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Technical Report

AD 640 107

MECHANIZATION STUDY  
OF THE  
PLASTICS TECHNICAL  
EVALUATION CENTER,  
U. S. ARMY PICA'TINNY ARSENAL,  
DOVER, N. J.

Submitted to

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## ABSTRACT

Under contract to the center, Franklin Institute processes R&D reports for input to a Honeywell 140 computer. The major output is the PLASTECH Document Index; four other outputs are used for control purposes. The computer program is limited to alphabetization and arrangement functions. No machine retrieval has been attempted. The Index contains document numbers which refer to a storage location at PLASTECH. Without a companion volume of citations related to these numbers (which does not exist at present), the Index is of no value to an outside reader and is therefore not distributed.

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INDEX TERMS

I N D E X   O F   F I G U R E S

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## I. SUMMARY

The Plastics Technical Evaluation Center (PLASTE<sup>C</sup>) is responsible to the Department of Defense as a central source of information on plastics. Under contract to PLASTE<sup>C</sup>, the Franklin Institute, located in Philadelphia, Pennsylvania, processes, abstracts, and indexes R&D reports for use at the Center. The index to these reports is prepared and maintained by computer. This output is called the PLASTE<sup>C</sup> Document Index. By-product runs in the production of this output are used for vocabulary and indexing control. Thus, the computer automates the preparation of the PLASTE<sup>C</sup> Document Index, but storage and retrieval of these documents are manual.

Figure 1 illustrates the PLASTE<sup>C</sup> information processing system, and Appendix A indicates the division of library functions between PLASTE<sup>C</sup> and Franklin Institute.

To use the document collection, the five subject specialists currently with the Center (see Appendix A) refer directly to the PLASTE<sup>C</sup> Document Index. Users from outside the Center depend on the Library staff for application of the Index and other tools in answering their inquiries. After noting applicable document numbers,

