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UNCLASSIFIED

FIFTH QUARTERLY REPORT

on

FUNGUS RESISTANCE OF PLASTICS

to

BUREAU OF ORDNANCE
DEPARTMENT OF THE NAVY
MOISTURE AND FUNGUS PROOFING SECTION
MATERIALS AND PRESERVATION BRANCH
RESEARCH AND DEVELOPMENT DIVISION

CONTRACT NOrd 11215

by

S. Ruggeri and R. Waitze Atlas

Period covered: February 9, 1952 to May 9, 1952

ALAKA RESEARCH LABORATORIES
division of
LACQUER AND CHEMICAL CORPORATION
214 - 40th Street
Brooklyn 32, N.Y.

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ATI 155 666 (Copies obtainable from ASTIA-DSC)

Lacquer and Chemical Corp., Alaka Research Laboratories Div., Brooklyn, N. Y. (5th Quarterly Report)

Fifth Quarterly Report on Fungus Resistance of Plastics - Feb 9 to May 9, 1952

Ruggeri, S.; Atlas, R. Waitze 16 May 52 71pp. tables

USN Contr. No. Nord 11215

Plastics - Effect of fungi
Plastics, Laminated
Plastics, Thermo-setting
Materials - Climatization
Materials, Non-Metallic (9)
Plastics (2)

UNCLASSIFIED

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CONTRACT NOrd 11215

from

ALAKA RESEARCH LABORATORIES

by

S. Ruggeri and R. Waitze Atlas

May 16, 1952

Foreword

During the fifth period covered by Research Contract NOrd 11215 additional plastic laminates, included in this program were tested for funginertness using the two test methods designated by the Bureau of Ordnance for inclusion in this program.

Testing of thermosetting molded plastics, included in this program using the Petri-Dish method, was continued. Testing of thermosetting molded plastics, included in this program, using the Humidity-Exposure method was initiated.

A number of solderless terminals, including plastics in their make-up, were tested for funginertness, using both the Petri-Dish method and Humidity-Exposure method.

A partial comparison of results obtained by the two methods has been included in this report.

FUNGINERTNESS OF PLASTIC LAMINATES

Introduction

Evaluation of plastic laminates has been continued by both the laboratory procedures mentioned in earlier reports in this series under this contract.

Results are presented in this report of determinations by the Petri-dish culture test procedure and by the humidity-exposure test method supplementing similar data in the prior reports.

Materials

The materials evaluated in this study include laminated, thermosetting, plastic materials as approved under the following specifications:

Specification	Type	Filler	Resin	Grade
MIL-P-997A	GSG	Glass Cloth	Silicone	General
MIL-P-15037A	GMG	Glass Cloth	Melamine	General
MIL-P-15047A	NPG	Nylon Cloth	Phenolic	General
MIL-P-3115A	PBG	Paper	Phenolic	General
MIL-P-3115A	PBE	Paper	Phenolic	Electrical
MIL-P-3115A	PBE-P	Paper	Phenolic	Electrical; Punching
MIL-P-15035A	FBM	Cotton Fab.	Phenolic	Mechanical
MIL-P-15035A	FBG	Cotton Fab.	Phenolic	General
MIL-P-15035A	FBE	Cotton Fab.	Phenolic	Electrical
MIL-P-15035A	FBI	Cotton Fab.	Phenolic	Fine Mach.

Petri-Dish Test Method

Introduction

Additional plastic laminated materials were tested following the Petri-Dish culture test procedure as outlined in the "Fungicertness Requirement and Test for use in MIL-I-631A (as completed 29 January 1951)", furnished by the Bureau of Ordnance with letter dated 16 February 1951.

Earlier work covering this phase of the study was reported as follows:

1st	Quarterly	Report	Pages 4-25
2nd	"	"	" 28-77
3rd	"	"	" 124-136
4th	"	"	" 249-262

Procedure

The procedure has been explained in detail in the First Quarterly Report, pages 5, 6, and 7.

Rating

At the end of the 21 day incubation period, each specimen was examined separately for growth on the surface and for growth on the cut edges and rated as follows:

Observed Fungus growth on the specimen	Rating
No growth	0
Traces of growth (*)	1
Slight to moderate growth: partial coverage	2
Moderate growth: considerable coverage	3
Abundant growth: complete coverage	4

(*) See next page for explanation

(*) Traces of growth are defined as scattered, sparse fungus growth such as might develop from an unusual mass of spores in the original inoculum, or upon an occasional extraneous bit of debris. (Continous cobwebby growth extending over the entire surface or edge of the specimen, even though not necessarily obscuring the Specimen, was rated as 2.)

Table 28 page 325, lists the observations on the individual replicates both for surface and edge growth. Table 29 page 326 lists the observations on the individual replicates of the conditioned specimens and the numeric rating of each replicate both for surface and edge growth.

Interpretation

For a material to be considered funginert it shall not support fungus growth; this shall be due to absence of nutritive substances in the material and not to presence of a fungistatic agent. The absence of a fugitive fungistatic agent was determined from the results on the specimens which received the conditioning of 6 hours at 85° C.

On the basis of the numeric rating of the fungus growth on the six specimens for each sample of plastic laminate being evaluated, the following criteria were used for the various degrees of fungus resistance:

1) Funginert - where at least 2 of 3 specimens were rated 0 or 1 when tested as received and at least 2 of 3 specimens were rated 0 or 1 when tested after being conditioned.

2) Fugitive Fungistatic- where at least 2 of 3 specimens were rated 0 or 1 when tested as received and at least 2 of 3 specimens were not rated 0 or 1 when tested after being conditioned.

3) Fungus Susceptible - where at least 2 of 3 specimens were not rated 0 or 1 when tested as received and at least 2 of 3 specimens were not rated 0 or 1 when tested after being conditioned.

Since it has not been determined whether these criteria will be applied to surface growth alone or to surface growth together with edge growth, separate ratings have been assigned to the specimens based on surface growth alone and on surface and edge growth considered together.

Table 30 page 327, lists the classification of the plastic laminates tested, based on the ratings considering surface growth alone and on the ratings considering surface growth together with edge growth.

TABLE 28

GROWTH OF FUNGUS ON PLASTIC LAMINATES

(PETRI-DISH METHOD)

Conditioning of Specimen: None

Spec. Grade	Manufacturer and Designation	Petri-dish Replicates	Description of Fungus Growth		Numeric Rating	
			Surface	Edges (**)	Surface	Surface and Edges
PBE-P	#2 782	629A	None (*)	None	0	0
		629B	None (*)	None	0	0
		629C	Traces (*)	None	1	1
NPG	#5 N	655A	Mod: Part Cov	Moderate	2	2
		655B	Mod: Part Cov (*)	Moderate	2	2
		655C	Mod: Part Cov (*)	Abundant	2	3
GMG	#7 G-5-813	656A	Traces (*)	Slight	1	2
		656B	Traces (*)	Slight	1	2
		656C	Traces (*)	Slight	1	2
PBG	#10 XX	627A	Slight (*)	Moderate	2	2
		627B	Slight (*)	Moderate	2	2
		627C	Slight (*)	Moderate	2	2
PBE	#10 XXX	628A	Slight (*)	Slight	2	2
		628B	Slight (*)	Moderate	2	2
		628C	Slight (*)	Moderate	2	2

*- Specimen surface was waterlogged **- Same for 4 edges unless otherwise noted

Note- For explanation of numeric rating code see page 322

TABLE 29

GROWTH OF FUNGUS ON PLASTIC LAMINATES
(PETRI-DISH METHOD)

Conditioning of Specimen: 6 hrs at 85° C

Spec. Grade	Manufacturer and Designation	Petri-dish Replicates	Description of Fungus Growth		Numeric Rating	
			Surface	Edges (**)	Surface	Surface and Edges
PBE-P	#2	637A	Traces (*)	Slight	1	2
		637B	Slight (*)	Slight	2	2
	782	637C	None (*)	Slight	0	2
NPG	#5	663A	Mod: Consid Cov (*)	Abundant	3	3
		663B	Mod: Part Cov (*)	Moderate	2	2
	N	663C	Mod: Consid Cov (*)	Moderate	3	3
GMG	#7	664A	Traces (*)	Traces	1	1
		664B	Traces (*)	Traces	1	1
	G-5-813	664C	Traces (*)	Traces	1	1
PBG	#10	635A	Slight (*)	Moderate	2	2
		635B	Slight (*)	Moderate	2	2
	XX	635C	Slight (*)	Moderate	2	2
PBE	#10	636A	Mod: Part Cov	Moderate	2	2
		636B	Slight (*)	Moderate	2	2
	XXX	636C	Slight (*)	Moderate	2	2

*- Specimen surface was waterlogged **- Same for 4 edges unless otherwise noted

~~Note - For explanation of numeric rating code see page 322~~

TABLE 30

FUNGUS RESISTANCE OF PLASTIC LAMINATES

(PETRI-DISH METHOD)

Summary of more detailed data shown in Tables 28 and 29

Spec. Grade	Manufacturer and Designation	Surface Growth Only			Surface and Edge Growth		
		Numeric Rating		Fungus Resistance (*)	Numeric Rating		Fungus Resistance (*)
		Uncond	Cond		Uncond	Cond	
PBE-P	#2 782	0 0 1	1 2 0	Funginert	0 0 1	2 2 2	Fungistatic
NPG	#5 N	2 2 2	3 2 3	Susceptible	2 2 3	3 2 3	Susceptible
GMG	#7 G-5-813	1 1 1	1 1 1	Funginert	2 2 2	1 1 1	_____
PBG	#10 XX	2 2 2	2 2 2	Susceptible	2 2 2	2 2 2	Susceptible
PBE	#10 XXX	2 2 2	2 2 2	Susceptible	2 2 2	2 2 2	Susceptible

