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Survey of Compatibility of Materials with High Pressure Oxygen Service

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Principal Technical Representative  
John G. Austin  
Huntsville, Alabama

Prepared by

J. G. Hust and A. F. Clark  
Cryogenics Division  
Institute for Basic Standards  
National Bureau of Standards  
Boulder, Colorado 80302

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## A Survey of Compatibility of Materials with High Pressure Oxygen Service

### I. Introduction

The Cryogenics Division of the National Bureau of Standards (NBS-CD) was recently requested by the Marshall Space Flight Center of the National Aeronautics and Space Administration (NASA-MSFC) to perform a survey and assess the existing state of knowledge regarding compatibility of materials with high pressure oxygen. Particular emphasis is to be placed on past practical operational and research experience.

Material compatibility, in general, implies a harmonious coexistence of all the materials of a system. The lack of such compatibility can lead to undesirable and sometimes disastrous results. For example, the chemical reaction of a combustible material with oxygen in a system results in corrosion, burning, or even explosion. It is clear that the general definition of incompatibility encompasses many phenomena. In this study, however, we have restricted ourselves to the consideration of materials exposed to high pressure oxygen. Because only high pressures are considered, any man-related incompatibilities are ignored. The harmonious coexistence of materials in a high pressure oxygen system implies the physical containment of the oxygen as well as the lack of significant chemical reactions with the oxygen. Thus compatible materials are defined, in this study, as those materials or combinations of materials with sufficient mechanical strength to withstand the high pressures and whose properties are not significantly degraded by the presence of oxygen. We will pay particular attention to the ease with which any degradation is initiated (reaction sensitivity), the rate at which degradation progresses (reaction intensity), and the sources of degradation

initiation (ignition sources). The dependence of these parameters on physical properties, such as thermal conductivity, specific heat, density, and heat of combustion, as well as system characteristics, such as pressure, pipe wall thickness, total mass, radius of pipe bends, and surface roughness, is considered. It is to be noted that the dependence on pressure is the primary consideration here; however, the interdependence of the effects of these characteristics makes it essentially impossible to analyze any one separately.

The objective of this survey is to gather the available information on the compatibility of materials with oxygen as applied to the production, transport, and applications experience of high pressure liquid and gaseous oxygen and to compile this material into a usable reference report. High pressure is here defined to be above about 2000 to 3000 psia. Since high pressure projections sometimes can be made from lower pressure data, some low pressure data are also included. Low pressure data are included if they are considered helpful to a better understanding of the behavior at high pressures.

It is anticipated that this technical input to NASA-MSFC will assist in the establishment of practical and safe, but not stifling, guidelines in the future use of high pressure oxygen. It is hoped that such guidelines will eventually be commonly accepted throughout NASA, other government agencies, and the commercial sector as well.

Recently, Clark (1971) of NBS performed a survey on oxygen compatibility of materials at ordinary pressures. Information from Clark's report which is especially applicable to high pressure application will be repeated for convenience. Surveys of oxygen related accidents have been conducted recently by Ordin (1971) and Johnson (1970) for NASA and by McQuaid and Cole (1972) for the Navy. Each of these surveys indicate a surprisingly high rate of accidents caused by material incompatibility. The surveys by Ordin and Johnson covered

NASA, some Air Force, and some related contractor records. Ordin reported 20% of the mishaps with liquid oxygen and 36% of the mishaps with gaseous oxygen involved material incompatibility. Johnson reported 56% were caused by the presence of oxygen incompatible materials. In many cases more than one factor was involved in the mishaps. For example, procedural errors were involved in 78% of the mishaps and design errors were present in 63% of the mishaps according to Ordin. Even though material incompatibility with oxygen was present in fewer instances than procedural or design error, the percentage due to incompatibility is significantly large and it is expected to be even higher in high pressure oxygen systems. It is also noted that the accident rate due to material incompatibility in high pressure gaseous oxygen is almost twice that in liquid oxygen.