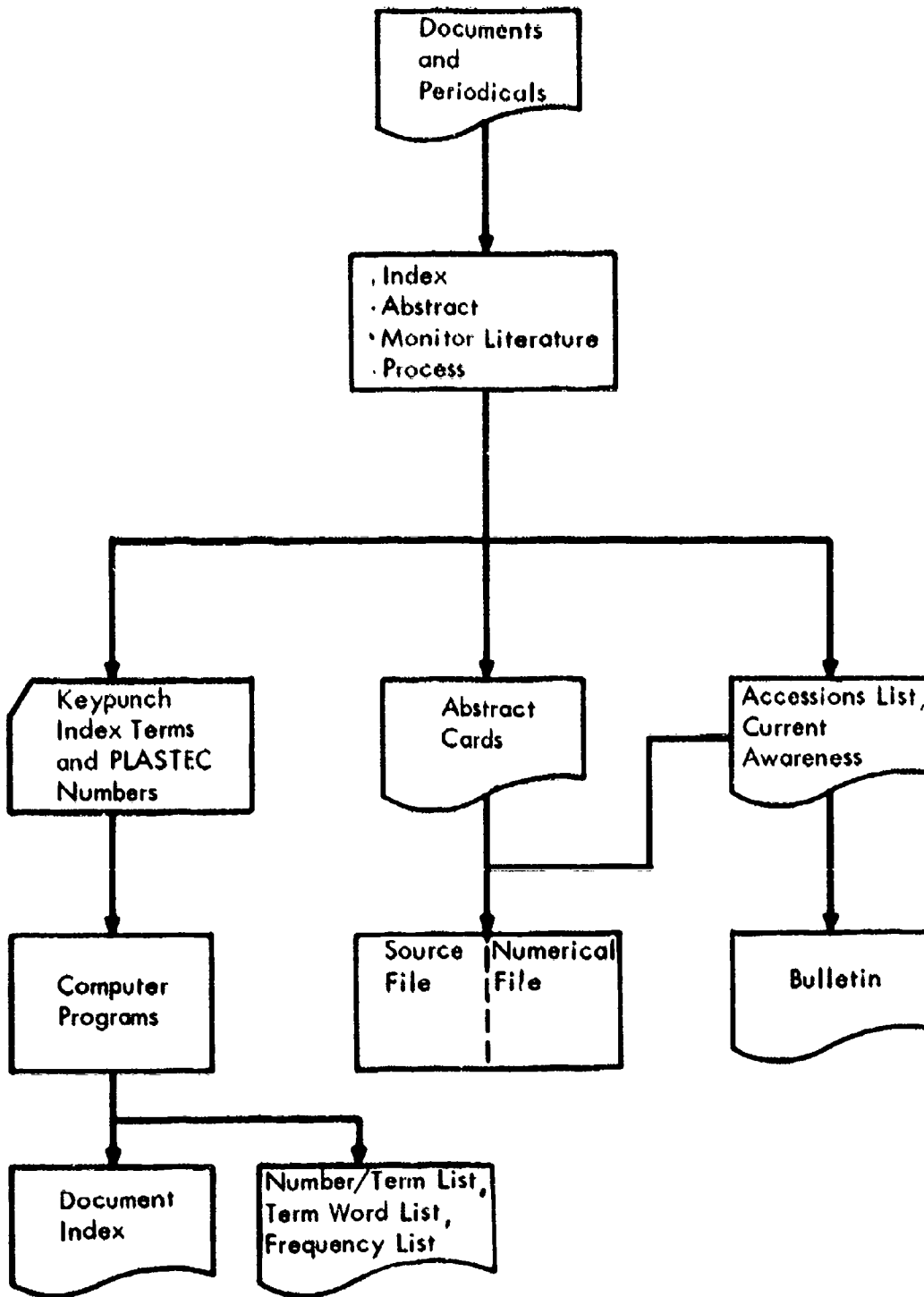


FIGURE 1  
Processing Diagram for PLASTEC Information



the searcher then refers either to the abstract card file for further decision concerning the relevancy of the documents or else he may go directly to the documents for information. For certain requirements, the searcher may find his answer within the abstract card itself.

PLASTECH maintains a library, for in-house use only, of books, periodicals, reports, government and commercial specifications and standards, manufacturers' catalogs, and proprietary literature. Quantitatively, these holdings are: 217 reference books (handbooks, design manuals, and textbooks) necessary for use as everyday tools; 506 bound and unbound volumes of periodicals on plastics, ceramics, and metals (64 annual subscriptions); 7, 500 R&D reports growing at a current rate of 2, 500 per year; 30 linear feet of manufacturers' and suppliers' catalogs primarily within the plastics subject area; a file of up-to-date standards and specifications issued by the government and industry as they become available; and a file of several hundred proprietary reports, many of which have not been released to any other known source.

## II. MECHANIZATION

### 1. CHRONOLOGY

Development of the existing system began in 1962, and the first Index was printed in August of that year. Since then, successive printings have been made every six months. The list of official term words is continually being edited and improved.

### 2. DESCRIPTION OF PROCESSES

The following procedures are used to produce a 5 x 8 index card and five outputs.

#### (1) Input Procedures

1. Reports and periodicals are received at PLASTECC and the subject specialists select the items to be included in the files. Items are then forwarded to Franklin Institute.
2. Upon receipt at Franklin, document accession numbers (PLASTECC numbers) are assigned. One PLASTECC number is assigned for all progress reports under one contract; individual technical reports (not progress-type reports) on one contract are given separate PLASTECC numbers. One PLASTECC number is assigned to a volume of conference

proceedings, and individual papers within the volume are indicated by -1, -2, etc.

3. Reports are given to the indexer who reviews the terms necessary to insure recall of the document. To date, this has averaged 4 or 5 terms per document, primarily because of the use of precoordinated terms.

4. A 5 x 8 card is prepared (Figure 2), which includes all bibliographic data, security classification, PLASTECC number, an abstract, and assigned subject index terms.

The documents now completely processed are returned to PLASTECC with the 5 x 8 cards.

PLASTECC 6657

American Machine and Foundry Company.

PRODUCTION REFINEMENT OF VERY THIN TEFLON FILM by W. K. W. Chen and others. March 1963. Final technical engineering report. ASD Technical report ASD TR-63-229. Period: 24 October 1955 - 15 April 1962. AF contract AF 33 (600) 34013. AD-420 640.

