50" x 50" x 1/16".....10 Lbs.
60" x 60" x 1/16".....15 Lbs.
Other Sizes in Proportion.

STANDARD PACKAGES

Sheets 50" and 60" wide rolled and packaged
in cartons, approximately 200 lbs.net weight.
Larger sheets in rolls,packaged in burlap.

Style 2150 is composed of
approximately 80% Chrysotile
Asbestos Fibres, 12-1/2%
G.R.S.synthetic rubber and
special curing compounds.
It meets Military Specifi-
cations MIL-A-17472, Class
11; MIL-G-7021; and ASTM
#1170-G-1111-1 (old #)

It is a good, general pur-
pose sheet for Industrial
and Marine Engine installa-
tions, and general ship
requirements. It has been
tested at temperatures up
to 700°F. and at pressures
up to 400 p.s.i.

Should be 1161A

SHEET GASKETING

Garlock Compressed Asbestos Sheet combines white or blue asbestos with a variety of binders, bonded under pressure and vulcanized into a homogeneous sheet. All styles are tough and durable with sufficient compressibility to seal properly, yet resist plastic flow under heavy bolt loads. Ideal for high pressure/high temperature applications employing rigid flanges with adequate bolting capacity. For basic information covering four popular styles, see chart below. Contact your Garlock representative on other styles.

STYLE 900

MATERIAL	Compressed Chrysotile asbestos with SBR binder					
TENSILE STRENGTH	With grain 6000 psi. Across grain 2500 psi. Average 4250 psi					
APPLICATION	Steam, gas, air and other services at temperatures to 700°F. Not recommended against extremely hot oil, organic solvents or strong mineral acids					
EQUIPMENT	On pipe flanges, boiler manholes, gasketed joints on steam engines, compressors, internal combustion engines, pumps or other equipment					
THICKNESSES (inches)	1/64, 1/32, 1/16, 3/32, 1/8, 3/16, 1/4					
SHEET SIZES (inches)	40 x 40	50 x 50	60 x 60	75 x 75	120 x 120	150 x 150
NOMINAL WEIGHTS* (pounds per sheet)	8.0	9.4	13.5	21.1	54.0	84.4

*Nominal weights for 1/16 in. thickness. Other thicknesses in proportion

7021

MATERIAL	Compressed Chrysotile asbestos with SBR binder					
TENSILE STRENGTH	With grain 6800 psi. Across grain 2500 psi. Average 5000 psi					
APPLICATION	Hot oil service at high temperature—steam or hot gases up to 700°F					
EQUIPMENT	On flanges of cracking stills and other refinery equipment, pipe lines, compressors, internal combustion engines; other high temperature applications					
THICKNESSES (inches)	1/64, 1/32, 1/16, 3/32, 1/8, 3/16, 1/4					
SHEET SIZES (inches)	40 x 40	50 x 50	60 x 60	75 x 75	120 x 120	150 x 150
NOMINAL WEIGHTS* (pounds per sheet)	8.0	9.4	13.5	21.1	54.0	84.4

*Nominal weights for 1/16 in. thickness. Other thicknesses in proportion

7228

MATERIAL	Compressed Chrysotile asbestos with neoprene binder					
TENSILE STRENGTH	With grain 5200 psi. Across grain 2800 psi. Average 4000 psi					
APPLICATION	Oil, refrigerants and solvents at temperatures to 300°F					
EQUIPMENT	On pipe flanges and gasketed joints of internal combustion engines, compressors, pumps and similar equipment					
THICKNESSES (inches)	1/64, 1/32, 1/16, 3/32, 1/8					
SHEET SIZES (inches)	40 x 40	50 x 50	60 x 60	75 x 75	120 x 120	150 x 150
NOMINAL WEIGHTS* (pounds per sheet)	6.0	9.4	13.5	21.1	54.0	84.4

*Nominal weights for 1/16 in. thickness. Other thicknesses in proportion

File



JEANNETTE, PA.



MATERIAL SPECIFICATION No. 372, 372A

Date May 7, 1964

Sheet 1

No. SHEETS 1

Title: Compressed Asbestos Sheet with Rubber Binder

Remarks: Subject specification is now obsolete.

For 372 use 51.

For 372A use 51A.

FOR REFERENCE ONLY
UNCONTROLLED COPY

Approved

[Signature]

Approved

[Signature]

Approved

[Signature]

Elliott
INTER-OFFICE LETTER

TO Material Specification
Distribution List

File

FROM William H. Rolshouse

DATE 1-2-64

OFFICE Materials Engineering

SUBJECT Material Specification No. 372



This specification has been revised to include the Crane Packing
Company as an additional approved source of supply.

William H. Rolshouse

WILLIAM H. ROLSHOUSE

WHR/vb

FOR REFERENCE ONLY
UNCONTROLLED COPY

ET-00331

2D2



JEANNETTE, PA.



MATERIAL SPECIFICATION No. 372

Date January 2, 1964

Sheet 1 No. SHEETS 2

Title: Compressed Asbestos Sheet with Rubber Binder

I. Scope: This specification covers a compressed chrysotile asbestos sheet stock impregnated with a SBR rubber binder, suitable for use to temperatures up to 250° F.

II. Tensile Strength:

With the grain	6800 psi
Across the grain	3200 psi
Average	5000 psi

III. Compressibility:

5000 psi Load	12 $\pm$ 5%
Recovery	40% min.

IV. Oil Resistance:

hours in ASTM #3 Oil at 300° F.

Thickness Increase	28%
Tensile Loss	40%

V. Fuel Resistance:

5 hours in ASTM Fuel B at RT

Thickness Increase	20%
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VI. Density:

Per cu. in.	1.00 oz.
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VII. Thickness: Available in 1/64" to 1/4". Must be specified on purchase order.

VIII. Sheet Sizes: Available in large range from 40" x 40" to 150" x 150".
Must be specified on purchase order.

IX. Standard Specifications: This material meets the requirements of the following specifications:

ASTM-D-1170 Latest Revision
Grade P-1161-A
MIL-A-17472

Approved

Approved

Approved

FOR REFERENCE ONLY
UNCONTROLLED COPY

ET-00332

2D3



JEANNETTE, PA.



MATERIAL SPECIFICATION No. 372

Date January 2, 1964

Sheet 2 No. SHEETS 2

Note: This sheet not to be sent to suppliers.

