



ESTABLISHED 1802

E. I. DUPONT DE NEMOURS & COMPANY
INCORPORATED

WILMINGTON, DELAWARE 19898

ENGINEERING DEPARTMENT

CC: A. Francis-CR 701
 S. S. Mileti-CR&D-Haskell Lab
 J. C. Thompson-PED
 R. Metzger-PED
 P. W. Hufnell-PED
 L. O. Barton-PED
 S. Costa-PED
 J. B. Arant-ESD
 D. M. Croskery-ESD
 IC 13/Maint Engrg

December 6, 1985

J. C. THOMPSON
 ENGINEERING DEPARTMENT
 L-3205

NONASBESTOS GASKET RECOMMENDATIONS

Results of the Company-wide nonasbestos gasket survey completed in June 1985 are:

<u>No. of Sites</u>	<u>Status</u>
73	Using asbestos gaskets
11	Using nonasbestos gaskets
17	Not returned

The eleven plants using nonasbestos gaskets are small plants with limited gasket usage.

I am contacting coordinators on each plant for the purposes of reviewing current product and service indexes, and making nonasbestos gasket code recommendations. Ten plants have been completed. If you want recommendations, please send me the pipe specification number for your site.

In the interim, please consider the following when evaluating nonasbestos sheet gaskets.

We recommend replacing Du Pont codes G-1, G-2, and G-40 gaskets with codes G-81 and G-83 gaskets only after evaluating chemical resistance of the new gaskets. Where no performance history exists, we recommend either immersion testing or in-line testing of G-83 gasket material to determine chemical resistance. While some of these tests can be done at the Engineering Test Center, we feel that they should be done on plant sites. This eliminates

GEC9A:4

PLAINTIFF'S
 EXHIBIT
 DUP-2362

DUP 1011080

DU 053122

2
December 6, 1985
Nonasbestos Gasket Recommendations

interstate transportation of hazardous chemicals. It also ensures testing will be done by people familiar with the hazards of the chemicals being used.

Gasket codes G-83/S-83 describe Kevlar® reinforced gaskets/sheet bonded with EPDM. Code S-83 is a better replacement choice than S-80 (SBR bonded Kevlar®) because:

- o Continuous temperature resistance of EPDM (325°F) is higher than SBR (225°F).
- o EPDM has wider chemical resistance than SBR.
- o Code S-83 contains fewer chlorides.

Replacing G-1 gaskets with G-80 gaskets is the more obvious, but not necessarily the best option. Gaskets G-80 and G-1 both use SBR binder. However, reinforcing fiber differs with G-80 gaskets having lower concentrations of fiber (20%) and higher concentrations of elastomer binder and inert fillers than G-1. In many past installations, G-1 gaskets worked only because of high concentrations (85%) of asbestos fibers and not because of chemical resistance of the binder. G-83 gaskets are 5% more than G-80 gaskets, but Du Pont supplies both Kevlar® and EPDM. Do not replace G-1 gaskets with G-80 gaskets without first determining chemical resistance by immersion or in-line testing, similar to tests recommended for G-83.

In a limited group of chemicals, G-82 (neoprene bonded Kevlar®) may show wider chemical resistance than G-83, especially when oils or Freon® are included. However, laboratory tests of various G-82 gaskets show total chloride levels of 35,000 to 60,000 ppm. Chlorine is used in the manufacture of neoprene so G-82 gaskets will always have high chlorides. To prevent chloride stress cracking in stainless steel piping systems, maximum gasket chloride levels are usually set at 250 ppm. We do not recommend using any type of neoprene gaskets to reduce chances of chloride stress cracking if the gaskets are inadvertently used in stainless steel flanges. Neoprene also has poor ozone resistance.

G-81 (Nitrile Butadiene Rubber (NBR) bound Kevlar®) gaskets are preferred for most oil, natural gas, hydrocarbon, and Freon® lines. EPDM used in G-83 gaskets will swell in these services. We are still determining whether swelling results in gasket deterioration or improves gasket sealability.

In summary, replacement of G-1, G-2, and G-40 gaskets is ideally accomplished with two gasket codes (G-83 and G-81). For plant sites insisting on using only one fiber reinforced sheet gasket, we recommend evaluating G-81. Code G-81 provides good hydrocarbon resistance and average temperature resistance, but

3
December 6, 1985
Nonasbestos Gasket Recommendations

still requires chemical resistance testing. Use only gasket styles listed in Engineering Specification SU-2A.