Dynamically cast thin Teflon films provide insulation for capacitors operated to temperatures of 200°C. This report discusses the method for producing high quality, thin Teflon films and describes how the parameters of foil belt thickness, Teflon dispersion solids, ph, rate of curing, and effect of wetting agents can vary the dielectric strength of the film. Teflon films were tested by being wound as insulation into capacitors and then tested under load-life conditions at 200°C. There are 15 tables and 31 figures. (Author, modified).

Film-Thin, Teflon; Casting-Thin teflon film; Dielectric-Teflon film; Curing-Thin teflon film; Capacitor-Teflon film insulation.

FIGURE 2  
5 x 8 Index Card

5. A worksheet is completed that includes the terms and PLASTECS numbers to be added to the computer files. Also, corrections or changes made in either of the two files (author and subject) are added to these worksheets. All worksheets are edited by a single person to insure consistency and accuracy and are then sent to the computing center for keypunching.
6. Terms and PLASTECS numbers are keypunched, one term per card.
7. This information is converted from card form to magnetic tape.
8. This tape used as the input is fed into a computer which inverts the Author File by alphabetizing authors' names and also arranges PLASTECS numbers in numerical order within each term. The Subject File is also inverted and alphabetically arranged.
9. A two-column page is used. Because of software limitations, term length must be kept to a maximum of 45 spaces. This output is produced by a high-speed printer on duplimat stock which is then offset printed.
10. The tape files are again machine manipulated for the printing of four additional outputs; a Number List,

a Number/Term List, a Term Word List, and a Frequency List. These lists are used primarily for the control of vocabulary and indexing.

(2) Outputs

1. PLASTECS Document Index

This Index is divided into two sections. In the first section, personal or corporate authors and conference names are listed alphabetically with the PLASTECS number (see Appendix B-1 for sample). In the second section, coordinated index terms are listed alphabetically with PLASTECS numbers (Appendix B-2).

The completed Index is forwarded to PLASTECS Technical Library and to each of the five subject specialists.

In using the Index, the user is lead to a PLASTECS number. He may either locate the document on the shelves or refer to the abstract card for further information on the relevancy of the document to the specific item of interest.

2. Number List

This printout shows, in sequence, all the PLASTECS

document numbers on file in the system (see Appendix B-3 for sample).

3. Number/Term List

The number/term list (Appendix B-4) contains each of the PLASTECS numbers in sequence and each index term alphabetically within numbered sequence. This file is used as a checklist for editing, quickly indicating what terms have been assigned to a particular report. The 12-character terms originally used have been expanded to 45 characters because 12 characters did not permit adequate recognition of bound terms, most of which contain three or more words.

4. Term Word List

This alphabetical printout of terms (Appendix B-5) is used for vocabulary control. The indexers check each term with the latest machine printout, using an existing term whenever possible. New terms are always being added. The sequence numbers of the terms and the PLASTECS numbers to which they are posted are included in the list.

5. Frequency List

This alphabetical printout (Appendix D-6) indicates the number of postings per term. A maximum

of 25 postings per term is allowed; when this number is exceeded, further precoordination will be carried out. It was felt that more than 25 postings per term would discourage use of the Index. This frequency list serves as a dictionary of terms.

### III. PROGRAM SYSTEM DATA

The computer program for PLASTEC is purposely limited to alphabetization and arrangement functions. No machine retrieval has been attempted. Other needed files are maintained in the conventional library form: numerical (shelf file) and corporate author. File cards contain citation and abstract.

The Index is the only printout that is circulated. All other printouts serve as work copies or auxiliary files for making changes or deletions and as bases for statistical information.

All runs except sorts are in COBOL language. Sorts are in machine language (Honeywell 1400). Computer processing consists of 11 routines. These routines are used for both Author File and Subject File.

#### 1. FILES

Two files (Author File and Subject File) are maintained in identical formats of 10 words per record. The first two words contain a nine-character document accession number (PLASTEC number), left justified (the first eight high-order characters are in word one and the ninth character is in word two). The next six words contain a 45-character author name or descriptor term, left justified.



The ninth word contains a term number and the tenth contains a frequency number, both right justified. The files are maintained in sequence by the 45-character descriptor field first, and, within that, by PLASTE C number.