Approved Sources:

Material

7021 Compressed Asbestos Sheet

Style 2150 Compressed Asbestos Sheet

Manufacturer

Garlock, Inc.

Crane Packing Company

FOR REFERENCE ONLY
UNCONTROLLED COPY

Approved

Approved

Approved

ET-00333

2D4



JEANNETTE, PA.

MATERIAL SPECIFICATION No. 367

Date September 11, 1963

Sheet 1 No. SHEETS 2

Title: Asbestos and Synthetic Rubber Compounded Gasket Material

- I. Scope: This specification covers a high quality compressed asbestos fibre gasket material compounded with a synthetic rubber.
- II. Typical Composition: Material supplied to this specification shall contain approximately 70% long fibred asbestos bonded with a synthetic rubber such as Buna-S (GR-S) and shall conform to ASTM D-1170 - Identification #P-1161A.
- III. Surface Treatment: This material may be furnished with graphite on one or both sides. Unless specifically designated, the material supplied will be without surface graphite treatment.
- IV. Fluid Resistance: Material supplied shall have excellent resistance to alternating wet and dry conditions involving water, steam, antifreeze solutions, caustic soda, dilute hydrochloric and acetic acids, and salt solutions.
- V. Temperature Limit: The material shall maintain its chemical and physical properties to a maximum continuous operating temperature, under dry conditions, of 350°F.
- VI. Fluid Absorption: Testing methods covered by ASTM D-733 Method A latest revision, shall apply. The increase in thickness shall be between 15-25% when immersed in ASTM reference fuel #1 for a period of 5 hours at 70-85°F. This value shall not exceed 15% when the samples are immersed in ASTM Oil #1 for 5 hours at 300°F.
- VII. Compressibility: Test procedures outlined in ASTM D-1147 latest revision shall apply. Compressibility shall be between 15 and 25% with a load of 5000 psi. The recovery shall be 50 to 60%.
- VIII. Hardness: The hardness shall range between 92 to 95 when measured with a Shore Durometer. (A scale)
- IX. Tensile Strength: Test method covered by ASTM D-733 latest revision shall apply. Samples conditioned 1 hour at 212°F.
Longitudinal - 5000 to 7000 psi
Transverse - 2000 to 3000 psi
- X. Sheet Size and Tolerance: The sheet size and tolerances shall be consistent with commercial practice within the industry. Special sizes and tolerances must be specified on the purchase orders.

Approved _____

Approved _____

Approved _____

ET-00334

2C1



JEANNETTE, PA.

MATERIAL SPECIFICATION No. 367

Date September 11, 1963

Sheet 2 No. SHEETS 2

Title: Asbestos and Synthetic Rubber Compounded Gasket Material

Note: This sheet not to be sent to suppliers.

Approved Sources and Materials:

Velumoid Company - Velbestos 172-B

130 B

Graphite on one or both sides can be supplied if requested.

This condition must be specifically designated by the person

initiating the requisition.

Approved

Approved

Approved

ET-00335

2C2

File



TO: Material Specification
Distribution List

Material Specifications
372, 373, 374, 375, 376

William H. Rolshouse
April 29, 1963

The above subject specifications are being issued to cover materials listed on our standard raw stock list. These materials had not been previously assigned a specification number.

William H. Rolshouse

**FOR REFERENCE ONLY
UNCONTROLLED COPY**

ET-00336



JEANNETTE, PA.



MATERIAL SPECIFICATION No. 372

Date April 25, 1963

Sheet 1 No. SHEETS 2

Title: Compressed Asbestos Sheet with Rubber Binder

I. Scope: This specification covers a compressed chrysotile asbestos sheet stock impregnated with a SBR rubber binder, suitable for use to temperatures up to 250° F.

II. Tensile Strength:

With the grain	6800 psi
Across the grain	3200 psi
Average	5000 psi

III. Compressibility:

5000 psi Load	12± 5%
Recovery	40% min.

IV. Oil Resistance:

5 hours in ASTM #3 Oil at 300° F.

Thickness Increase	28%
Tensile Loss	40%

V. Fuel Resistance:

5 hours in ASTM Fuel B at RT

Thickness Increase	20%
--------------------	-----

VI. Density:

Per cu. in. 1.00 oz.

VII. Thickness: Available in 1/64" to 1/4". Must be specified on purchase order.

VIII. Sheet Sizes: Available in large range from 40" x 40" to 150" x 150".
Must be specified on purchase order.

IX. Standard Specifications: This material meets the requirements of the following specifications:

ASTM-D-1170 Latest Revision
Grade P-1161-A
MIL-A-17472

Approved

Approved

Approved

FOR REFERENCE ONLY
UNCONTROLLED COPY

ET-00337

2D6



JEANNETTE, PA.



MATERIAL SPECIFICATION No. 372

Date April 25, 1963

Sheet 2 No. SHEETS 2

Note: This sheet not to be sent to suppliers.

Approved Sources:

Material

7021 Compressed Asbestos

Manufacturer

Garlock, Inc.

FOR REFERENCE ONLY
UNCONTROLLED COPY

Approved [Signature]

Approved [Signature]

Approved _____

ELLIOTT COMPANY



JEANNETTE, PA.

MATERIAL SPECIFICATION No. 89

Compressed Rubber Asbestos Gaskets

DATE 9-1-39

SHEET 1 NO. SHEETS 2

This specification covers compressed asbestos gaskets to be used on steam and water services for temperatures up to 700°F. and for all other gasket purposes where bolting or closure standards permit a relatively inelastic gasket.

REQUIREMENTS

Packing shall be composed of asbestos fibre inerts and rubber, compounded thoroughly and evenly mixed to the desired consistency, and pressed into sheets.

RUBBER

The packing shall contain not less than 10% by weight of rubber and the finished sheet shall be free of all solvents used in the manufacture.

ASBESTOS FIBRE

The packing shall consist of not less than 75% asbestos fibre which shall be Chrysolite which in turn shall contain not less than 12% pure water of crystallization.

REMARKS

The finished packing shall be graphited* and if the manufacturers' standards conform, it is desired that each square foot or less shall be marked with the manufacturer's brand name.

While not subject to test, this quality standard requires an average tensile strength of 4000 lb. per square inch averaged upon three samples for each of two right angle directions.

The packing shall be furnished in rolls or sheets and in various thicknesses as required by the purchase orders. A tolerance of 10% is allowed on thicknesses less than 1/8" and 5% on greater thicknesses.