*- See page 323 for detailed explanation

Summary of Observations (Surface Growth Alone)

	Manuf.	Designation	Grade
The following sample showed traces of growth on all six replicates:	#7	G-5-813	GMG
The following sample showed no growth, traces of growth, or slight growth on all six replicates:	#2	782	PBE-P
The following sample showed slight growth on all six replicates:	#10	XX	PBG
The following sample showed slight or moderate growth on all six replicates:	#10	XXX	PBE
The following sample showed moderate growth on all six replicates:	#5	N	NPG

Summary of Observations (Surfaces and Edge Growth)

The following sample showed no growth, traces of growth, or slight growth on all six replicates:	#2	782	PBE-P
The following sample showed traces or slight growth on all six replicates:	#7	G-5-813	GMG
The following samples showed slight or moderate growth on all six replicates:	#10 #10	XX XXX	PBG PBE
The following sample showed moderate or abundant growth on all six replicates:	#5	N	NPG

Humidity-Exposure Method

Introduction

Work during this period has been the testing of additional plastic laminated materials for fungus resistance, following the Humidity-Exposure method as outlined in paragraph 4.2 of "Draft of BuOrd Specification 52T15 (Ord), rev. draft, Rele, of 15 August 1950", furnished by the Bureau of Ordnance with letter dated 17 January 1951. Earlier work covering this phase of the study was reported as follows:

2nd Quarterly Report		Pages 78-120
3rd "	"	" 137-201
4th "	"	" 263-303

Procedure

The procedure has been explained in detail in the Second Quarterly Report, pages 78 through 81.

Rating

At the end of the incubation period the watch glass was removed and the rack taken out of the jar. The separate pieces of string (controls) were examined for fungus growth (visible to the naked eye).

All of the controls included in this set of tests developed profuse fungus growth.

Each of the 4 specimens, exposed without attached cotton string, was examined (with the aid of a 7X "Flash-O-Lens" magnifier) for fungus growth. The percentage of area covered by fungus growth was noted for each of the two surfaces, two side edges, top edge, and bottom edge.

Each of the 4 specimens, exposed with attached cotton string was examined for fungus growth (visible to the naked eye) extending from the cotton string. The maximum extent of the fungus growth from point of contact with the string was noted for each of two surfaces and each of the two side edges, of each specimen.

Table 31 pages 332 through 341, lists the observations on the individual replicates.

Interpretation

For a material to be considered funginert it shall not support fungus growth; this shall be due to absence of nutritive substances in the material and not to presence of a fungistatic agent. The absence of a fungistatic agent was determined by the fungus growth extending from the cotton string on those replicates exposed with string attached.

On the basis of the percentage of area covered by fungus growth of four of the eight specimens and the extent of fungus growth from a known nutrient source on the remaining four of the eight specimens for each sample of plastic laminate being evaluated the following criteria were used for the various degrees of fungus resistance:

1) Funginert - where none of the replicates, exposed without attached cotton string, shows more than 2% fungus growth and where fungus growth extends at least 1 mm from the string on at least 2 of 4 replicates exposed with cotton string attached.

2) Fungistatic- where none of the replicates, exposed without attached cotton string, shows more than 2% fungus growth and where fungus growth does not extend at least 1 mm. from the string on at least 2 of the 4 replicates exposed with cotton string attached.

3) Fungus Susceptible- where at least one of the four replicates, exposed without attached cotton string, shows more than 2% fungus growth.

In table 31, pages 332 through 341 are listed the ratings for the ten (10) plastic laminated materials reported in this section. A separate page has been set aside for each sample and each page presents both the original data and the fungus resistance rating both for surface growth and for edge growth. The Humidity-Exposure method permits a separate evaluation based on the edge growth alone, hence the separate ratings. In this method the edge growth is true edge growth in contrast to the Petri-dish method where edge growth could in reality be deriving its nourishment from the agar and merely extending over the edges of the specimen.

TABLE 31

FUNGUS RESISTANCE OF PLASTIC LAMINATES
(HUMIDITY EXPOSURE METHOD)

Grade: PBE-P Manufacturer and designation: #2 782

Specimens without strings attached:

Replicate	Growth on Surfaces		Growth on Edges			
	Relative Profusion	% of area covered	Relative Profusion of Growth:			% of area covered
			2 sides	Top	Bottom	
1073	Traces	< 2%	Traces	Traces	None	< 2%
1074	Traces	< 2%	None	Traces	Traces	< 2%
1075	Traces	< 2%	None	None	Traces	< 2%
1076	Traces	< 2%	None	Traces	Slight	< 2%

Specimens with strings attached:

Replicate	Maximum Extent of Fungus Growth from Point of Contact with String	
	Surfaces	Side Edges
1077	4 mm	2 mm
1078	6 mm	3 mm
1079	2 mm	4 mm
1080	5 mm	5 mm

Rating (See pages 329 through 331 for explanation):

Based on surfaces alone: Funginert

Based on Edges alone: Funginert

TABLE 31 (CONTINUED)

FUNGUS RESISTANCE OF PLASTIC LAMINATES
(HUMIDITY EXPOSURE METHOD)

Grade: PBG Manufacturer and Designation: #10 XX

Specimens without strings attached:

Replicate	Growth on Surfaces		Growth on Edges			
	Relative Profusion	% of area covered	Relative Profusion of Growth:			% of area covered
			2 sides	Top	Bottom	
1121	Traces	< 2%	Traces	Traces	Slight	< 2%
1122	Traces	< 2%	Traces	Traces	Slight	< 2%
1123	Traces	< 2%	None	None	Traces	< 2%
1124	Traces	< 2%	Traces	Slight	Moderate	< 2%

Specimens with strings attached:

Replicate	Maximum Extent of Fungus Growth from Point of Contact with String	
	Surfaces	Side Edges
1125	6 mm	4 mm
1126	3 mm	6 mm
1127	8 mm	6 mm
1128	2 mm	2 mm

Rating (See pages 329 through 331 for explanation):

Based on surfaces alone: Funginert

Based on Edges alone: Funginert

TABLE 31 (CONTINUED)

FUNGUS RESISTANCE OF PLASTIC LAMINATES
(HUMIDITY EXPOSURE METHOD)

Grade: PBE Manufacturer and Designation: #10 XXX

Specimens without strings attached:

Replicate	Growth on Surfaces		Growth on Edges			
	Relative Profusion	% of area covered	Relative Profusion of Growth:			% of area covered
			2 sides	Top	Bottom	
1153	Traces	< 2%	None	None	Slight	< 2%
1154	Traces	< 2%	None	None	Slight	< 2%
1155	Traces	< 2%	Traces	Traces	Slight	< 2%
1156	Traces	< 2%	Slight	Traces	Slight	2%

Specimens with strings attached:

Replicate	Maximum Extent of Fungus Growth from Point of Contact with String	
	Surfaces	Side Edges
1157	5 mm	2 mm
1158	4 mm	3 mm
1159	9 mm	5 mm
1160	5 mm	6 mm

Rating (See pages 329 through 331 for explanation):

Based on surfaces alone: Funginert

Based on Edges alone: Funginert

TABLE 31 (CONTINUED)

FUNGUS RESISTANCE OF PLASTIC LAMINATES
(HUMIDITY EXPOSURE METHOD)

Grade: FBE Manufacturer and Designation: #12 LE-13

Specimens without strings attached:

Replicate	Growth on Surfaces		Growth on Edges			
	Relative Profusion	% of area covered	Relative Profusion of Growth: 2 sides	Top	Bottom	% of area covered
1081	Moderate	25%	Moderate	Moderate	Moderate	20%
1082	Moderate	40%	Moderate	Moderate	Moderate	20%
1083	Moderate	30%	Moderate	Moderate	Moderate	10%
1084	Moderate	35%	Moderate	Moderate	Moderate	20%

Specimens with strings attached:

Replicate	Maximum Extent of Fungus Growth from Point of Contact with String	
	Surfaces	Side Edges
1085	4 mm	4 mm
1086	3 mm	2 mm
1087	2 mm	3 mm
1088	3 mm	3 mm

Rating (See pages 329 through 331 for explanation):

Based on surfaces alone: Susceptible

Based on Edges alone: Susceptible

TABLE 3X (CONTINUED)

FUNGUS RESISTANCE OF PLASTIC LAMINATES
(HUMIDITY EXPOSURE METHOD)

Grade: PBG Manufacturer and Designation: #13 XX-13

Specimens without strings attached:

Replicate	Growth on Surfaces		Growth on Edges			
	Relative Profusion	% of area covered	Relative Profusion of Growth: 2 sides	Top	Bottom	% of area covered
1097	Traces	< 2%	None	None	Moderate	< 2%
1098	Slight	2%	Traces	None	Traces	< 2%
1099	Traces	< 2%	None	None	Traces	< 2%
1100	Traces	< 2%	Traces	None	Slight	< 2%

Specimens with strings attached:

Replicate	Maximum Extent of Fungus Growth from Point of Contact with String	
	Surfaces	Side Edges
1101	4 mm	2 mm
1102	2 mm	3 mm
1103	6 mm	6 mm
1104	6 mm	7 mm

Rating (See pages 329 through 331 for explanation):

Based on surfaces alone: Fung inert

Based on Edges alone: Funginert

TABLE 31 (CONTINUED)

FUNGUS RESISTANCE OF PLASTIC LAMINATES
(HUMIDITY EXPOSURE METHOD)

Grade: PBE Manufacturer and Designation: #13 XXX-13

Specimens without strings attached:

Replicate	Growth on Surfaces		Growth on Edges			
	Relative Profusion	% of area covered	Relative Profusion of Growth: 2 sides	Top	Bottom	% of area covered
1105	Traces	< 2%	None	Traces	Traces	< 2%
1106	Slight	2%	Traces	Traces	Slight	< 2%
1107	Slight	2%	Traces	Traces	Slight	< 2%
1108	Traces	< 2%	Traces	None	Slight	< 2%

Specimens with strings attached:

Replicate	Maximum Extent of Fungus Growth from Point of Contact with String	
	Surfaces	Side Edges
1109	2 mm	2 mm
1110	8 mm	6 mm
1111	5 mm	2 mm
1112	7 mm	4 mm

Rating (See pages 329 through 331 for explanation):

Based on surfaces alone: Funginert

Based on Edges alone: Funginert

TABLE 31 (CONTINUED)

FUNGUS RESISTANCE OF PLASTIC LAMINATES
(HUMIDITY EXPOSURE METHOD)

Grade: FBE Manufacturer and Designation: #13 LE-13

Specimens without strings attached:

Replicate	Growth on Surfaces		Growth on Edges			
	Relative Profusion	% of area covered	Relative Profusion of Growth:			% of area covered
			2 sides	Top	Bottom	
1137	Traces	< 2%	None	None	Traces	< 2%
1138	Traces	< 2%	Traces	None	None	< 2%
1139	Traces	< 2%	None	None	Traces	< 2%
1140	Traces	< 2%	Traces	Traces	Traces	< 2%

Specimens with strings attached:

Replicate	Maximum Extent of Fungus Growth from Point of Contact with String	
	Surfaces	Side Edges
1141	9 mm	2 mm
1142	2 mm	2 mm
1143	3 mm	3 mm
1144	3 mm	1 mm

Rating (See pages 329 through 331 for explanation):

Based on surfaces alone: Funginert

Based on Edges alone: Funginert

TABLE 31 (CONTINUED)

FUNGUS RESISTANCE OF PLASTIC LAMINATES
(HUMIDITY EXPOSURE METHOD)

Grade: PBE Manufacturer and Designation: #16 XXX

Specimens without strings attached:

Replicate	Growth on Surfaces		Growth on Edges			
	Relative Profusion	% of area covered	Relative Profusion of Growth:			% of area covered
			2 sides	Top	Bottom	
1113	Slight	2%	Slight	Traces	Slight	2%
1114	Slight	2%	Moderate	Slight	Moderate	5%
1115	Slight	2%	Traces	Traces	Slight	< 2%
1116	Moderate	5%	Slight	Slight	Moderate	2%

Specimens with strings attached:

Replicate	Maximum Extent of Fungus Growth from Point of Contact with String	
	Surfaces	Side Edges
1117	4 mm	4 mm
1118	6 mm	3 mm
1119	6 mm	3 mm
1120	8 mm	2 mm

Rating (See pages 329 through 331 for explanation):

Based on surfaces alone: Susceptible

Based on Edges alone: Susceptible

TABLE 31 (CONTINUED)

FUNGUS RESISTANCE OF PLASTIC LAMINATES
(HUMIDITY EXPOSURE METHOD)

Grade: FBI Manufacturer and Designation: #16 L

Specimens without strings attached:

Replicate	Growth on Surfaces		Growth on Edges			
	Relative Profusion	% of area covered	Relative Profusion of Growth: 2 sides	Top	Bottom	% of area covered
1129	Moderate	20%	Moderate	Moderate	Moderate	15%
1130	Moderate	25%	Moderate	Moderate	Moderate	15%
1131	Moderate	20%	Moderate	Moderate	Moderate	20%
1132	Moderate	25%	Moderate	Moderate	Moderate	20%

Specimens with strings attached:

Replicate	Maximum Extent of Fungus Growth from Point of Contact with String	
	Surfaces	Side Edges
1133	2 mm	2 mm
1134	3 mm	3 mm
1135	3 mm	2 mm
1136	2 mm	2 mm

Rating (See pages 329 through 331 for explanation):

Based on surfaces alone: Susceptible

Based on Edges alone: Susceptible

TABLE 31 (CONCLUDED)

FUNGUS RESISTANCE OF PLASTIC LAMINATES
(HUMIDITY EXPOSURE METHOD)

Grade: FBI Manufacturer and Designation: #35 L

Specimens without strings attached:

Replicate	Growth on Surfaces		Growth on Edges			
	Relative Profusion	% of area covered	Relative Profusion of Growth:			% of area covered
			2 Sides	Top	Bottom	
1089	Moderate	10%	Moderate	Slight	Slight	5%
1090	Moderate	15%	Moderate	Moderate	Moderate	25%
1091	Moderate	10%	Moderate	Slight	Moderate	5%
1092	Moderate	10%	Moderate	Moderate	Moderate	15%

Specimens with strings attached:

Replicate	Maximum Extent of Fungus Growth from Point of Contact with String	
	Surfaces	Side Edges
1093	7 mm	2 mm
1094	2 mm	2 mm
1095	8 mm	2 mm
1096	2 mm	2 mm

Rating (See pages 329 through 331 for explanation):

Based on surfaces alone: Susceptible

Based on Edges alone: Susceptible

TABLE 32

FUNGUS RESISTANCE OF PLASTIC LAMINATES
(HUMIDITY-EXPOSURE METHOD).

(Summary of ratings listed in table 31)

Spec. Grade	Manufacturer and Designation		Surface Rating	Edge Rating
PBE-P	#2	782	Funginert	Funginert
PBG	#10	XX	Funginert	Funginert
PBE	#10	XXX	Funginert	Funginert
FBE	#12	LE-13	Susceptible	Susceptible
PBG	#13	XX-13	Funginert	Funginert
PBE	#13	XXX-13	Funginert	Funginert
FBE	#13	LE-13	Funginert	Funginert
PBE	#16	XXX	Susceptible	Susceptible
FBI	#16	L	Susceptible	Susceptible
FBI	#35	L	Susceptible	Susceptible

Summary of Observations

This summary applies either to surface or to edge growth as the listings, if made separately, would be identical.

	Manuf.	Designation	Grade
The following samples showed growth covering 2% or less of the area on all 4 replicates: (These samples also showed a minimum of 1mm growth from string on replicates exposed with string attached)	#2	782	PBE-P
	#10	XX	PBG
	#10	XXX	PBE
	#13	XX-13	PBG
	#13	XXX-13	PBE
	#13	LE-13	FBE
The following sample showed growth covering 2-10% of the area on all 4 replicates:	#16	XXX	PBE
The following samples showed growth covering 10-40% of the area on all 4 replicates:	#12	LE-13	FBE
	#16	L	FBI
	#35	L	FBI

Comparison of Results by the two Methods

A total of 139 plastic laminated materials have been tested for resistance to fungus growth using both the Petri-Dish Method and the Humidity-Exposure Method as supplied by the Bureau of Ordnance. Observations and ratings of the individual replicates of these 139 laminates have been reported on previous pages of this report and in prior reports in this series.

Partial comparisons of these results have been reported as follows:

2nd Quarterly Report	Table 9	Page 122
3rd " "	" 18	" 246-247
4th " "	" 27	" 319
5th " "	" 33	" 344

As in the previous lists of this comparison, Table 33, page 344 lists additional laminates arranged in decreasing order of fungus resistance, as determined by the Petri-Dish Method, considering surface growth alone. Also listed are the corresponding results as obtained using the Humidity-Exposure Method.

This listing has been compiled using results of surface growth alone (on unconditioned specimens) since it is not felt that the edge growth obtained in the Petri-Dish Method is comparable to that obtained in the Humidity-Exposure Method.

No conclusions are being drawn from this listing until all the laminates under test have been reported.

TABLE 33

FUNGUS RESISTANCE OF PLASTIC LAMINATES
AS DETERMINED BY TWO TEST METHODS

Spec. Grade	Manufacturer and Designation	Surface Growth by:			
		Petri-Dish Method		Humidity-Exposure Method	
		Relative Profusion	Rating (*)	Relative Profusion	% of area covered
PBE-P	#2 782	None	0	Traces	1%
FBE	#13 LE-13	Traces	1	Traces	1%
PBE	#13 XXX-13	Traces	1	Tr. - Sl.	1.5%
PBG	#10 XX	Slight	2	Traces	1%
PBE	#10 XXX	Slight	2	Traces	1%
PBG	#13 XX-13	Slight	2	Tr. - Sl.	1.25%
PBE	#16 XXX	Slight	2	Sl. - Mod.	2.75%
FBI	#35 L	Slight	2	Moderate	11.25%
FBI	#16 L	Mod: Part Cov	2	Moderate	22.5%
FBE	#12 LE-13	Mod: Part Cov	2	Moderate	32.5%

*- See page 322 for explanation

FUNGINERTNESS OF THERMOSETTING MOLDED PLASTICS

Introduction

During the period covered by this report, testing of thermosetting molded plastics has been continued by the Petri-Dish culture method. Also during this period tests were initiated using the Humidity-Exposure method.

Results are presented in this report of the determinations by both the laboratory procedures.

Materials

The materials evaluated in this study include thermosetting molded plastics as approved under Military Specification MIL-P-14B:

Phenolic Resin:

Type CFG	Cellulose filler, general purpose
Type CFI-5	Cellulose filler, impact-resistant; nominal impact strength, 0.60 foot-pounds per inch notch.
Type CFI-10	Cellulose filler, impact-resistance; nominal impact strength, 1.0 foot-pounds per inch notch.
Type CFI-20	Cellulose filler, impact-resistant; nominal impact strength, 2.0 foot-pounds per inch notch.
Type CFI-30	Cellulose filler, impact-resistant; nominal impact strength, 3.0 foot-pounds per inch notch.
Type CFI-40	Cellulose filler, impact-resistant; nominal impact strength, 4.0 foot-pounds per inch notch.