2. ROUTINES

(1) Punched cards containing changes are converted to tape. This routing introduces changes, corrections, and deletions into the previous master Subject File.

(2) The tape is then sorted by term number and type of change. At the present time, five changes are being used, (1) frequency delete, (2) frequency change, (5) term delete, (6) term change, (7) PLASTE C number change. (See Appendix C for procedure used in correcting PLASTE C index terms.)

(3) The Subject File is then updated in accordance with routine 2.

(4) The tape of routine 3 is next sorted by term word first and, within that, by PLASTE C number.

(5) Punched addition cards (new information) are now converted to tape.

- (6) The addition tape is then sorted by term word and PLASTE<sup>C</sup> number.
- (7) Routines 4 and 6 are merged, edited for final index layout, and split into left and right page columns. A tape is created which is used to produce the term word list and the frequency list. The Index is the main output of this process.
- (8) The Index is printed from routine 7.
- (9) The term word list and the frequency list are printed from routine 7. The term word printout lists each term with its PLASTE<sup>C</sup> number plus a sequential term number (not printed in the Index but used for change purposes). The frequency list differs from the term word list in that all repetitive terms are dropped and no PLASTE<sup>C</sup> numbers are given. It is in fact the dictionary of terms used in the Index.
- (10) The term word list from routine 7 is next sorted by PLASTE<sup>C</sup> number and, within that, by term.
- (11) The number/term list and the number list are then printed. These auxiliary (reverse) lists indicate what documents are in the file and by what terms they are identified.

### 3. DICTIONARY OF TERMS

The list of terms used to index documents (frequency list) is continually being updated. New terms are added by indexers only when required; the editor making the final decision as to whether such additions are justified. When the frequency of postings for a term exceeds 25 documents, the term is expanded so as to be more specific. Observed use has shown that a greater number of postings results in less enthusiastic use of the Index.

Indexers and users of the Index are subject oriented. Therefore common abbreviations of these subject terms are permitted.

To eliminate the use of commas and inverted terms, coordinated terms not sufficiently clear as a bound concept are connected by a hyphen and arranged alphabetically in the printouts by the first term of the pair. The highest interest term, which is generally a property or use-oriented term, is always placed so that it is first in the pair.

A list of style rules has been developed for use as a guide by the indexers. They include rules for: (a) use of dashes, commas, and slash marks for separating bound terms; (b) use of abbreviations of subject terms; (c) when and when not to use the singular or plural form; (d) two-part, PLASTECH document number, etc.

#### IV. EQUIPMENT, COSTS, AND EVALUATION

##### 1. EQUIPMENT

The following is a list of the Honeywell hardware in the Franklin Institute Computing Center. This equipment is used for business-type problems, such as accounting, mailing lists, etc. It is operated 2 shifts at present. Franklin uses FORTRAN and COBOL compilers and Easy II assembly language.

140	with 4K memory (one 48-bit word)
140 C	console
140 -PC	power supply
140 - B	floating point arithmetic unit
404-3	tape drive 48KC (6 drives)
422-4	high-speed printer, 900 LPM, 120-character positions
427	card reader/punch (IBM 1402)

##### 2. COSTS AND TIME

Existing program tape was available at Franklin for use. After the problem was defined, programming took 6 weeks. Indexing rate averages 2-7/8 documents per hour. Four hours of computer time were required to process the first Document Index and 8 hours

for the second. The latter time is broken down into 3 hours for adding new material, 3-1/2 hours for corrections, and 1-1/2 hours for merging the two sets alphabetically and arranging terms for printout.

Estimated Breakdown PLASTECH Project  
May 14, 1963 to May 13, 1964

<u>Item</u>	<u>Quantity</u>	<u>\$</u>	<u>\$/document</u>
Abstracting	1920 documents	15,700	8.20
Indexing	3370 documents	16,600*	4.90
Processing+	6000 documents	11,600	1.90
Current Awareness (5 months)		1,600	-
Electrical properties	120 data sheets	800	-
Data Study (report)		<u>6,000</u>	<u>        </u>
Total		52,300	15.00

\* includes \$1,900 in computing center

+ includes acquisition, cataloging, checking, updating files, accessions list, zerox, concordance, and handling.