*Gaskets for Navy should not be graphited.

APPROVED

H. Benquet

APPROVED

ET-00339

2B1

ELLIOTT COMPANY



JEANNETTE, PA.

MATERIAL SPECIFICATION No. 89

Compressed Rubber Asbestos Gaskets

DATE 9-1-39

SHEET 2 No. SHEETS 2

INSPECTOR

On lot purchases of several rolls, the inspector shall supply a piece cut from the sheet approximately 6" square to the laboratory for analysis.

PURCHASING DEPARTMENT

This grade of packing corresponds to a Federal Specification EH-P-46 and is available from practically all packing distributors under a variety of brand names, but is not limited to any particular brand name, the selection to be made by the Purchasing Department.

ET-00340

APPROVED

H. Benjamine

APPROVED

J. L. ...

Garlock SPEC. SHEET

STYLE 7006 & 7819
DATE January 20, 1975
PAGE 175-4

MATERIAL: White chrysotile asbestos with SBR binder.
COLOR: 7006--Off-White STYLE CODE: 7006--31417
7819--Grey-Black 7819--31595
SPECS: Meets ASTM-D-1170-62T, Grade P-1161A; SAE-J90A;
Grade P-1161A.
USES: General purpose commercial grade sheet for industrial
and marine applications. Temperatures to 750°F.

* * * * *

TYPICAL PHYSICAL VALUES

TENSILE STRENGTH:

Across Grain: 2600 psi

COMPRESSIBILITY AT 5000 PSI LOAD:

7-17%

RECOVERY FROM 5000 PSI LOAD:

40% Min.

ASTM #3 OIL IMMERSION:

5 Hours at 300°F.

Thickness Increase: 25%
Tensile Loss: 45%

ASTM REF. FUEL B IMMERSION:

5 Hours at 70-85°F.

Thickness Increase: 20%
Weight Increase: 20%

* * * * *

THICKNESSES

1/64" + .005/- .002
1/32" ± .005
1/16" ± .006
3/32" ± .008
1/8" ± .010
3/16" ± .015
1/4" ± .015

SHEET SIZES

40" x 42"	60" x 63"
40" x 63"	60" x 126"
40" x 126"	75" x 75"
50" x 50"	75" x 150"
50" x 75"	120" x 126"
50" x 150"	150" x 150"

NOTES:

- (1) Special thicknesses and/or thickness tolerances available on request.
- (2) Special sheet sizes also available on request.

DESCRIPTION: A premium "navy grade" sheet composed of grade asbestos fibers and bonded with an SBR Elastomer. Intended as a full service gasketing material where high bolt torques, temperatures and pressures will be encountered.

APPLICATIONS: Especially suited for sealing against steam, air, water, and many chemical solutions. Typical applications have been flange gaskets for paper making equipment and combustion gases.

COLOR: Black

SPECIFICATIONS: Meets ASTM D1170, P1161A, SAE J90b, P1161A, MIL-G-12803, P1161A, HH-P-0046 D Class I, MIL-A-17472B and MIL-A-7021-B Class S. is listed on QPL 17472.

TYPICAL WEIGHTS:

NOMINAL THICKNESS	POUNDS PER SQ. YD.	WEIGHT OF STOCK SHEETS - LBS.	
		50" X 50"	50" x 150"
1/64"	1.23	2.37	7.11
1/32"	2.46	4.74	14.22
1/16"	4.92	9.48	28.44
1/8"	9.84	18.96	56.88

PHYSICAL PROPERTIES:

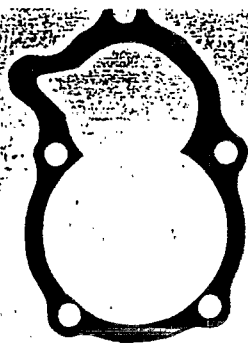
Original

Density, lbs./cu.ft.	105
Longitudinal tensile strength, psi (typical)	7,000
Transverse tensile strength, psi (typical)	3,000
Compressibility, @ 5000 psi, %	7-17
Recovery, min., %	40
Flexibility factor, longitudinal, max.	10T
Flexibility factor, transverse, max.	8T
Sealability, ASTM fuel A, @ 700F, 30" HG, 2000 psi., ML/HR	0.5

FLUID IMMERSIONS

ASTM No. 3 oil, 5 hrs. @ 300 OF	
Thickness increase, %	20-50
Tensile loss max., %	70
ASTM Fuel B, 5 hrs. @ 70-85 OF	
Weight increase, max., %	40
Thickenssss increase, %	15-35

NOTES: Tests in accordance with ASTM designations F36, F37, F104, F146 and F152. Properties based on 1/32" thickness. See page PK-41 for General Production information.



Velbestos

CONTROLLED SWELL ASBESTOS MATERIALS

Velbestos 840 & Velbestos 880

Velbestos 840 and Velbestos 880 are compounded from a special blend of rubbers and selected asbestos fibers. They are produced by the beater addition process, resulting in homogeneous materials with a uniform distribution of fibers and binder. These materials represent a unique development in gasket technology.

Velbestos 840 and Velbestos 880 are designed to provide controlled high swelling properties in contact with petroleum oils and fuels. Both materials show minimal deterioration under these conditions, even in applications where a substantial portion of the gasket is exposed to these fluids. They are also highly resistant to water and anti-freeze solutions.

Velbestos 840 is produced to a lower density than Velbestos 880 to give higher compressibility where required for greater flange conformability. Both grades exhibit excellent sealing properties and retention of applied torque. Velbestos 840 and Velbestos 880 contain a special surface treatment to reduce adhesion to flanges. This makes an additional anti-stick coating usually unnecessary. They possess excellent dimensional stability and aging properties. Both materials are suggested for temperatures up to approximately 400°F., depending on the conditions of the application.

Material Specifications

	Velbestos 840	Velbestos 880
Compressibility @ 5000 psi. load, %	15-25	10-20
Recovery, minimum %	40	45
Tensile Strength, minimum psi.	1500	2000
Fluid Immersion		
ASTM Oil No. 1—5 hours at 300°F.		
Thickness Increase, %	20-35	20-35
ASTM Oil No. 3—5 hours at 300°F.		
Thickness Increase, %	35-60	40-65
ASTM Ref. Fuel A—5 hours at 70-80°F.		
Thickness Increase, %	15-30	15-30
ASTM Ref. Fuel B—5 hours at 70-80°F.		
Thickness Increase, %	25-40	30-45

Test Methods

Compressibility and Recovery: ASTM F 36-66, Procedure A.