McQuaid and Cole's (1972) survey indicates an accident in a Navy compressed gas system due to spontaneous ignition every four weeks during the period January 1968 to May 1971. They do not indicate what proportion of these are due to material incompatibility, but do state that material failure accounts for about half of these accidents; the cause of the other half is unknown. No accidents are attributed to design failure or personnel error. From this information one can not rule out that a sizable proportion may be due to material incompatibility.

Recent trends in NASA, military, and commercial use of liquid (LOX) and gaseous (GOX) oxygen point toward use of higher pressures. With this increased use to 10,000 psi and higher, compatibility considerations are of paramount importance. Deep concern with safety is rightfully prevalent throughout the field, both by the producer and the user. This survey will better define material incompatibility problems and hazards caused by the use of high pressure LOX and GOX. This report contains recommended guidelines in later sections which will hopefully allow the necessary flexibility and compromise between cost - effectiveness and

safety. Also included is a tabulation and assessment of available high pressure compatibility data and an indication of the availability of equipment. The next section is a discussion of the compatibility parameters affecting the selection of materials for high pressure oxygen service. Following sections include discussions on structural integrity, chemical compatibility, and experimental tests and data which characterize the relative compatibility of different materials.

## II. Material Selection

The selection of a given material to fulfill a specified function in high pressure oxygen service must be based both on its physical-mechanical properties as well as its chemical properties. The principal chemical property of interest here is its potential reactivity with oxygen. The relevant physical-mechanical properties are primarily strength and plastic deformation properties. For example the plastic deformation of polytetrafluoroethylene may make it unusable for a valve seat material at sufficiently high pressure and copper may be too weak for a pressure chamber, even though they may be judged chemically compatible with oxygen. Also, the designer needs to consider that plastics and nearly all metals become more brittle at LOX temperatures. Other properties such as specific heat, thermal conductivity, density, and thermal diffusivity influence material compatibility. For example, nickel-copper alloys are rapidly replacing stainless steel in high pressure oxygen systems because of the increased thermal conductivity and diffusivity of the nickel-copper alloys. The higher thermal conductivity results in lower reaction sensitivity. Also, mechanical properties may be altered in the presence of high pressure oxygen, e. g. crack propagation may be enhanced.

Several good reviews of lower pressure oxygen compatibility have been written. Many of these contain information basic to the understanding of the higher pressure phenomena. The most recent review is by Clark (1971);

other noteworthy reviews and technical papers are by Pelouch (1972), McQuaid and Cole (1972), McKinley (1971), Attwood and Allen (1971), Ordin (1971), Schwinghamer (1971), Keeping (1971), Blackstone and Ku (1971), Johnston (1970), Kimzey (1970), Guter (1967), Olson (1967), White and Ward (1966), Nihart and Smith (1964), Baum, Goobich, and Trainer (1962), Dean and Thompson (1961), Van Dyke (1959), and Grosse and Conway (1958). An assessment of the views presented by these authors along with our own views are described in this report.

Of particular interest is the work on oxygen safety by the Aerospace Safety Research and Data Institute (ASRDI) at NASA - Lewis Research Center. They will be publishing, soon, a series of NASA Special Publications entitled "ASRDI Oxygen Technology Survey: - - - -" covering the subject areas of metals and alloys, cleaning requirements, hardware, and contamination control. Of special interest for material selection is the report in this series by Pelouch (1972). Another pertinent report of this series is a state-of-the-art survey on oxygen instrumentation, including a section on pressure measurement. This survey is being performed by the Cryogenics Division, NBS, Boulder. ASRDI has also collected a large amount of oxygen safety related information into a computerized data retrieval system called RECON. These reports and the readily accessible data bank should be very helpful for assessing specific problems.

An extensive treatise on the subject of material selection for application in manned spacecraft is NASA MSC-02681 (1972). This volume contains more general technical information and design guidelines regarding oxygen compatibility than any other single reference work. It is not addressed toward problems associated with high pressures; however, as is stressed later, low pressure guidelines are directly applicable at high pressure as well.