NOTE: PLASTECH advises that contract costs are \$43,000 to \$47,000 per year.

3. FACILITY'S EVALUATION OF SYSTEM

The system was developed for an information center having a reasonable number of documents in a limited subject area. It has not been evaluated under any other conditions.

The subject specialists and most other users of the Index are necessarily familiar with the terms so abbreviations peculiar to the subject are acceptable; library terms and abbreviations are not.

The Index yields document numbers which refer to a storage location at PLASTECC. This limits the usefulness of this Index to an in-house tool. Without a companion volume of citations related to these numbers, the Index would be of no value to an outside reader. For this reason, copies of the Index are not distributed outside PLASTECC.

In summary, the computer use at PLASTECC is limited to alphabetization, arrangement, and printing of an Index. Document retrieval is manual.

PLASTICS TECHNICAL EVALUATION CENTER

Director

Information Services Contract Franklin Institute 2	Technical Librarian 2	Subject Specialists 5	Technical Editor- Writer 2
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Assign control or accession numbers  
 Prepare main entry/subject catalog cards  
 Maintain catalog authorities\*  
 Assign subject heading terms (reports)  
 Perform subject and author indexing for periodicals  
 Prepare abstracts or analytical notes  
 File entries\*\*  
 Prepare list of acquisitions  
 Translate abstracts of technical interest appearing in foreign periodicals

Perform acquisitions of books, periodicals, technical reports which includes budgeting, ordering, security control  
 Review periodicals for "specific interest" routing  
 Circulate weekly bulletin containing current accessions and abstracts from foreign periodicals  
 Check in periodicals, match and inspect shipment  
 Receive technical reports on distribution or special request  
 File entries  
 Answer reference questions and inquiries  
 Prepare bibliographies  
 Maintain specific area reference files  
 Perform literature searches  
 File/circulate books, reports, periodicals  
 Perform interlibrary loan transactions  
 Control classified reports; receiving, circulation, downgrading, destruction, inventory  
 Take inventory of periodical/book collection  
 Perform statistical accounting  
 Supervision of clerical and semi-professional help  
 Supervision and direction of contract services  
 Develop methods and routines  
 Provide liaison between information and evaluation services

Structural Plastics  
 Electrical-Electronic Uses  
 Packaging  
Mechanical Uses  
 Conduct studies and prepare reports, with attendant bibliographies and literature searches  
 Maintain awareness of current R&D projects involving plastic materials in government and industry  
 Review incoming material for inclusion in Library  
 Answer technical inquiries

\* Mechanized

\*\* Both mechanized and nonmechanized

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NULPH, R.J. 6722					ODONNELL, J.F. 1345				
NUNNELLEY, J.R. C 2283					ODOWD, T.A. 3809				
NUNN, P.A. 1079					ONESTERIE, R.K. 6184				
NYCUM, R.S. 2559					OESTMANN, M.J. 2013 2299	2666	3940	3940-1	
NYSMITH, C.R. 5753-04					OFFENHARTZ, E. 5470				
O'TOOLF, J.L. 6905					OFNER, R.E. 3548				
OAKES, B.H. C 5616-02					OGDEN, R.E. 3644				
OAKES, W.G. 3660					OGLESBY, SABERT 1526 2433	2451	2453-57	2605	
OBERDCRFFR, P.E. 2236-34					OGLESBY, SABERT, JR. 3587				
OBERMAYER, A.S. 6156					OGORKIEWICZ, R.M. 6458				
OBERTO, S. 2236-7					OHALLORAN, G.J. 5954				
OBRIEN, F.R. 2605-1					OHARE, B.J. C 6627				
OBRIEN, M. 2572	2572-2	3941-23			OHASKI, K. 1949				
OCALLAGHAN, T. C 5207					OHIO STATE UNIV SYMP ELECTROMAG WINDOWS-1960 2060 5 2060-60				
OCONE, L.R. 3177					OHORA, J.F. 6719				
OCONNELL, J.J. 3233-1	3233-2	3233-3	3233-4		OHORI, Y. 4071				
OCONNELL, J.J., SR. 3233-1	3233-2	3233-3			OHYR, JACK 0661				
OCONNOR, D.G. 3260					OHYR, J. 2571				
OCONNOR, R.T. 0922					OHYR, E.O. 4951 6349				
OCONNOR, T.J. 6447					OH, L.L. 6556				
ODD-PES6ENG 30TH SYMP SHOCK&VIBRATION-1961.OC 3520-2 3520-3 3520-5 3520-1					OKADA, J.M. 4249				
ODD-PES6ENG 33RD SYMP SHOCK&VIBRATION-1963.DE 1341 4A57					OLCOTT, E.L. 2127-1 2228	2445	2445-1	2445-2	
ODELL, C.N. 2699					6664-06				
ODENING, R.E. 5276 5277					OLDEN, R.G. 3927				
ODIAN, GEORGE 2465 3924	4023-1	4835	6215		OLEARY, W.C. 2325				
6444-32					OLEESKY, S.S. 5390				
ODONNELL, J.D. 3254	3254-3	C 6611			OLEVITCH, ALBERT 3549-14				