Tensile Strength and Fluid Immersion: ASTM F 104-68T, Type 1 Materials.

Compliance with ASTM and SAE Specifications

ASTM F 104-68T and SAE J90b Classification System

Velbestos 840: F124700-M5

Velbestos 880: F123700-M6

ET-00343

DIFFERENTIAL HOUSINGS
TRANSMISSIONS
OIL PANS
TIMING COVERS
WATER PUMPS
WATER OUTLETS
DIESE ENGINE GASKETS

Thickness Tolerances

Nominal Thickness	Velbestos 840	Velbestos 880
1/64"	.014-.017"	.014-.017"
.020	—	.018-.022
1/32	.028-.034	.028-.034
3/64	.043-.052	.043-.052
1/16	.057-.069	.057-.069

Standard material thicknesses are listed above. Other thicknesses can be produced if sufficient requirements exist. Please contact National Seal Division for information on the availability of thicknesses not shown.

Applications

Velbestos 840 and Velbestos 880 offer performance characteristics not previously available in rubber-asbestos gasket materials. Both grades exhibit excellent sealing and torque retention. These properties are further enhanced by a binder composition that causes the material to swell when a portion of the gasket is in contact with petroleum oils or fuels.

Deformable Flanges

The controlled swell properties of Velbestos 840 and 880 make them well adapted for sealing petroleum oils and fuels under irregular compression loads usually found in stamped flange assemblies. Typical applications are oil pans, transmission pans, timing covers and water pumps.

Compressibility

Velbestos 840 and 880 offer two levels of compressibility designed to give the conformability required for an initial seal in applications where compressed asbestos materials are too hard.

Uniformity And Economy

Both materials are manufactured by a process that permits intimate blending of asbestos fibers with the binder. This results in gaskets that are free from agglomerates of fiber and with cleaner cut edges than is frequently possible with compressed asbestos materials. Significant improvements in thickness uniformity are also found in Velbestos 840 and 880. Important cost savings can be realized in fabricated parts from Velbestos 840 and 880 in relation to comparable grades of compressed asbestos.

Service Limitations

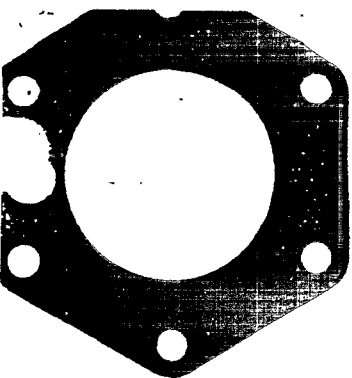
HEAVY DUTY APPLICATIONS

Under unusually severe operating conditions where high internal pressures, shock loads or very high temperatures exist, Velbestos 840 and 880 may not possess adequate physical properties to perform properly. Under these circumstances, an oil resistant compressed asbestos material such as Velbestos 170-1 should be considered.

ET-00344

VELUMOD GASKETS

FEDERAL-MOGUL
NATIONAL SEAL DIVISION
WEBSTER, MASSACHUSETTS 01580



NITRILE RUBBER-ASBESTOS MATERIALS

Velbestos 250 & Velbestos 260

Velbestos 250 and Velbestos 260 are composed of nitrile (Buna N) rubber and asbestos fiber. They are produced by the beater addition process to provide highly uniform materials which can be fabricated into gaskets which, unlike many other asbestos base materials, have a minimum of loose fibers.

Velbestos 250 and 260 both provide outstanding sealing qualities and torque retention. Velbestos 260 is produced to a higher density than Velbestos 250 and shows better sealability and torque retention than the latter material.

Since both Velbestos 250 and 260 are made with nitrile rubber, they have excellent resistance to petroleum fuels and lubricants as well as water and anti-freeze solutions. These materials are specially treated to resist flange adhesion.

Velbestos 250 and 260 have excellent dimensional stability and aging properties. They can be used at temperatures up to 500°F.

Material Specifications

	Velbestos 250	Velbestos 260
Compressibility @ 5000 psi. load, %	15-25	7-17
Recovery, minimum %	40	40
Tensile Strength		
Longitudinal, minimum psi.	3000	3500
Transverse, minimum psi.	2000	2500
Fluid Immersion		
ASTM Oil No. 3 — 5 hours at 300°F.		
Compressibility, maximum %	30	30
Loss in Tensile Strength, maximum %	35	30
Thickness Increase, %	5-15	5-13
ASTM Ref. Fuel B — 5 hours at 70-80°F.		
Weight Increase, maximum %	30	30
Thickness Increase, %	5-15	5-15

Test Methods:

Compressibility and Recovery: ASTM F 36-66, Procedure A

Tensile strength: ASTM F 152-72, Type 1 Materials

Fluid Immersion: ASTM F 146-72, Type 1 Materials

Compliance with ASTM and SAE Specifications

ASTM F 104-71 and SAE J90b Classification System

Velbestos 250 : F124100-M6

Velbestos 260 : F123100-M6

ET-00345

CARBURETORS

**DIFFERENTIAL
HOUSINGS**

OIL PUMPS

**HEAVY DUTY
OIL PANS**

WATER PUMPS

**HEAVY DUTY
TRANSMISSIONS**

**HIGH TEMPERATURE
GASKETS**

We hope the information given here will be helpful. It is based on our best knowledge and we believe it to be true and accurate. Please read all statements, recommendations, and instructions before use. We cannot be held responsible for any loss or damage resulting from the use of our products in any manner not recommended by us.

2C10

Thickness Tolerances

Nominal Thickness	Velbestos 250	Velbestos 260
.010"	.009-.011"	
1/64	.014-.017	.013-.016"
.020	.018-.022	.017-.021
1/32	.028-.034	.027-.033
3/64	.043-.052	.041-.050
1/16	.057-.069	.055-.067

Standard material thicknesses are listed above. Other thicknesses can be produced if sufficient requirements exist. Please contact Vellumoid for information on the availability of thicknesses not shown.

Applications

The outstanding qualities of Velbestos 250 and Velbestos 260 make them well suited for a wide variety of critical gasket applications. In many instances, these materials provide superior performance when compared to most other gasket materials.

Torque Retention

Both Velbestos 250 and 260 have excellent torque retention under load. Velbestos 260 is slightly superior to Velbestos 250 in this characteristic.