Type MFE	Mineral filler, best electrical properties.
Type MFG	Mineral filler, general purpose, heat-resistant.
Type MFH	Mineral filler, heat-resistant.
Type MFI-10	Mineral filler, impact-resistant; nominal impact strength, 1.0 foot-pounds per inch notch.
Type MFI-20	Mineral filler, impact-resistant; nominal impact strength; 2.0 foot-pounds per inch notch.

Melamine Resin:

Type CMG	Cellulose filler, general-purpose.
Type CMI-5	Cellulose filler, impact-resistant; nominal impact strength, 0.60 foot-pounds per inch notch.
Type MME	Mineral filler, arc-and flame-resistant.

Alkyd Resin:

Type MAG	Mineral filler, general-purpose alkyd resin.

Petri-Dish Test Method

Introduction

Additional thermosetting molded plastics were tested following the Petri-dish culture test procedure as outlined in the "Funginertness Requirement and Test for use in MIL-I-631A (as completed 29 January 1951)", furnished by the Bureau of Ordnance with letter dated 16 February 1951.

Earlier work covering this phase of the study was reported in the Third Quarterly Report (pages 202-244) and in the Fourth Quarterly Report (pages 304-317).

Procedure

The procedure used was the same as that used in the Petri-Dish funginertness tests of plastic laminates except for the test specimens used. The details of this procedure are found in the First Quarterly Report of this series. (See pages 5,6, and 7.).

The specimens used in these tests were prepared as follows: The thermosetting molding plastic, being tested was molded into discs of 1/8" thickness in such dimensions as to allow subsequent cutting of squares 1 inch by 1 inch from the discs. This cutting was done using an 8" arbor tilt saw equipped with a suitable cutting blade.

The resulting specimens (1/8" x 1" x 1") were then handled in the same manner as the plastic laminate specimens.

Rating

At the end of the 21 day incubation period, each specimen was examined separately for growth on the surface and for growth on the cut edges and rated as follows:

Observed Fungus Growth on the Specimen	Rating
No growth	0
Traces of growth (*)	1
Slight to moderate growth: partial coverage	2
Moderate growth: considerable coverage	3
Abundant growth: complete coverage	4

(*) Traces of growth are defined as scattered, sparse fungus growth such as might develop from an unusual mass of spores in the original inoculum, or upon an occasional extraneous bit of debris. (Continous cobwebby growth extending over the entire surface or edge of the specimen, even though not necessarily obscuring the specimen, was rated as 2.)

Table 34, pages 350 through 351, lists the observations on the individual replicates of unconditioned specimens and numeric rating of each replicate both for surface and edge growth. Table 35, pages 352 through 353, lists the observations on the individual replicates of the conditioned specimens and the numeric rating of each replicate both for surface and edge growth.

Interpretation

For a material to be considered funginert it shall not support fungus growth; this shall be due to absence of nutritive substances in the material and not to presence of a fungistatic agent. The absence of a fugitive fungistatic agent was determined from the results on the specimens which received the conditioning of 6 hours at 85° C.

On the basis of the numeric rating of the fungus growth on the six specimens for each sample of plastic being evaluated, the following criteria were used for the various degrees of fungus resistance:

1) Funginert - where at least 2 of 3 specimens were rated 0 or 1 when tested as received and at least 2 of 3 specimens were rated 0 or 1 when tested after being conditioned.

2) Fugitive Fungistatic - where at least 2 of 3 specimens were rated 0 or 1 when tested as received and at least 2 of 3 specimens were not rated 0 or 1 when tested after being conditioned.

3) Fungus Susceptible - where at least 2 of 3 specimens were not rated 0 or 1 when tested as received and at least 2 of 3 specimens were not rated 0 or 1 when tested after being conditioned.

Since it has not been determined whether these criteria will be applied to surface growth alone or to surface growth together with edge growth, separate ratings have been assigned to the specimens based on surface growth alone and on surface and edge growth considered together.

Table 36, page 354, lists the classification, of the molded plastics tested, based on the rating considering surface growth alone and on the ratings considering surface growth together with edge growth.

TABLE 34

GROWTH OF FUNGUS ON MOLDED PLASTICS
(PETRI-DISH METHOD)

Conditioning of Specimen: None

Spec. Grade	Manufacturer and Designation	Petri-dish Replicates	Description of Fungus Growth		Numeric Rating	
			Surface	Edges (**)	Surface	Surface and Edges
CFG	#22 1544 Nat	723A 723B 723C	Slight (*) Traces (*) Traces (*)	Slight Traces Traces	2 1 1	2 1 1
CFG	#22 11540 Brown	724A 724B 724C	Slight (*) Slight (*) Traces (*)	Slight Slight Slight	2 2 1	2 2 2
CFI 10	#22 12052 Black	725A 725B 725C	Mod: Part Cov (*) Mod: Part Cov (*) Slight (*)	Slight Slight Slight	2 2 2	2 2 2
CFI 10	#22 13537 Natural	726A 726B 726C	Traces (*) Traces (*) Traces (*)	Traces Traces Traces	1 1 1	1 1 1
CFI 20	#22 11934 Black	727A 727B 727C	Slight (*) Mod: Part Cov (*) Slight (*)	Slight Slight Slight	2 2 2	2 2 2

* - Specimen surface was waterlogged **- Same for 4 edges unless otherwise noted
Note - For explanation of numeric rating code see page 347

TABLE 34 (CONCLUDED)

Sheet 2 of 2

GROWTH OF FUNGUS ON MOLDED PLASTICS
(PETRI-DISH METHOD)

Conditioning of Specimen: None

Spec. Grade	Manufacturer and Designation	Petri-dish Replicates	Description of Fungus Growth		Numeric Rating	
			Surface	Edges (**)	Surface	Surface and Edges
CFI 20	#22 14482 Natural	728A	Traces (*)	Traces	1	1
		728B	Traces (*)	Traces	1	1
		728C	Traces (*)	Traces	1	1

*- Specimen surface was waterlogged **- Same for 4 edges unless otherwise noted
Note For explanation of numeric rating code see page 347

TABLE 35

GROWTH OF FUNGUS ON MOLDED PLASTICS
(PETRI-DISH METHOD)

Conditioning of Specimen: 6 hrs at 85° C

Spec. Grade	Manufacturer and Designation	Petri-dish Replicates	Description of Fungus Growth		Numeric Rating	
			Surfaces	Edges (**)	Surface	Surface and Edges
CFG	#22 1344 Natural	731A 731B 731C	Slight (*) Slight (*) Slight (*)	Slight Slight Slight	2 2 2	2 2 2
CFG	#22 11540 Brown	732A 732B 732C	Slight (*) Traces (*) Slight (*)	Slight (*) Slight (*) Slight (*)	2 1 2	2 2 2
CFI 10	#22 12052 Black	733A 733B 733C	Mod: Part Cov (*) Mod: Part Cov (*) Slight (*)	Slight Slight Slight	2 2 2	2 2 2
CFI 10	#22 13537 Natural	734A 734B 734C	Traces (*) Traces (*) Traces (*)	Traces Traces Traces	1 1 1	1 1 1
CFI 20	#22 11934 Black	735A 735B 735C	Slight (*) Slight (*) Slight (*)	Slight Slight Slight	2 2 2	2 2 2

*- Specimen surface was waterlogged **- Same for 4 edges unless otherwise noted
Note - For explanation of numeric rating code see page 347

TABLE 35 CONCLUDED

GROWTH OF FUNGUS ON MOLDED PLASTICS
(PETRI-DISH METHOD)

Conditioning of Specimen: 6 hrs at 85° C

Spec. Grade	Manufacturer and Designation	Petri-dish Replicates	Description of Fungus Growth		Numeric Rating	
			Surface	Edges (**)	Surface	Surface and Edges
CFI 20	#22 14482 Natural	736A	Traces	Traces	1	1
		736B	Traces (*)	Traces	1	1
		736C	Traces (*)	Traces	1	1

*- Specimen surface was waterlogged **- Same for 4 edges unless otherwise noted
Note - For explanation of numeric rating code see page 347

TABLE 36

FUNGUS RESISTANCE OF MOLDED PLASTICS
(PETRI-DISH METHOD)

Summary of more detailed data shown in tables 34 and 35.

Spec. Grade	Manufacturer and Designation	Surface Growth Only			Surface and Edge Growth		
		Numeric Rating		Fungus Resistance (*)	Numeric Rating		Fungus Resistance (*)
		Uncond	Cond		Uncond	Cond	
CFG	#22 1544 Nat	2 1 1	2 2 2	Fungistatic	2 1 1	2 2 2	Fungistatic
CFG	#22 11540 Br.	2 2 1	2 1 2	Susceptible	2 2 2	2 2 2	Susceptible
CFI-10	#22 12052 Black	2 2 2	2 2 2	Susceptible	2 2 2	2 2 2	Susceptible
CFI-10	#22 13537 Nat.	1 1 1	1 1 1	Funginert	1 1 1	1 1 1	Funginert
CFI-20	#22 11934 Black	2 2 2	2 2 2	Susceptible	2 2 2	2 2 2	Susceptible
CFI-20	#22 14482 Nat.	1 1 1	1 1 1	Funginert	1 1 1	1 1 1	Funginert

* See page 348 for more detailed explanation.

Summary of Observations

This summary applies either to surface alone, or to surface and edges together as the listings, if made separately, would be identical.