	PAGE	38						
BREAKING STRENGTH-TESTING 3071			BUCKLING-RIBBLOGRAPHY	3295	3333			
BREAKING STRENGTH-WOVEN NYLON TAPE 6751			BUCKLING-COATED FABRIC	3310	4882			
BRITTLE TRANSITION TEMPERATURE-RIGID PVC 6890			BUCKLING-CURVED SHELL	2956	3295	4031		
BRITTLNESS-ADHESIVE 2290			BUCKLING-CYLINDER	2956	5136			
BRITTLNESS-CERAMIC,NDT 5589			BUCKLING-CYLINDRICAL SHELL	3791				
BRITTLNESS-FLASTOMER 2770			BUCKLING-DEEP SUBMERGENCE VESSEL	4500-2				
BRITTLNESS-FLASTOMER,CRYOGENIC 5001			BUCKLING-FILAMENT WOUND CASE	C 2714				
BRITTLNESS-FPOXY,CONTROLLED CURING 1414			BUCKLING-FILAMENT WOUND COMPOSITE	5260				
BRITTLNESS-ETHYLENE COPOLYMER 0952			BUCKLING-FRP	4836	5260	5281		
BRITTLNESS-ETHYLENE/ETHYLACRYLATE COPOLYMER 5087			BUCKLING-FRP CYLINDER	2307	3524	3878	3883	3895-B
BRITTLNESS-FIBER,TESTING 5412			BUCKLING-FRP PANEL	2732	2747	3074	3307-1	3827
BRITTLNESS-FRP 3716-58 3010				3871	3890	3898	389A-A	389A-D
BRITTLNESS-FRP/EPOXY 3392				3898-E	3902	3902-A	3902-B	3902-C
BRITTLNESS-FRP/HONEYCOMB 3778				4399	4855	5301	5592	
BRITTLNESS-GLASSY POLYMER 1054			BUCKLING-FRP/EPOXY	4017				
BRITTLNESS-PHENOLIC 3712-3 3716-22			BUCKLING-HONEYCOMB SANDWICH	4680				
BRITTLNESS-PMMA 1054			BUCKLING-ORTHOTROPIC CYLINDER	5750				
BRITTLNESS-POLYETHYLENE 0974 0971 1690 3742-20 4045			BUCKLING-PANEL	5301				
BRITTLNESS-POLYETHYLENE FILM 5026			BUCKLING-PLASTIC,TESTING	5260				
BRITTLNESS-POLYSTYRENE 1054			BUCKLING-POLYETHYLENE	32A0				
BRITTLNESS-QUARTZ FIBER 4880			BUCKLING-RIGID PVC	3260				
BRITTLNESS-TESTING 4045			BUCKLING-ROCKET MOTOR CASE	2211	4017			
BRITTLNESS-TRANSPARENT PLASTICS 2631			BUCKLING-SANDWICH CYLINDER	6807				
BRITTLNESS-URETHANE 3755 4089			BUCKLING-SANDWICH PANEL	6769	6789	6789		
BRUSHING-EPOXY 2785			BUCKLING-SANDWICH STRUCTURE	5558				
PURPLE FORMATION 2331 4563			BUCKLING-TESTING	3699	3791			
BUCKLING-ADHESIVE 2342-2			BUCKLING-URETHANE	3699				
			BUILDING-ADHESIVE	3013				