Sealability

These materials are designed to provide excellent sealability under moderate flange loads.

Resistance To Fluids

Since they are formulated with nitrile rubber, both Velbestos 250 and 260 exhibit high resistance to the effects of lubricating oils and petroleum fuels. They are also resistant to water, coolants and salt solutions.

Thickness Control

Velbestos 250 and 260 are manufactured to closer tolerances than most compressed asbestos materials. They are also available in lower thicknesses than many materials. These features make the materials valuable for use in shim type applications in which spacing requirements are critical.

Cost

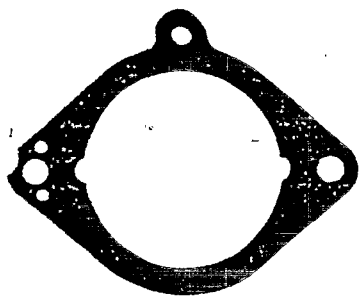
In relation to parts fabricated from comparable compressed asbestos materials, Velbestos 250 and 260 gaskets provide significant savings.

Service Limitations

OUT-OF-FLAT OR DISTORTED FLANGES

Because of the low compressibility of Velbestos 250 and 260, these materials may not compensate adequately for out-of-flat conditions which sometimes exist in stamped metal parts. In such cases, a more compressible material may be required.

ET-00346



SBR RUBBER-ASBESTOS MATERIAL Velbestos 310

Velbestos 310 is composed of asbestos fiber and SBR rubber. It is produced by the beater addition process to provide a highly uniform material which can be fabricated into gaskets having a minimum of loose fibers.

Velbestos 310 provides excellent sealability and torque retention under load. It is highly resistant to water and anti-freeze solutions, and has good resistance to petroleum oils. Because of its special properties, Velbestos 310 provides performance which is superior to most cellulose fiber materials.

Velbestos 310 is given a special surface treatment to resist flange adhesion. The material has excellent heat aging properties and can be used at temperatures up to 500°F.

Material Property	Velbestos 310
Compressibility @ 5000 psi. load, %	20-30
Recovery, minimum %	30
Tensile Strength	
Longitudinal, minimum psi.	2000
Transverse, minimum psi.	1500
Fluid Immersion	
ASTM Oil No. 3 — 5 hours at 300°F.	
Loss in Tensile Strength, maximum %	60
Thickness Increase, %	10-25
ASTM Ref. Fuel B — 5 hours at 70-80°F.	
Weight Increase, maximum %	50
Thickness Increase, %	5-20

Test Methods

Compressibility and Recovery: ASTM F36-66, Procedure A

Tensile Strength and Fluid Immersion: ASTM D1170-62T, Type 1 Procedure

Compliance with ASTM D1170-62T & SAE J90a Specifications

Velbestos 310: P1261A

ET-00347

**HEAVY DUTY
OIL PANS**

WATER PUMPS

**DIFFERENTIAL
HOUSINGS**

**HIGH TEMPERATURE
GASKETS**

**STANDARD
TRANSMISSIONS**

COVER GASKETS

The information given here will be based on our best knowledge, and is not intended to constitute a contract. It is subject to change without notice. The user is responsible for the proper selection and use of the material. The user is also responsible for the proper installation and maintenance of the material. The user is also responsible for the proper disposal of the material.

Thickness Tolerances

Nominal Thickness	Velbestos 310
1/64"	.014-.017"
1/32	.028-.034
3/64	.043-.052
1/16	.057-.069

Standard material thicknesses are listed above. Other thicknesses can be produced if sufficient requirements exist. Please contact Vellumoid Division for information on the availability of thicknesses not shown.

Velbestos 310

Functional Property Ratings

The physical test data that are used for material specifications, while valuable for quality control, do not give adequate information about how a material will perform in a gasket application.

Therefore, we have prepared qualitative ratings of the functional properties of Velbestos 310 to help identify the kinds of service for which the material is designed. The properties rated are those which, in most applications, are of prime importance. To provide a comparison we have also rated the functional properties of three other types of materials.

The ratings should be interpreted as follows:

- 1 — Excellent performance; for applications where this property is critical.
- 2 — Very good performance.
- 3 — Adequate performance.
- 4 — Acceptable performance; will provide good service when this property is of secondary importance in the application.
- 5 — Marginal performance; suitable only when this property is not a factor in the application.

The Functional Property Ratings provide a guide for selecting a gasket material. However, as a rule, it is also advisable to evaluate the performance of the gasket in the application itself. This will insure that all operating requirements have been satisfied.

Functional Property	Velbestos 310	Velbestos 505 Fibre*	Velbuna MD-25**	Velbestos 250***
Torque retention	2	1	3	1
Sealability				
Light flange loads	2	1	3	1
Moderate flange loads	1	1	2	1
High flange loads	1	1	1	1
Approximate compressibility @ 1000 psi.	15%	20%	20%	15%
Resistance to effects of fluid sealed				
Petroleum oils	2	1	2	1
Fuels	3	1	3	1
Water	1	1	1	1
Maximum operating temperature	500°F	250 F	300 F	500 F
Resistance to flange adhesion	2	1	2	2
Dimensional stability	1	3	2	1
Cost ratio (Vell. 505 Fibre = 1.0)	1.8	1.0	1.4	2.1

*Treated fiber material **Rubber-cellulose medium density material ***Nitrile rubber-asbestos material

ET-00348

Velbestos 310 provides a combination of valuable properties for a wide variety of gasket applications. It has relatively high density for excellent torque retention. Its asbestos-rubber content gives high sealing ability. In addition, Velbestos 310 is an economical material, even when compared to materials with far fewer attributes.

The use of Velbestos 310 is suggested for consideration in the following general situations:

LIGHTLY LOADED FLANGES

If flanges are lightly loaded and yet reasonably rigid, Velbestos 310 will provide better service than most cellulose fiber type materials.

HIGH TEMPERATURE APPLICATIONS

While cellulose fiber grades are not suitable for operating temperatures over 300°F., Velbestos 310 will provide service up to 500°F.

COMPRESSED ASBESTOS

For cost reductions, Velbestos 310 should be evaluated in applications using SBR rubber bonded compressed asbestos. If the application is not severe, Velbestos 310 will give excellent service at a substantial cost saving.