	Manuf.	Designation	Grade
The following samples showed traces of growth on all six replicates:	#22	13537 Nat.	CFI-10
	#22	14482 Nat.	CFI-20
The following samples showed traces or slight growth on all six replicates:	#22	1544 Nat.	CFG
	#22	11540 Brown	CFG
The following samples showed slight or moderate growth on all six replicates:	#22	12052 Black	CFI-10
	#22	11934 Black	CFI-20

Humidity-Exposure Method

Introduction

During this period, thermosetting molded plastics were tested following the Humidity-Exposure method as outlined in paragraph 4.2 of "Draft of BuOrd Specification 52T15 (Ord), rev. draft, Rel3, of 15 August 1950", furnished by the Bureau of Ordnance with letter dated 17 January 1951.

Procedure

The experimental procedure has been explained in detail in the Second Quarterly Report, pages 78 through 81, except for the test specimens used. These were prepared by cutting four standard impact test bars ($\frac{1}{2}$" x $\frac{1}{2}$" x 5"), for each sample, in half to produce eight test specimens each $\frac{1}{2}$" x $\frac{1}{2}$" x $2\frac{1}{2}$". One long edge of each specimen was ground so as to remove the surface polish and expose the filler.

Rating

At the end of the incubation period the watch glass was removed and the rack taken out of the jar. The separate pieces of string (controls) were examined for fungus growth (visible to the naked eye). All of the controls included in this set of tests developed profuse fungus growth.

Each of the 4 specimens, exposed without attached cotton string, was examined (with the aid of a 7X "Flash-O-Lens" magnifier) for fungus growth. The percentage of area covered by fungus growth was noted for each of the surfaces, of each specimen.

Each of the 4 specimens, exposed with attached cotton string was examined for fungus growth (visible to the naked eye) extending from the cotton string. The maximum extent of the fungus growth from the point of contact with the string was noted for each of the surfaces of each specimen.

Table 37 pages 359 through 369, lists the observations on the individual replicates.

Interpretation

For a material to be considered funginert, it shall not support fungus growth; this shall be due to absence of nutritive substances in the material and not to presence of a fungistatic agent. The absence of a fungistatic agent was determined by the fungus growth extending from the cotton string on those replicates exposed with string attached.

On the basis of the percentage of area covered by fungus growth of four of the eight specimens and the extent of fungus growth from a known nutrient source on the remaining four of the eight specimens for each sample of plastic laminate being evaluated; the following criteria were used for the various degrees of fungus resistance:

1) Funginert- where none of the replicates, exposed without attached cotton string, shows more than 2% fungus growth and where fungus growth extends at least 1 mm. from the string on at least 2 of 4 replicates exposed with cotton string attached.

2) Fungistatic- where none of the replicates, exposed without attached cotton string, shows more than 2% fungus growth and where fungus growth does not extend at least 1mm. from the string on at least 2 of the 4 replicates exposed with cotton string attached.

3) Fungus Susceptible- where at least one of the four replicates, exposed without attached cotton string, shows more than 2% fungus growth.

In table 37, pages 359 through 369 are listed the ratings for the eleven (11) thermosetting molded plastics reported in this section. A separate page has been set aside for each sample and each page presents both the original data and the fungus resistance rating both for polished surface growth and ground surface growth. The Humidity-Exposure method permits a separate evaluation based on the ground surface growth alone, hence the separate ratings.

TABLE 37

FUNGUS RESISTANCE OF THERMOSETTING MOLDED PLASTICS
(HUMIDITY EXPOSURE METHOD)

Grade: CFG Manufacturer and Designation: #19 BM 120 Black

Specimens without strings attahced:

Replicate	Fungus Growth					
	Polished Surface		2Adjacent Surfaces		Ground Surface	
	Relative Profusion	% of area covered	Relative Profusion	% of area covered	Relative Profusion	% of area covered
17	Moderate	30%	Moderate	30%	Moderate	30%
18	Moderate	20%	Moderate	25%	Moderate	25%
19	Moderate	15%	Moderate	10%	Moderate	15%
20	Moderate	10%	Moderate	10%	Moderate	5%

Specimens with strings attached:

Replicate	Maximum Extent of Fungus Growth from Point of Contact with String		
	Polished Surface	Adjacent Surfaces	Ground Surface
21	4 mm	5 mm	2 mm
22	2 mm	2 mm	1 mm
23	3 mm	3 mm	1 mm
24	2 mm	3 mm	2 mm

Rating (See pages 357 and 358 for explanation):

Based on polished surfaces: Susceptible

Based on ground surfaces: Susceptible

TABLE 37 (CONTINUED)

FUNGUS RESISTANCE OF THERMOSETTING MOLDED PLASTICS
(HUMIDITY EXPOSURE METHOD)

Grade: CFG Manufacturer and Designation: #25 307 Black

Specimens without strings attached:

Replicate	Fungus Growth					
	Polished Surface		2Adjacent Surfaces		Ground Surface	
	Relative Profusion	% of area covered	Relative Profusion	% of area covered	Relative Profusion	% of area covered
81	Traces	< 2%	Slight	2%	Slight	2%
82	Slight	2%	Traces	< 2%	Slight	2%
83	Traces	< 2%	Traces	< 2%	Slight	2%
84	Traces	< 2%	Traces	< 2%	Traces	< 2%

Specimens with strings attached:

Replicate	Maximum Extent of Fungus Growth from Point of Contact with String		
	Polished Surface	Adjacent Surfaces	Ground Surface
85	1 mm	1 mm	1 mm
86	3 mm	2 mm	4 mm
87	2 mm	2 mm	4 mm
88	2 mm	2 mm	2 mm

Rating (See pages 357 and 358 for explanation):

Based on polished surfaces: Funginert

Based on ground surfaces: Funginert

TABLE 37 (CONTINUED)

FUNGUS RESISTANCE OF THERMOSETTING MOLDED PLASTICS
(HUMIDITY EXPOSURE METHOD)

Grade: CFG Manufacturer and Designation: #25 307 Natural

Specimens without strings attached:

Replicate	Fungus Growth					
	Polished Surface		2Adjacent Surfaces		Ground Surface	
	Relative Profusion	% of area covered	Relative Profusion	% of area covered	Relative Profusion	% of area covered
73	Slight	2%	Traces	< 2%	Moderate	5%
74	Slight	2%	Slight	2%	Slight	2%
75	Slight	2%	Traces	< 2%	Slight	2%
76	Traces	< 2%	Slight	2%	Slight	2%

Specimens with strings attached:

Replicate	Maximum Extent of Fungus Growth From Point of Contact with String		
	Polished Surface	Adjacent Surfaces	Ground Surface
77	3 mm	4 mm	6 mm
78	3 mm	3 mm	5 mm
79	2 mm	1 mm	2 mm
80	1 mm	1 mm	2 mm

Rating (See pages 357 and 358 for explanation):

Based on polished surfaces: Funginert

Based on ground surfaces: Susceptible

TABLE 37 (CONTINUED)

FUNGUS RESISTANCE OF THERMOSETTING MOLDED PLASTICS
(HUMIDITY EXPOSURE METHOD)

Grade: CFI-20 Manufacturer and Designation: #4 Grade C

Specimens without strings attached:

Replicate	Fungus Growth					
	Polished Surface		2Adjacent Surfaces		Ground Surface	
	Relative Profusion	% of area covered	Relative Profusion	% of area covered	Relative Profusion	% of area covered
1	Moderate	35%	Moderate	70%	Moderate	35%
2	Moderate	20%	Moderate	50%	Moderate	55%
3	Moderate	30%	Moderate	50%	Moderate	20%
4	Moderate	30%	Moderate	40%	Moderate	20%

Specimens with strings attached:

Replicate	Maximum Extent of Fungus Growth from Point of Contact with String		
	Polished Surface	Adjacent Surfaces	Ground Surface
5	2 mm	5 mm	3 mm
6	4 mm	5 mm	2 mm
7	6 mm	7 mm	2 mm
8	5 mm	6 mm	2 mm

Rating (See pages 357 and 358 for explanation):

Based on polished surfaces: Susceptible

Based on ground surfaces: Susceptible

TABLE 37 (CONTINUED)

FUNGUS RESISTANCE OF THERMOSETTING MOLDED PLASTICS
(HUMIDITY EXPOSURE METHOD)

Grade: CFI-20 Manufacturer and Designation: #12 Grade 20

Specimens without strings attached:

Replicate	Fungus Growth					
	Polished Surface		2Adjacent Surfaces		Ground Surface	
	Relative Profusion	% of area covered	Relative Profusion	% of area covered	Relative Profusion	% of area covered
9	Traces	< 2%	Slight	2%	Traces	< 2%
10	Moderate	5%	Moderate	15%	Moderate	5%
11	Moderate	5%	Moderate	10%	Moderate	20%
12	Moderate	15%	Moderate	5%	Slight	2%

Specimens with strings attached:

Replicate	Maximum Extent of Fungus Growth from Point of Contact with String		
	Polished Surface	Adjacent Surfaces	Ground Surface
13	2 mm	3 mm	2 mm
14	1 mm	2 mm	2 mm
15	2 mm	2 mm	2 mm
16	2 mm	2 mm	1 mm

Rating (See pages 357 and 358 for explanation):

Based on polished surfaces: Susceptible

Based on ground surfaces: Susceptible

TABLE 37 (CONTINUED)

FUNGUS RESISTANCE OF THERMOSETTING MOLDED PLASTICS
(HUMIDITY EXPOSURE METHOD)

Grade: CFI-20 Manufacturer and Designation: #19 BM 3510 Black

Specimens without strings attached:

Replicate	Fungus Growth					
	Polished Surface		2Adjacent Surface		Ground Surface	
	Relative Profusion	% of area covered	Relative Profusion	% of area covered	Relative Profusion	% of area covered
89	Slight	2%	Traces	< 2%	Slight	2%
90	Slight	2%	Slight	2%	Slight	2%
91	Slight	2%	Slight	2%	Slight	2%
92	Slight	2%	Slight	2%	Moderate	5%

Specimens with strings attached:

Replicate	Maximum Extent of Fungus Growth from Point of Contact with String		
	Polished Surface	Adjacent Surfaces	Ground Surface
93	1 mm	4 mm	2 mm
94	1 mm	1 mm	1 mm
95	3 mm	3 mm	2 mm
96	2 mm	1 mm	1 mm

Rating (See pages 357 and 358 for explanation):

Based on polished surfaces: Funginert

Based on ground surfaces: Susceptible

TABLE 37 (CONTINUED)

FUNGUS RESISTANCE OF THE THERMOSETTING MOLDED PLASTICS
(HUMIDITY EXPOSURE METHOD)

Grade: CFI-40 Manufacturer and Designation: #19 BM 16468 Black

Specimens without strings attached:

Replicate	Fungus Growth					
	Polished Surface		Adjacent Surfaces		Ground Surface	
	Relative Profusion	% of area covered	Relative Profusion	% of area covered	Relative Profusion	% of area covered
49	Moderate	35%	Moderate	35%	Moderate	50%
50	Abundant	75%	Moderate	55%	Abundant	75%
51	Moderate	50%	Moderate	35%	Moderate	60%
52	Moderate	50%	Moderate	60%	Abundant	75%

Specimens with strings attached:

Replicate	Maximum Extent of Fungus Growth From Point of Contact with String		
	Polished Surface	Adjacent Surfaces	Ground Surface
53	2 mm	3 mm	4 mm
54	3 mm	6 mm	6 mm
55	3 mm	5 mm	4 mm
56	2 mm	2 mm	3 mm

Rating (See pages 357 and 358 for explanation):

Based on polished surfaces: Susceptible

Based on ground surfaces: Susceptible

TABLE 37 (CONTINUED)

FUNGUS RESISTANCE OF THERMOSETTING MOLDED PLASTICS
(HUMIDITY EXPOSURE METHOD)

Grade: MFE Manufacturer and Designation: #19 BM 16981 Natural

Specimens without strings attached:

Replicate	Fungus Growth					
	Polished Surface		2 Adjacent Surfaces		Ground Surface	
	Relative Profusion	% of area covered	Relative Profusion	% of area covered	Relative Profusion	% of area covered
65	Traces	< 2%	Traces	< 2%	Traces	< 2%
66	Traces	< 2%	Traces	< 2%	Traces	< 2%
67	Traces	< 2%	Traces	< 2%	Traces	< 2%
68	Traces	< 2%	Traces	< 2%	Traces	< 2%

Specimens with strings attached:

Replicate	Maximum Extent of Fungus Growth From Point of Contact with String		
	Polished Surface	Adjacent Surfaces	Ground Surface
69	4 mm	3 mm	2 mm
70	2 mm	3 mm	3 mm
71	1 mm	2 mm	2 mm
72	1 mm	2 mm	2 mm

Rating (See pages 357 and 358 for explanation):

Based on polished surfaces: Funginert

Based on ground surfaces: Funginert

TABLE 37 (CONTINUED)

FUNGUS RESISTANCE OF THERMOSETTING MOLDED PLASTICS
(HUMIDITY EXPOSURE METHOD)

Grade: MFE Manufacturer and Designation: #19 BM 17748 Natural

Specimens without strings attahced:

Replicate	Fungus Growth					
	Polished Surface		2Adjacent Surfaces		Ground Surface	
	Relative Profusion	% of area covered	Relative Profusion	% of area covered	Relative Profusion	% of area covered
57	Traces	<2%	Traces	<2%	Traces	<2%
58	Traces	<2%	Traces	<2%	Traces	<2%
59	Traces	<2%	Traces	<2%	Slight	2%
60	Traces	<2%	Traces	<2%	Slight	2%

Specimens with strings attahced:

Replicate	Maximum Extent of Fungus Growth From Point of Contact with String		
	Polished Surface	Adjacent Surfaces	Ground Surface
61	1 mm	2 mm	2 mm
62	2 mm	2 mm	2 mm
63	2 mm	1 mm	2 mm
64	2 mm	2 mm	2 mm

Rating (See pages 357 and 358 for explanation):

Based on polished surfaces: Funginert

Based on ground surfaces: Funginert

TABLE 37 (CONTINUED)

FUNGUS RESISTANCE OF THERMOSETTING MOLDED PLASTICS
(HUMIDITY EXPOSURE METHOD)

Grade: MRI-10 Manufacturer and Designation: #23 12420

Specimens without strings attached:

Replicate	Fungus Growth					
	Polished Surface		Adjacent Surfaces		Ground Surface	
	Relative Profusion	% of area covered	Relative Profusion	% of area covered	Relative Profusion	% of area covered
25	Moderate	25%	Moderate	35%	Moderate	35%
26	Moderate	25%	Moderate	35%	Moderate	25%
27	Moderate	35%	Moderate	30%	Moderate	30%
28	Moderate	40%	Moderate	30%	Moderate	30%

Specimens with strings attached:

Replicate	Maximum Extent of Fungus Growth From Point of Contact with String		
	Polished Surface	Adjacent Surfaces	Ground Surface
29	3 mm	4 mm	2 mm
30	2 mm	2 mm	2 mm
31	5 mm	2 mm	2 mm
32	4 mm	4 mm	3 mm

Rating (See pages 357 and 358 for explanation):

Based on polished surfaces: Susceptible

Based on ground surfaces: Susceptible

TABLE 37 (CONCLUDED)

FUNGUS RESISTANCE OF THERMOSETTING MOLDED PLASTICS
(HUMIDITY EXPOSURE METHOD)

Grade: MFI-20 Manufacturer and Designation: #23 12410

Specimens without strings attached:

Replicate	Fungus Growth					
	Polished Surface		2Adjacent Surfaces		Ground Surface	
	Relative Profusion	% of area covered	Relative Profusion	% of area covered	Relative Profusion	% of area covered
33	Moderate	40%	Moderate	35%	Moderate	35%
34	Moderate	30%	Moderate	25%	Moderate	40%
35	Moderate	30%	Moderate	30%	Moderate	40%
36	Moderate	40%	Moderate	25%	Moderate	40%

Specimens with strings attahced:

Replicate	Maximum Extent of Fungus Growth From Point of Contact with String		
	Polished Surface	Adjacent Surfaces	Ground Surface
37	2 mm	3 mm	2 mm
38	2 mm	3 mm	2 mm
39	5 mm	4 mm	6 mm
40	3 mm	3 mm	4 mm

Rating (See pages 357 and 358 for explanation):

Based on polished surfaces: Susceptible

Based on ground surfaces: Susceptible

TABLE 38

FUNGUS RESISTANCE OF THERMOSETTING MOLDED PLASTICS
(HUMIDITY-EXPOSURE METHOD)

(Summary of ratings listed in table 37)

Spec. Grade	Manufacturer and Designation	Polished Surface Rating	Ground Surface Rating
CFG	#9 BM 120 Black	Susceptible	Susceptible
CFG	#25 307 Black	Funginert	Funginert
CFG	#25 307 Nat.	Funginert	Susceptible
CFI-20	#4 Grade C	Susceptible	Susceptible
CFI-20	#12 Grade 20	Susceptible	Susceptible
CFI-20	#19 BM 3510 Black	Funginert	Susceptible
CFI-40	#19 BM 16468 Black	Susceptible	Susceptible
MFE	#19 BM 16981 Nat.	Funginert	Funginert
MFE	#19 BM 17748 Nat.	Funginert	Funginert
MFI-10	#23 12420	Susceptible	Susceptible
MFI-20	#23 12410	Susceptible	Susceptible

Summary of Observations (Polished Surface)

	Manuf.	Designation	Grade
The following samples showed growth covering 2% or less of the area on all 4 replicates: (These samples also showed a minimum of 1mm growth from string on replicates exposed with string attached)	#25	307 Black	CFG
	#25	307 Nat.	CFG
	#19	BM 3510 Bl.	CFI-20
	#19	BM 16981 Nat.	MFE
	#19	BM 17748 Nat.	MFE
The following sample showed growth covering 2-10% of the area on all 4 replicates:	#12	Grade 20	CFI-20
The following samples showed growth covering 10-40% of the area on all 4 replicates:	#19	BM 120 Black	CFG
	#4	Grade C	CFI-20
	#23	12420	MFI-10
	#23	12410	MFI-20
The following sample showed growth covering 30-80% of the area on all 4 replicates:	#19	BM 16468 Bl.	CFI-40

Summary of Observations (Ground Surface)

	Manuf.	Designation	Grade
The following samples showed growth covering 2% or less of the area on all 4 replicates: (These samples also showed a minimum of 1mm growth from string on replicates exposed with string attached)	#25	307 Black	CFG
	#19	BM 16981 Nat.	MFE
	#19	BM 17748 Nat.	MFE
The following samples showed growth covering 2-10% of the area on all 4 replicates:	#25	307 Nat.	CFG
	#12	Grade 20	CFI-20
	#19	BM 3510 Bl.	CFI-20
The following samples showed growth covering 10-40% of the area on all 4 replicates:	#19	BM 120 Black	CFG
	#4	Grade C	CFI-20
	#23	12420	MFI-10
	#23	12410	MFI-20
The following sample showed growth covering 30-80% of the area on all 4 replicates:	#19	BM 16468 Bl.	CFI-40

Comparison of Results by the Two Methods

A total of 11 thermosetting molded plastics have been tested for resistance to fungus growth using both the Petri-Dish Method and the Humidity-Exposure Method as supplied by the Bureau of Ordnance. Observations and ratings of the individual replicates of these 11 molded plastics have been reported on previous pages of this report and in prior reports in this series.