## PLASTEC NUMBER LIST

3716-22	3716-23	3716-24	3716-25	3716-26	3716-27	3716-28
3716-31	3716-32	3716-33	3716-34	3716-35	3716-36	3716-37
3716-40	3716-41	3716-42	3716-43	3716-44	3716-45	3716-46
3716-4	3716-50	3716-51	3716-52	3716-53	3716-54	3716-55
3716-59	3716-5	3716-60	3716-61	3716-62	3716-63	3716-64
3716-68	3716-69	3716-6	3716-7	3716-8	3716-9	3717-10
3717-14	3717-15	3717-16	3717-17	3717-18	3717-19	3717-1
3717-23	3717-24	3717-25	3717-26	3717-27	3717-28	3717-29
3717-32	3717-33	3717-34	3717-35	3717-36	3717-37	3717-38
3717-41	3717-42	3717-43	3717-44	3717-45	3717-46	3717-47
3717-50	3717-51	3717-52	3717-53	3717-54	3717-55	3717-56
3717-5	3717-60	3717-61	3717-62	3717-63	3717-6	3717-7
3719-2	3720	3721	3722	3723	3724	3725
3730	3731	3733	3734	3735	3736	3737
3742-12	3742-13	3742-14	3742-15	3742-16	3742-17	3742-18
3742-21	3742-22	3742-23	3742-24	3742-25	3742-26	3742-27
3742-30	3742-31	3742-32	3742-33	3742-34	3742-35	3742-3
3742-7	3742-8	3742-9	3744-10	3744-11	3744-12	3744-13
3744-17	3744-18	3744-19	3744-1	3744-20	3744-21	3744-22
3744-26	3744-27	3744-28	3744-29	3744-2	3744-30	3744-31
3744-35	3744-36	3744-37	3744-38	3744-39	3744-3	3744-40
3744-44	3744-45	3744-46	3744-47	3744-48	3744-49	3744-4
3744-53	3744-54	3744-55	3744-56	3744-57	3744-58	3744-59
3744-62	3744-63	3744-64	3744-6	3744-7	3744-8	3744-9
3745-45	3745-4	3745-5	3745-6	3745-7	3746	3747-1
3748-11	3748-12	3748-1	3748-2	3748-3	3748-4	3748-5
3748-9	3749-1	3749-2	3749-3	3749-4	3749-5	3750
3750-4	3751	3752	3753	3754	3755	3756

## NUMBER-TERM LIST

PLASTEC NO	TERM WORD
1379	ADHESIVE-NITRILE RUBBER/PHENOLIC
1379	PEEL STRENGTH-NITRILE PHENOLIC
1380	ABLATION-ASBESTOS/EPOXY/PHENOLIC
1380	COATING-ALUMINIZED FRP TAPE
1380	FIBER-SILICA
1380	INSULATION-SATURN
1380	SATURN MISSILE
1380	THERMAL RADIATION
1381	COMPRESSION-FRP/EPOXY
1381	ELECTRICAL PROPERTIES-FRP/MELAMINE
1381	ELECTRICAL PROPERTIES-PAPER/PHENOLIC
1381	FATIGUE-FRP/EPOXY
1381	FLEXURAL STRENGTH-FRP/EPOXY
1381	MECHANICAL PROPERTIES-FRP/EPOXY
1381	MECHANICAL PROPERTIES-FRP/POLYESTER
1381	MOLDING
1381	TENSILE STRENGTH
1382	CURING-POLYESTER
1382	DIELECTRIC-HIGH TEMPERATURE
1382	DIELECTRIC-SILICONE
1382	ELECTRICAL PROPERTIES-FILLER/EPOXY
1382	ENCAPSULATION-HIGH TEMPERATURE
1382	HIGH TEMPERATURE-POLYESTER
1382	SILICONE
1384	DAMPING-SILICONE RUBBER
1384	VIBRATION-DAMPING
1386	PLASTICS-RESEARCH
1387	ABLATION-EPOXY

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TERM NO	TERM WORD	PLASTEC NO
24331	TITANIUM STRIP	2014
24332	TITANIUM TAPE	2177
24333	TITANIUM-BETA WIRE	2114
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