SERVICE LIMITATIONS

GASOLINE AND SOLVENT APPLICATIONS

Since Velbestos 310 does not have high resistance to aromatic fuels or solvents, its use is limited in sealing these materials. For greater resistance, Velbestos 250 or Velbuna WG-5 should be considered.

HEAVY DUTY APPLICATIONS

Where high internal pressures, shock loads, high oil temperatures or other severe operating conditions exist, Velbestos 310 may not have adequate physical properties to withstand the operating conditions. If this proves a problem, an oil resistant material such as Velbestos 260 or Velbestos 170-1 should be considered.

OUT OF FLAT OR DISTORTED FLANGES

Because of the low compressibility of Velbestos 310, the material may not compensate for out-of-flat conditions which sometimes exist in stamped metal parts under light loads. In these cases, a more compressible material may be required. The use of Vellumoid 505 Fibre, Velcar B or Velbuna WG-77 should be considered under these conditions.

ET-00349

VELLUMOID DIVISION
FEDERAL-MOGUL CORPORATION
WORCESTER, MASSACHUSETTS 01608



GASKET MATERIALS

SPECIAL RUBBER COMPOSITIONS

Velcon Materials

RUBBER-CELLULOSE FIBER

Velbuna WG-1
Velbuna WG-5
Velbuna WG-6
Velbuna WG-25
Velbuna WG-40
Velbuna WG-77
Velbuna WG-80
Velbuna WG-95

RUBBER-ASBESTOS FIBER

Velbestos 250
Velbestos 260
Velbestos 305
Velbestos 310

TREATED FIBER

Vellumoid Fibre
Vellumoid 505 Fibre
Vellumoid 444 Fibre
Vellumoid 477 Fibre

RUBBER COATED MATERIALS

Velcar
Nicote
Bucar
Velcote

ADHESIVE COATED MATERIALS

Velbond

RESIN IMPREGNATED MATERIAL

Vellutex

UNTREATED FIBER MATERIALS

Natural MRP Fibre
Red MRP Fibre

COMPRESSED ASBESTOS MATERIALS

Velbestos 170-1
Velbestos 170-R
Velbestos 170-5
Velbestos 130-B
Velbestos 140-B
Velbestos 170-4B
Velbestos 172-B

STEEL & ASBESTOS MATERIAL

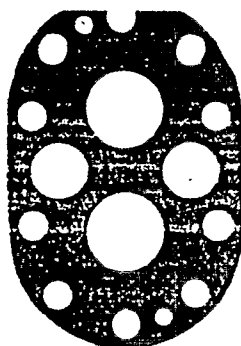
Velclad SK-1

ET-00350

VELLUMOID DIVISION

GENERAL MOTORS CORPORATION

WARREN, MICHIGAN 48090



COMPRESSED ASBESTOS MATERIALS

Velbestos 130-B & Velbestos 170-1

Velbestos 130-B is a compressed asbestos gasket material bonded with SBR (styrene-butadiene) rubber. It may be used with petroleum oils and fuels where moderate swelling is not objectionable. Velbestos 130-B exhibits excellent resistance to water, steam, anti-freezes and salt solutions.

Velbestos 170-1 is a premium grade of compressed asbestos gasket material made from long fibered asbestos bonded with neoprene (chloroprene) rubber. It possesses excellent resistance to petroleum oils and fuels. Velbestos 170-1 is also highly resistant to water, anti-freezes, caustic soda, salt solutions and many hydrocarbon solvents. It will not corrode aluminum or magnesium alloys.

Both materials are capable of withstanding high compressive loads. Their temperature limit is approximately 500°F.

	Velbestos 130-B	Velbestos 170-1
Compressibility @ 5000 psi. load, %	7-17	7-17
Recovery, minimum %	45	45
Tensile Strength		
Longitudinal, minimum psi.	4000	4000
Transverse, minimum psi.	2000	2000
Fluid Immersion		
ASTM Oil No. 3—5 hours at 300°F.		
Compressibility, maximum %	—	30
Loss in Tensile Strength, maximum %	70	50
Thickness Increase, %	20-50	15-30
ASTM Ref. Fuel B—5 hours at 70-80°F.		
Weight Increase, maximum %	35	30
Thickness Increase, %	15-35	10-25

Test Methods

Compressibility and Recovery: ASTM F 36-66, Procedure A

Tensile Strength and Fluid Immersion: ASTM F 104-68T, Type 1 Materials

Compliance with ASTM, SAE and Federal Specifications

ASTM F 104-68T and SAE J90b Classification System

Velbestos 130-B: F112500-M6

Velbestos 170-1: F112400-M6

ASTM D 1170-62T and SAE J90a Specifications

Velbestos 130-B: P1161A

Velbestos 170-1: P1151A

MIL-A-7021B Military Specification

Velbestos 170-1: Class I

AMS 3232J Specification (SAE)

Velbestos 170-1

DIESEL ENGINES

AIRCRAFT ENGINES

**HEAVY DUTY
TRANSMISSIONS**

HEAVY DUTY AXLES

**HIGH TEMPERATURE
GASKETS**

**HIGH PRESSURE
PIPE FLANGES**

Thickness Tolerances

Nominal Thickness	Velbestos 130-B	Velbestos 170-1
1/64"	.013-.020"	.013-.020"
1/32	.026-.036	.026-.036
1/16	.056-.068	.056-.068

Standard material thicknesses are listed above. Other thicknesses can be produced if sufficient requirements exist. Please contact National Seal Division for information on the availability of thicknesses not shown.

Applications

Sealing Characteristics

Velbestos 130-B and 170-1 provide exceptionally good sealing performance under a wide range of compressive loads with rigid flanges.

Torque Retention

The relaxation properties of Velbestos 130-B and 170-1 surpass those of most other types of resilient gasket materials. This characteristic yields outstanding torque retention in many applications.

High Strength

The inherent strength of Velbestos 130-B and 170-1 make them especially well suited for many applications involving high internal pressures. This property also enables these materials to perform satisfactorily under high flange loads without rupture or extrusion.

Service Limitations

THICKNESS CONTROL

Thickness tolerances normally cannot be held as closely as for better addition asbestos materials. Where tighter control is required, Velbestos 250, 260, 310, 840 and 880 materials should be considered, depending on the performance needs of the application.

DISTORTED FLANGES

Since Velbestos 130-B and 170-1 are relatively low in compressibility, they may not compensate adequately for out-of-flat conditions which often exist in stamped metal flanges. In such instances, a more compressible material may be required. Velbestos 310, 840, or softer materials if necessary, should be considered.