Edge Moor uses plastic coated tags to mark the location of nonasbestos gaskets undergoing in-line testing. Tags are available from Story Printing. Contact Ben Cohen on (302) 655-4455.

Table 1 lists "m" and "y" values for various nonasbestos gaskets manufactured by Garlock. Seating stress ("y") is the force required to initially seal a gasket before process pressure is applied. "Y" values for all nonasbestos gaskets are higher than "y" values for asbestos gaskets listed in the ASME Boiler Pressure Vessel Code. However, Garlock has retested Style 9532 asbestos sheet gasket (G-1) and found the "y" value (seating stress) to be in the same range as nonasbestos substitutes.

Please copy me on any significant correspondence regarding the transition from asbestos to nonasbestos gaskets. Feel free to call me on 366-4200 if there are any additional questions.

ENGINEERING SERVICE DIVISION

G. E. Colalillo

G. E. Colalillo
Maintenance Engineering Group

GEC:mer
Enclosure

DUP 1011082

GEC9A:3

DU 053124

TABLE 1
"m" AND "y" FACTORS FOR COMPRESSED NONASBESTOS
AND GYLON GASKETS

PROCEDURE	MATERIAL	CODE	GARLOCK NO.	THICKNESS	m	y
DIN-3535	Compressed Asbestos	G-1	9532	1/32	3.0	2800
				1/16	5.6	3400
				1/8	6.5	4800
DIN-3535	Compressed Nonasbestos	G-80	3200 & 3400	1/32	3.5	2400
				1/16	4.0	2600
				1/8	6.6	3000
DIN-3535	Compressed Nonasbestos	-	3000	1/32	3.5	2600
				1/16	4.8	3000
				1/8	6.6	3400
DIN-3535	Compressed Nonasbestos	G-81	3001	Data Not Available		
DIN-3535	Compressed Nonasbestos	G-82	3300	1/32	3.2	2800
				1/16	12.4	5600
				1/8	15.3	7600
DIN-3535	Compressed Nonasbestos	G-83	3700	1/32	2.5	2800
				1/16	3.0	3200
				1/8	6.7	4200
ASTM F-586	Compressed Asbestos	G-1	9532	Data Not Available To be supplied soon		
ASTM F-586	Filled Teflon® (Fawn)		3500	1/32	7.3	5600
				1/16	8.0	6000
				1/8	14.5	10000
ASTM F-586	Filled Teflon® (Off-white)	G-49H	3510	1/32	2.0	3400
				1/16	2.0	3400
				1/8	2.0	3400
ASTM F-586	Filled Teflon® (Blue)	-	3504	1/32	2.5	3000
				1/16	1.8	2500
				1/8	2.5	3000
ASTM F-586	Flexible Graphite (homogeneous sheet)	S-13	Graphlock	1/32	2.0	2000
				1/16	2.0	2500
				*1/8	2.0	2500
ASTM F-586	Flexible Graphite (wire inserted)	S-13W	Graphlock	1/32	2.0	2200
				1/16	2.0	2500
				*1/8	2.0	2500

*Not recommended - too thick for good sealability through sheet.

GEC9A:5

DUP 1011083

DU 053125



E. I. DU PONT DE NEMOURS & COMPANY
INCORPORATED
WILMINGTON, DELAWARE 19898

CC: D.M. Croskery/M.C. Hewitt-ESD
L.J. Kitchens-ESD
IC 13-Maint. Engg.

ENGINEERING DEPARTMENT
LOUVIERS BUILDING

October 3, 1985

TOM WEBSTER
ESSENTIAL 1078
MFL
SECONDARY

DENNIS STORDAHL
TEXTILE FIBERS DEPARTMENT
SEAFORD

NON-ASBESTOS GASKET RECOMMENDATIONS
IDENTIFICATION OF PRODUCT AND SERVICES

In order to make non-asbestos gasket recommendations, please identify the following product or services found on Piping Specification 4225, Section 2.