Table 39, page 373, lists molded plastics arranged in decreasing order of fungus resistance, as determined by the Petri-Dish Method, considering surface growth alone. Also listed are the corresponding results as obtained using the Humidity-Exposure Method.

This listing has been compiled using results of surface growth alone (on unconditioned specimens) since it is not felt that the edge growth obtained in the Petri-Dish Method is comparable to that obtained in the Humidity-Expsoure Method.

No conclusions are being drawn from this listing until all the molded plastics under test have been reported.

TABLE 39

FUNGUS RESISTANCE OF THERMOSETTING MOLDED PLASTICS
AS DETERMINED BY TWO TEST METHODS

Spec. Grade	Manufacturer and Designation	Surface Growth by:			
		Petri-Dish Method		Humidity-Exposure Method	
		Relative Profusion	Rating (*)	Relative Profusion	% of area covered
MFE	#19 BM 16981 Natural	Traces	1	Traces	1%
MFE	#19 BM 17748	Traces	1	Traces	1%
CFG	#25 307 Bl.	Traces	1	Tr. - Sl.	1.25%
CFG	#25 307 Nat.	Slight	2	Tr. - Sl.	1.75%
CFG	#19 BM 120 Black	Slight	2	Moderate	18.75%
CFI-20	#19 BM 3510 Black	Mod: Part Cov	2	Slight	2%
CFI-20	#4 Grade C	Mod: Part Cov	2	Moderate	28.75%
CFI-40	BM 16468 Black	Mod: Part Cov	2	Mod. - Abund	52.5%
CFI-20	#12 Grade 20	Abundant	4	Tr. - Mod.	6.5%
MFI-10	#23 12420	Abundant	4	Moderate	31.25%
MFI-20	#23 12410	Abundant	4	Moderate	35%

*- See page 347 for explanation

FUNGINERTNESS OF SOLDERLESS TERMINALS

Introduction

An additional phase of work under this program has been the testing of solderless wire and cable terminals incorporating plastic materials in their make-up. These materials include injection molded nylon in some cases and vinyl-type plastics in other cases.

Results are presented in this report of the determinations by both the laboratory procedures.

Materials

Samples of solderless wire and cable terminals, as supplied by three manufacturers were evaluated. These included the following:

Manufacturer	Designation	Plastic	Color
#29	RA-853	Nylon	Red (Dyed)
#29	RB-873	Nylon	Blue (Dyed)
#29	RC-362	Nylon	Yellow (Dyed)
#29	RBB-221	Nylon	Natural
#29	Insulators	Nylon	Natural
#30	31902	Vinyl	Blue
#30	31878	Vinyl	Red
#30	35108	Vinyl	Yellow
#30	7-32056	Vinyl	Blue
	Note: Metal Part corrosion-proofed		
#31	YAE-18G43	Nylon	Red
#31	YAE-14N	Nylon	Blue
#31	YAEV10-T5	Nylon	Yellow
#31	-------	Nylon	Clear

Petri-Dish Test Method

Introduction

The solderless wire and cable terminals were tested following the Petri-Dish culture test procedure as outlined in "Funginertness Requirement and Test for use in MIL-I-631A (as completed 29 January 1951) furnished by the Bureau of Ordnance with letter dated 16 February 1951.

Procedure

The procedure used was the same as that used in the Petri-Dish funginertness tests of plastic laminates except for the test specimens used. Details of this procedure are found in the First Quarterly Report of this series. (See pages 5, 6, and 7.)

In these tests, the specimens used were as commercially supplied by the manufacturers, with overall dimensions ranging from 1/2" to 1" long and from 3/16" to 5/16" in diameter; and were handled in the same manner as the plastic specimens.

Rating

At the end of the 21 day incubation period, each specimen was examined for growth on the plastic parts and rated as follows:

(See Next Page)

Observed Fungus Growth on the Specimen	Rating
No growth	0
Traces of Growth (*)	1
Slight to moderate growth: partial coverage	2
Moderate growth: considerable coverage	3
Abundant growth: complete coverage	4

(*) Traces of growth are defined as scattered, sparse fungus growth such as might develop from an unusual mass of spores in the original inoculum, or upon an occasional extraneous bit of debris. (Continous cobwebby growth extending over the entire surface or edge of the specimen even though not necessarily obscuring the specimen, was rated as 2.)

Table 40, pages 378 through 380, lists the observations on the individual replicates of both the unconditioned and the conditioned specimens and the numeric rating of each replicate.

Interpretation

For a material to be considered funginert it shall not support fungus growth; this shall be due to absence of nutritive substances in the material and not to presence of a fungistatic agent. The absence of a fugitive fungistatic agent was determined from the results on the specimens which received the conditioning of 6 hours at 85° C.

On the basis of the numeric rating of the fungus growth on the six specimens for each material being evaluated, the following criteria were used for the various degrees of fungus resistance:

(See Next Page)

1) Funginert- where at least 2 of 3 specimens were rated 0 or 1 when tested as received and at least 2 of 3 specimens were rated 0 or 1 when tested after being conditioned.

2) Fugitive Fungistatic- where at least 2 of 3 specimens were rated 0 or 1 when tested as received and at least 2 of 3 specimens were not rated 0 or 1 when tested after being conditioned.

3) Fungus Susceptible- where at least 2 of 3 specimens were not rated 0 or 1 when tested as received and at least 2 of 3 specimens were not rated 0 or 1 when tested after being conditoned.

Table 40 pages 378 through 380, lists the classification of the solderless terminals tested, based on the ratings of fungus growth.

TABLE 40

Sheet 1 of 3

GROWTH OF FUNGUS ON SOLDERLESS TERMINALS
(PETRI-DISH METHOD)

Manufacturer and Designation	Unconditioned Specimens			Conditioned Specimens			Fungus Resistance (**)
	Replicate	Relative Profusion of Growth	Numeric Rating (*)	Replicate	Relative Profusion of Growth	Numeric Rating (*)	
#29 RA-853	403A 403B 403C	None None None	0 0 0	415A 415B 415C	None None None	0 0 0	Funginert
#29 RB-873	402A 402B 402C	None None None	0 0 0	414A 414B 414C	None None None	0 0 0	Funginert
#29 RC-362	401A 401B 401C	None None None	0 0 0	413A 413B 413C	None None None	0 0 0	Funginert
#29 RBB- 221	400A 400B 400C	Traces Traces Traces	1 1 1	412A 412B 412C	Traces None Traces	1 0 1	Funginert
#29 Insulators	399A 399B 399C	Traces Slight Traces	1 2 1	411A 411B 411C	Traces Traces Traces	1 1 1	Funginert

Note: Conditioning of Specimen (where applicable): 6 hours at 85° C
(*): For explanation of numeric rating code see pages 375 and 376
(**): See pages 376 and 377 for detailed explanation

TABLE 40 (CONTINUED)

Sheet [illegible]

GROWTH OF FUNGUS ON SOLDERLESS TERMINALS
(PETRI-DISH METHOD)

Manufacturer and Designation	Unconditioned Specimens			Conditioned Specimens			Fungus Resistance (**)
	Replicate	Relative Profusion of Growth	Numeric Rating (*)	Replicate	Relative Profusion of Growth	Numeric Rating (*)	
#30 31 902	625A 625B 625C	None None None	0 0 0	633A 633B 633C	None None None	0 0 0	Funginert
#30 31 878	623A 623B 623C	Traces None None	1 0 0	631A 631B 631C	None None None	0 0 0	Funginert
#30 35 108	624A 624B 624C	Traces Traces None	1 1 0	632A 632B 632C	Traces Traces None	1 1 0	Funginert
#30 T-32,56	626A 626B 626C	None Traces Traces	0 1 1	634A 634B 634C	Traces Traces Traces	1 1 1	Funginert
#31 YAE-186 43	404A 404B 404C	None None None	0 0 0	416A 416B 416C	None None None	0 0 0	Funginert

Note: Conditioning of Specimen (where applicable): 6 hours at 85° C
(*): For explanation of numeric rating code see pages 375 and 376
(**): See pages 376 and 377 for detailed explanation

TABLE 40 (CONCLUDED) Sheet 3 of 3

GROWTH OF FUNGUS ON SOLDERLESS TERMINALS
(PETRI-DISH METHOD)

Manufacturer and Designation	Unconditioned Specimens			Conditioned Specimens			Fungus Resistance (**)
	Replicate	Relative Profusion of Growth	Numeric Rating (*)	Replicate	Relative Profusion of Growth	Numeric Rating (*)	
#31 YAE-14 N	406A 406B 406C	None None None	0 0 0	418A 418B 418C	Traces None None	1 0 0	Funginert
#31 YAEV10 - E5	405A 405B 405C	Traces Traces Traces	1 1 1	417A 417B 417C	None Traces Traces	0 1 1	Funginert
#31 Clear Nylon	407A 407B 407C	Traces Traces None	1 1 0	419A 419B 419C	None None None	0 0 0	Funginert

Note: Conditioning of Specimen (where applicable): 6 hours at 85° C
(*): For explanation of numeric rating code see pages 375 and 376
(**): See pages 376 and 377 for explanation.

Summary of Observations

All replicates of all samples showed no growth or traces of growth on surfaces and edges. All samples were rated "Funginert".