ET-00352

VELLUMOID GASKETS

FEDERAL-MOGUL
NATIONAL SEAL DIVISION
WORCESTER, MASSACHUSETTS 01606

2C17



Interoffice Letter



MATERIALS SPECIFICATION
DISTRIBUTION LIST

Date: JUNE 9, 1989
From: MICHAEL S. WALKER Extension No.: 8098
Office: MATERIALS ENGINEERING Location: 66-1
Subject: REVISION OF MS-373

This specification has been revised to delete all
reference to asbestos materials.

Michael S. Walker
MICHAEL S. WALKER

MSW/pbk
Attachment

FOR REFERENCE ONLY
UNCONTROLLED COPY



Subject: LUBRICATED & GRAPHITED PACKING, BRAIDED NON-ASBESTOS

Date 6-9-89

Page 1 of 1

Superseded Date 4-25-63

R 1.

Scope:

- 1.1 This specification covers a soft resilient braided packing made from organic fibers. The packing is thoroughly impregnated with a high flash point lubricant and graphite.

2. Service:

- 2.1 This material shall be suitable for centrifugal or rotary pumps handling hot or cold water, cold oils, caustic solutions, and weak acids.

3. Sizes and Packaging:

- 3.1 Sizes from 1/8" up to and including 1/2" shall be supplied in spool form. Sizes 9/16" and over shall be supplied in coil form. Size and quantity must be specified on the purchase order.

FOR REFERENCE ONLY
UNCONTROLLED COPY

NOTE: THIS SHEET NOT TO BE SENT TO SUPPLIERS.

S1. Approved Source:

Material

Manufacturer

Style K1761 Interlace Braided
Non-Asbestos Packing.

John Crane-Houdaille Inc.

R 

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UNCONTROLLED COPY

ET-00355

4A3



JEANNETTE, PA.



MATERIAL SPECIFICATION No. 373

Date April 25, 1963

Sheet 1 No. SHEETS 2

Title: Square Braided Asbestos, Lubricated and Graphited Packing

- I. Scope: This specification covers a soft resilient square braided packing made from asbestos yarns. The packing is thoroughly impregnated with a high flash point lubricant and graphite.
- II. Service: This material shall be suitable for centrifugal or rotary pumps handling hot or cold water, cold oils, caustic solutions and weak acids.
- III. Sizes and Packaging: Sizes up to and including 1/2 inch shall be supplied in spool form. Sizes 9/16 inch and over shall be supplied in coil form. Size and quantity must be specified on the purchase order.

FOR REFERENCE ONLY
UNCONTROLLED COPY

Approved K.K. Poff
Approved J.C. Am
Approved _____

ET-00356

4A4



JEANNETTE, PA.



MATERIAL SPECIFICATION No. 373

Date April 25, 1963

Sheet 2 No. SHEETS 2

Note: This sheet not to be sent to suppliers.

Approved Source:

Material

Style 810 Square Braided
Asbestos Packing

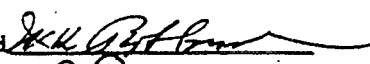
Style 193 Square Braided
Asbestos Packing

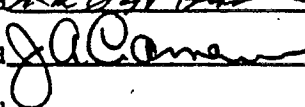
Manufacturer

Crane Packing Co.

U. S. Packing Co.

FOR REFERENCE ONLY
UNCONTROLLED COPY

Approved 

Approved 

Approved _____



JEANNETTE, PA.

MATERIAL SPECIFICATION No. 375

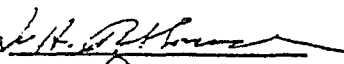
Date April 25, 1963

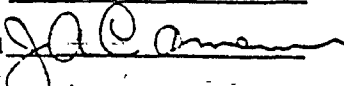
Sheet 1

No. SHEETS 2

Title: Round Twisted Asbestos, Lubricated and Graphited Packing

- I. Scope: This specification covers a round twisted asbestos packing made from long fibre Canadian asbestos yarn. The packing shall be thoroughly impregnated with a high heat resistant lubricant and graphite.
- II. Service: Shall be suitable for packing small spaces subjected to high pressure steam, hot or cold water or oil.
- III. Sizes and Packaging: This material is available in sizes from 1/16 inch to 1/2 inch diameter. All sizes progress by sixteenths. Normally supplied on spools. Size, length in feet or weight required shall be specified on the purchase order.

Approved 

Approved 

Approved _____

ET-00358

4B1



JEANNETTE, PA.

MATERIAL SPECIFICATION No. 375

Date April 25, 1963

Sheet 2 No. SHEETS 2

Note: This sheet not to be sent to suppliers.

Approved Source:

Material

Style 814 Round
Twisted Asbestos Packing

Style 185 Round
Twisted Asbestos Packing

Manufacturer

Crane Packing Co.

U. S. Packing Co.

Approved [Signature]
Approved [Signature]
Approved _____



JEANNETTE, PA.

MATERIAL SPECIFICATION No. 376

Date April 25, 1963

Sheet 1 No. SHEETS 2

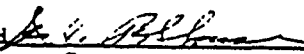
Title: Wire Inserted Woven Asbestos, Slotted Gasketing Tape

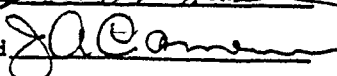
Scope: This specification covers a slotted asbestos tape constructed of two parallel courses or strips of wire - inserted asbestos cloth frictioned with rubber cement and spaced 7/16 inch apart. These parallel strips are joined together with a fabric connecting member.

Use: Must be suitable for gasketing flanged joints on large tanks or other equipment where high temperatures and pressures exist.

Sizes: Sizes range from 1-3/16 inch width and from 1/8 inch in thickness. Width and thickness must be specified on the purchase order.

ET-00360

Approved 

Approved 

Approved _____

6A1



JEANNETTE, PA.

MATERIAL SPECIFICATION No. 376

Date April 25, 1963

Sheet 2

No. SHEETS 2

Note: This sheet not to be sent to suppliers.

Approved Sources:

Material

617 Gasketing Tape

Manufacturer

Garlock, Inc.

ET-00361

Approved [Signature]
Approved [Signature]
Approved _____



JEANNETTE, PA.