<u>Item</u>	<u>Product or Service</u>
4	Additive Solution 300
5	Additive Type 826
38	DRL-6
39	Finish Solution
40	Finish, Agent 305
41	Finish, Agent 314
42	Finish, Agent 365
43	Finish, Agent 395
44	Finish, Agent 436
45	Finish, Flake 361
46	Finish, Ingredient 313
47	Finish, Liquid 306
48	Finish, Liquid 326
49	Finish, Liquid 327
50	Finish, Liquid 328
51	Finish, Liquid 337
52	Finish, Liquid 364
53	Finish, Liquid 366
54	Finish, Liquid 368
55	Finish, Liquid 391
56	Finish, Liquid 394
57	Finish, Liquid 396
58	Finish, Liquid 441
59	Finish, Primary
60	Finish, Secondary
61	Finish, Spinning Machine Primary
62	Finish, Spinning Machine Secondary
63	Finish, Waste Drains
64	Finisher to Hot Well Flake Conditioning

DUP 1011084

2
October 3, 1985
Dennis Stordahl

<u>Item</u>	<u>Product or Service</u>
70	Inert Gas
77	Liquid 565
78	Miscellaneous Waste
84	NRD 25
85	NRD 254 Salt Solution
86	NRD 47 Liquid
87	NRD 52 and NRD 43
88	NRD 54 Liquid
89	NRD 59 Additive Solution
90	NRD 70 Anti-Stat
91	NRD 29 Solution after Injection Pump
92	NRD 29 Solution before Injection Pump
93	Nylon - 100% Salt
96	Nylon Polymer
97	Nylon Polymer, Reaction Vessel of Flasher Feed Pumps

Please identify type of gaskets used for items Number 176 and 177, now specified for Johns-Manville Number 92 B & B (i.e., asbestos, elastomer, etc.).

If there are any further questions, please call me on 366-4200.

ENGINEERING SERVICE DIVISION

Gregory E. Colalillo

Gregory E. Colalillo
Maintenance Engineering Group

GEC:tmt
GEC7A:19

DUP 1011085

DU 053127



E. I. DU PONT DE NEMOURS & COMPANY
INCORPORATED
WILMINGTON, DELAWARE 19898

CC: D.M. Croskery/M.C. Hewitt-ESD
 L.J. Kitchens-ESD
 IC 13-Maint. Engg.

ENGINEERING DEPARTMENT
 LOUVIERS BUILDING

October 3, 1985

DENNIS STORDAHL
 TEXTILE FIBERS DEPARTMENT
 SEAFORD

**NON-ASBESTOS GASKET RECOMMENDATIONS
 IDENTIFICATION OF PRODUCT AND SERVICES**

In order to make non-asbestos gasket recommendations, please identify the following product or services found on Piping Specification 4225, Section 2.

<u>Item</u>	<u>Product or Service</u>
4	Additive Solution 300
5	✓ Additive Type 826
38	DRL 6
39	Finish Solution
40	Finish, Agent 305
41	Finish, Agent 314
42	Finish, Agent 365
43	Finish, Agent 395
44	Finish, Agent 436
45	Finish, Flake 361
46	✓ Finish, Ingredient 313
47	✓ Finish, Liquid 306
48	Finish, Liquid 326
49	Finish, Liquid 327
50	Finish, Liquid 328
51	Finish, Liquid 337
52	Finish, Liquid 364
53	Finish, Liquid 366
54	Finish, Liquid 368
55	Finish, Liquid 391
56	Finish, Liquid 394
57	Finish, Liquid 396
58	Finish, Liquid 441
59	✓ Finish, Primary
60	✓ Finish, Secondary
61	✓ Finish, Spinning Machine Primary
62	✓ Finish, Spinning Machine Secondary
63	✓ Finish, Waste Drains
64	✓ Finisher to Hot Well Flake Conditioning

DUP 1011086

2
October 3, 1985
Dennis Stordahl

<u>Item</u>	<u>Product or Service</u>
70	✓ Inert Gas
77	Liquid 565
78	✓ Miscellaneous Waste
84	NRD 25
85	✓ NRD 254 Salt Solution
86	NRD 47 Liquid
87	✓ NRD 52 and NRD 43
88	✓ NRD 54 Liquid
89	✓ NRD 59 Additive Solution
90	✓ NRD 70 Anti-Stat
91	✓ NRD 29 Solution after Injection Pump
92	✓ NRD 29 Solution before Injection Pump
93	✓ Nylon - 100% Salt
96	✓ Nylon Polymer
97	✓ Nylon Polymer, Reaction Vessel of Flasher Feed Pumps

Please identify type of gaskets used for items Number 176 and 177, now specified for Johns-Manville Number 92 B & B (i.e., asbestos, elastomer, etc.).

If there are any further questions, please call me on 366-4200.

ENGINEERING SERVICE DIVISION

Gregory E. Colalillo

Gregory E. Colalillo
Maintenance Engineering Group

GEC:tmt
GEC7A:19

DUP 1011087

DU 053129