Humidity-Exposure Method

Introduction

The solderless terminals were tested following the Humidity-Exposure Method as outlined in paragraph 4.2 of "Draft of BuOrd Specification 52T15 (Ord), rev. draft, Role, of 15 August 1950"; furnished by the Bureau of Ordnance with letter dated 17 January 1951.

Procedure

The procedure has been explained in detail in the Second Quarterly Report, pages 78 through 81.

In these tests, as in the Petri-Dish tests, the specimens used were as commercially supplied by the manufacturers, with the overall dimensions ranging from 1/2" or 1" long and from 3/16" to 5/16" in diameter; and were handled in the same manner as the plastic specimens.

Rating

At the end of the incubation period the watch glass was removed and the rack taken out of the jar. The separate pieces of string (controls) were examined for fungus growth (visible to the naked eye). All of the controls included in this set of tests developed profuse fungus growth.

Each of the 4 specimens, exposed without attached cotton string, was examined (with the aid of a 7X "Flash-O-lens" magnifier) for fungus growth. The percentage of area covered by fungus growth was noted.

Each of the 4 specimens, exposed with attached cotton string was examined for fungus growth (visible to the naked eye) extending from the cotton string. The maximum extent of the fungus growth from the point of contact with with the string was noted, for each specimen.

Table 41 pages 385 through 388, lists the observations on the individual replicates.

Interpretation

For a material to be considered funginert, it shall not support fungus growth; this shall be due to absence of nutritive substances in the material and not to presence of a fungistatic agent. The absence of a fungistatic agent was determined by the fungus growth extending from the cotton string on those replicates exposed with string attached.

On the basis of the percentage of area covered by fungus growth of four of the eight specimens and the extent of fungus growth from a known nutrient source on the remaining four of the eight specimens for each sample being evaluated, the following criteria were used for the various degrees of fungus resistance:

1) Funginert- where none of the replicates, exposed without attached cotton string, shows more than 2% fungus growth and where fungus growth extends at least 1 mm. from the string on at least 2 of 4 replicates exposed with cotton string attached.

2) Fungistatic- where none of the replicates, exposed without attached cotton string, shows more than 2% fungus growth and where fungus growth does not extend at least 1 mm. from the string on at least 2 of the 4 replicates exposed with cotton string attached.

3) Fungus Susceptible- where at least one of the four replicates, exposed without attached cotton string, shows more than 2% fungus growth.

In table 41, pages 385 through 388 are listed the ratings for the thirteen (13) solderless terminals reported in this section.

TABLE 41

FUNGUS RESISTANCE OF SOLDERLESS TERMINALS
(HUMIDITY EXPOSURE METHOD)

Manufacturer and Designation	Specimens Without Strings Attached			Specimens With Strings Attached		Rating (**)
	Replicate	Relative Profusion of Growth	% of area Covered	Replicate	Extent of Growth (*)	
#29 RA 853	1229 1230 1231 1232	Traces Traces Traces Traces	< 2% < 2% < 2% < 2%	1233 1234 1235 1236	1 mm 2 mm 2 mm 3 mm	Funginert
#29 RB- 873	1213 1214 1215 1216	Traces Traces Slight Traces	< 2% < 2% 2% < 2%	1217 1218 1219 1220	2 mm 5 mm 1 mm 3 mm	Funginert
#29 RC- 362	1221 1222 1223 1224	Traces Traces Traces Traces	< 2% < 2% < 2% < 2%	1225 1226 1227 1228	2 mm 2 mm 3 mm 4 mm	Funginert
#29 RBB- 221	1237 1238 1239 1240	Traces Traces Traces Traces	< 2% < 2% < 2% < 2%	1241 1242 1243 1244	3 mm 2 mm 6 mm 2 mm	Funginert

(*) Maximum extent of fungus growth from point of contact with string
(**) For explanation of rating code see pages 383-384

TABLE 41 (CONTINUED)

FUNGUS RESISTANCE OF SOLDERLESS TERMINALS
(HUMIDITY EXPOSURE METHOD)

Manufacturer and Designation	Specimens Without Strings Attached			Specimens With Strings Attached		Rating (**)
	Replicate	Relative Profusion of Growth	% of area Covered	Replicate	Extent of Growth (*)	
#29 Insulators	1205 1206 1207 1208	Traces Traces Traces Traces	< 2% < 2% < 2% < 2%	1209 1210 1211 1212	5 mm 5 mm 5 mm 3 mm	Funginert
#30 31902	1169 1170 1171 1172	Traces Traces Traces None	< 2% < 2% < 2% 0%	1173 1174 1175 1176	1 mm 0 mm 0 mm 1 mm	Funginert
#30 31878	1177 1178 1179 1180	None None Traces None	0% 0% < 2% 0%	1181 1182 1183 1184	1 mm ½ mm 0 mm 0 mm	Fungistatic
#30 35108	1161 1162 1163 1164	None Traces Traces None	0% < 2% < 2% 0%	1165 1166 1167 1168	2 mm 2 mm 2 mm 1 mm	Funginert

(*) Maximum extent of fungus growth from point of contact with string
(**) For explanation of rating code see pages 383-384

TABLE 41 (CONTINUED)

FUNGUS RESISTANCE OF SOLDERLESS TERMINALS
(HUMIDITY EXPOSURE METHOD)

Manufacturer and Designation	Specimens Without Strings Attached			Specimens With Strings Attached		Rating (**)
	Replicate	Relative Profusion of Growth	% of Area Covered	Replicate	Extent of Growth (*)	
#30 7-32056	1185 1186 1187 1188	Traces Traces Traces Traces	<2% <2% <2% <2%	1189 1190 1191 1192	½ mm ¼ mm 1 mm 0 mm	Fungistatic
#31 YAE-18G43	1253 1254 1255 1256	Traces Slight Traces Slight	<2% 2% <2% 2%	1257 1258 1259 1260	3 mm 1 mm 1 mm ½ mm	Funginert
#31 YAE - 14N	1261 1262 1263 1264	Moderate Slight Moderate Moderate	5% 2% 10% 5%	1265 1266 1267 1268	2 mm 2 mm 2 mm 2 mm	Susceptible
#31 YAEV10 - T5	1269 1270 ——— ———	Moderate Slight ——— ———	10% 2% ——— ———	1273 1274 ——— ———	3 mm 2 mm ——— ———	Susceptible

(*) Maximum extent of fungus growth from point of contact with string
(**) For explanation of rating code see pages 383-384

TABLE 41 (CONCLUDED) Sheet 4 of 4

FUNGUS RESISTANCE OF SOLDERLESS TERMINALS
(HUMIDITY EXPOSURE METHOD)

Manufacturer and Designation	Specimens Without Strings Attached			Specimens with Strings Attached		Rating (**)
	Replicate	Relative Profusion of Growth	% of area Covered	Replicate	Extent of Growth (*)	
#31 Clear Nylon	1277 1278 1279 1280	Traces Traces Traces Traces	<2% <2% <2% <2%	1281 1282 1283 1284	4 mm 1 mm 4 mm 4 mm	Funginert

(*) Maximum Extent of fungus growth from point of contact with string
(**) For explanation of rating code see pages 383-384

Summary of Observations

	Manuf.	Designation
The following samples showed growth covering 2% or less of the area on all 4 replicates: (These samples also showed a minimum of 1mm growth from string on replicates exposed with string attached)	#29	RA 853
	#29	RB 873
	#29	RC 362
	#29	RBB 221
	#29	Insulators
	#30	31902
	#30	35108
	#31	YAE 18C43
	#31	Clear Nylon
The following samples showed growth covering 2 - 10% of the area on all 4 replicates:	#31	YAE-14N
	#31	YAEV10-T15
The following samples showed growth covering 2% or less of the area on all 4 replicates: (These samples did not show a minimum of 1mm growth from string on replicates exposed with string attached)	#30	31878
	#30	7-32056

Comparison of Results by the Two Methods

Results of tests on the solderless terminals by the two methods show good agreement except in a few cases.

All samples were rated funginert by the Petri-Dish method. By the Humidity-Exposure method, all the samples supplied by manufacturer #29 were rated funginert. Two of the samples supplied by #30 were rated funginert and two were rated fungistatic. Two of the samples supplied by #31 were rated funginert and two were rated susceptible. (On a slightly different basis for rating, which rates samples as funginert, intermediate, or susceptible, these last two samples would be rated intermediate).

Different samples by each manufacturer represent minor changes in the coloring and size of the sample rather than changes in the plastic formulation. Hence the difference in the results may be due to test method rather than differences in the samples. For this reason additional samples have been requested for further tests on these materials.

Table 42, page 391, lists a comparison of growth and rating by the tw test methods.

TABLE 42

FUNGUS RESISTANCE OF SOLDERLESS TERMINALS
AS DETERMINED BY TWO TEST METHODS

Manufacturer and Designation		Surface Growth by:			
		Petri-Dish Method		Humidity-Exposure Method	
		Relative Profusion	Rating (*)	Relative Profusion	% of area covered
#30	31878	None	0	None-Tr.	0.25%
#30	31902	None	0	None-Tr.	0.75%
#29	RA 853	None	0	Traces	1%
#29	RC 362	None	0	Traces	1%
#29	RB 873	None	0	Tr.- Sl.	1.25%
#31	YAE-18G43	None	0	Tr.- Sl.	1.50%
#31	YAE-14N	None	0	Sl.-Mod.	5.5%
#30	35108	Traces	1	None-Tr.	0.5%
#30	7-32056	Traces	1	Traces	1%
#31	Clear Nylon	Traces	1	Traces	1%
#29	RBB-221	Traces	1	Traces	1%
#29	Insulators	Traces	1	Traces	1%
#31	YAEV10-T5	Traces	1	Sl.- Mod.	6%

*- See page 376 for explanation