MATERIAL SPECIFICATION No. 377

Date June 14, 1963

Sheet 1 No. SHEETS 2

Title: Asbestos Roving - Thread Reinforced

I. Scope: This specification covers a fire resistant product made from carded asbestos fibre and cotton, which is mechanically rubbed into a uniform roving around a core of cotton yarn.

II. Asbestos Content:

Min. - 80%
Max. - 84%

III. Service Temperature: Material supplied to this specification shall be capable of withstanding a maximum temperature of 450°F.

IV. Grade and Size: Material supplied shall be ASTM D-375, underwriters' grade.
Available size range shall be between 5 and 14 "cut" inclusive.

V. Standard Specification: Material supplied to this specification shall meet the requirements of ASTM D-375, latest revision.

Approved

Approved

Approved

L. H. Robinson
J. A. Carr



JEANNETTE, PA.

MATERIAL SPECIFICATION No. 377

Date June 14, 1963

Sheet

SI

No. SHEETS

2
SI

Title: Asbestos Roving - Thread Reinforced

Note: This sheet not to be sent to suppliers.

Approved Source:

Johns Manville Corporation

Note that size (cut) must be specified on the purchase order.
At present our only stock size is 5 cut, but other sizes may be
required for future requirements.

Approved

Approved

Approved

[Handwritten signatures]

ET-00363

6B2



JEANNETTE, PA.

MATERIAL SPECIFICATION No. 378

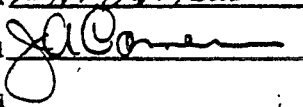
Date June 14, 1963

Sheet 1 No. SHEETS 2

Title: Asbestos Yarn - Plain

- I. Scope: This specification covers a fire resistant product known as single asbestos yarn which is made from an asbestos roving.
- II. Asbestos Content:
Min. - 95%
Max. - 98%
- III. Service Temperature: The material supplied to this specification shall be capable of withstanding a maximum temperature of 750°F.
- IV. Grade and Sizes: The material supplied shall be ASTM D-299 AAA Grade.
Sizes available shall be between 5 and 18 "cut" inclusive.
- V. Standard Specification: All provisions and requirements of ASTM D-299, latest revision, shall apply.

Approved 

Approved 

Approved _____

ET-00364

6C1



JEANNETTE, PA.

MATERIAL SPECIFICATION No. 378

Date June 14, 1963

Sheet 2

No. SHEETS 2

Title: Asbestos Yarn - Plain

Note: This sheet not to be sent to suppliers.

Approved Source:

Johns Manville Corporation

Note that size (cut) must be specified on the purchase order.
At present our only stock size is 16 cut, but other sizes may be
required for future requirements.

Approved

A handwritten signature in cursive script, appearing to read 'William H. Roth'.

Approved

A handwritten signature in cursive script, appearing to read 'JAC'.

Approved

A handwritten signature in cursive script, appearing to read 'JAC'.



JEANNETTE, PA.

MATERIAL SPECIFICATION No. 379

Date June 14, 1963

Sheet 1 No. SHEETS 2

Title: Asbestos Yarn - Waxed

I. Scope: This specification covers a fire retardant product known as single asbestos yarn which is made from rubbed asbestos roving. The finished yarn shall have a waxed surface.

II. Asbestos Content:

Min. - 80%

Max. - 84%

III. Service Temperature: The material supplied to this specification shall be capable of withstanding a maximum temperature of 450°F.

IV. Grade and Sizes: The material shall be ASTM D-299, underwriters grade.

Sizes available shall be between 5 and 18 "cut" inclusive.

V. Standard Specification: All provisions and requirements of ASTM D-299, latest revision, shall apply.

Approved

Approved

Approved

ET-00366

6D1



JEANNETTE, PA.

MATERIAL SPECIFICATION No. 379

Date June 14, 1963

Sheet 2 No. SHEETS 2

Title: Asbestos Yarn - Waxed

Note: This sheet not to be sent to suppliers.

Approved Source:

Johns Manville Corporation

Note that size (cut) must be specified on the purchase order.
At present our only stock size is 8 cut, but other sizes may be
required for future requirements.

Approved W. R. Rouse
Approved J. C. C. C.
Approved _____

ET-00367

6D2



JEANNETTE, PA.

MATERIAL SPECIFICATION No. 433

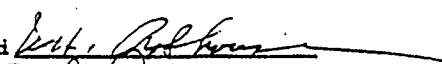
Date August 15, 1963

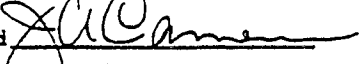
Sheet 1 No. SHEETS 2

Title: Packing, Asbestos, Round, High Temperature

- I. Scope: This specification covers a high temperature steam packing, of round cross section, made from braided long fibre white asbestos yarn.
- II. Service: This material shall be suitable for service on slow speed dynamic applications, valve stems, and expansion joints, involving hot water and steam to 1250°F.
- III. Treatment: This material shall be supplied without an internal lubricant. A surface coating of graphite shall be used.
- IV. Sizes and Packaging: Sizes from 1/16" up to and including 3/16" round shall be supplied on 1 and 5 lb. spools. Sizes 1/4" through 1" shall be packaged as boxed coils.

Size and quantity must be specified on the purchase order.

Approved 

Approved 

Approved _____



JEANNETTE, PA.

MATERIAL SPECIFICATION No. 433

Date August 15, 1963

Sheet 2
SI

No. SHEETS 2
SI

Title: Packing, Asbestos, Round, High Temperature

Note: This sheet not to be sent to suppliers.

Approved Source and Materials:

Garlock, Inc. - #1700 Braided White Asbestos Packing

Approved [Signature]

Approved [Signature]

Approved _____

ET-00369

4C2



A Division Of
Carrier Corporation

Form 247 A (4-64)

MATERIAL SPECIFICATION NO. 473

SUBJECT

SHEET ASBESTOS

Date 10/26/71

Page 1 of 1

Superseded Date

NEW

1. Scope:
 - 1.1 This specification covers a grade of commercially available sheet asbestos normally used for packing.
2. Stocked Size:
 - 2.1 1/16" thick x 36" wide
3. Reorder Point:
 - 3.1 3 rolls
4. Reorder Quantity:
 - 4.1 10 rolls
5. Approved Grade:
 - 5.1 J-102
6. Approved Vendor:
 - 6.1 Johns-Manville Sales Corporation

ET-00370

Approved

Marilyn E. Hightman

Approved

D. A. Cameron

Approved

J. H. Gault

2E1