## A. Structural Considerations

Prior to chemical reaction considerations, one should be assured that the material selected for a given application is structurally adequate. If the material is not structurally adequate there is little point in assessing its chemical compatibility. The physical - mechanical properties of interest for high pressure service are strength, hardness, machinability, brittleness, thermal expansion, etc. Data necessary for structural design can be found in many sources. A few recent sources are Aerospace Structural Metals Handbook by Weiss (1966), Cryogenic Materials Data Handbook, Schwartzberg (1968), and Materials Properties Data Handbook by Aerojet Nuclear Systems Company (1970), NATO-AGARD (1959).

ASRDI recently contracted Linde Division of Union Carbide Corporation to report on their vast experience in design and handling of oxygen systems. The resulting report, Linde (1971), includes a section on "Structural Compatibility" with emphasis on thermal expansion problems encountered with LOX equipment.

## B. Chemical Reaction Consideration

Chemical reactions with system materials are important in that the material properties may be altered to the point of system failure. Material incompatibility here is generally synonymous with oxidation or burning. Important factors in the consideration of oxidation are reaction sensitivity, reaction intensity, and ignition sources. The effect of high pressures on these factors and ultimately on equipment design is essentially the subject of this study.

### 1. Reaction sensitivity

Reaction sensitivity is a measure of how readily a material will react with oxygen. Most of the experimental tests performed to characterize oxygen compatibility (described in a later section) are directed toward obtaining a measure of reaction sensitivity. Examples of reaction sensitivity tests are those involving reactions initiated by impact, by heating, or by electric arc. The variable most important to reaction sensitivity is the

ignition temperature of the material. However, this may be considerably altered by the presence of oxide coatings or contamination. It is to be noted that many of the materials tested include contamination or impurities. Oxide coatings on metals usually raise the apparent ignition temperatures; while contaminants generally lower the ignition temperature. Impurities such as oil or grease, rust, metal filings, etc. on metals usually drastically increase the probability of reaction. Other factors which are significant in the consideration of reaction sensitivity are specific heat, thermal conductivity, density, thermal diffusivity, and material configuration.

The ignition temperature is the most critical factor in determining a material's reaction sensitivity. As will be shown later, the ignition temperature of a solid generally decreases with increasing pressure up to about 2000 psia. Above this pressure the ignition temperature is relatively independent of pressure. Thus, the reaction sensitivity is not expected to change appreciably at higher pressures. However, the possibility of ignition at higher pressures is enhanced because the possibility of the release of sufficient energy is greater.

## 2. Reaction intensity

Reaction intensity is a measure of the rate of energy release of the reaction once it is started. The importance of reaction intensity to material selection is discussed by Blackstone et al (1971), (1970), (1967) and Jamison (1971). Reaction intensity determines to a large extent the degree of damage done to a system, the speed with which the damage progresses, and the ability of the reaction to spread to other materials in the system. The factors which most influence reaction intensity are heat of combustion and oxygen availability. Oxygen availability is determined by temperature, volume, pressure, and rate of flow. Other factors influencing reaction intensity are material density, configuration (e. g. the size of the heat sink) and the properties of combustion products. Reaction intensity is expected to be greater in high pressure systems due to the increased availability of oxygen and concomitant increased burning potential.

### 3. Ignition Sources

It is often stated that a reaction is only possible in the presence of a fuel, an oxidizer, and an ignition source. This statement is of little consolation in an oxygen system when one realizes that the fluid is the oxidizer, the system is the fuel, and ignition sources are ever-present in varied forms. Probably the most important source of ignition in a high pressure system is the heating due to rapid adiabatic compression. The use of materials with high thermal diffusivity and high heat capacity are most beneficial here since the most rapid rates of heating by compression are not appreciably faster than the effective surface cooling rate of good heat conductors.

Another important source of ignition is impact, such as by small particles or bulk pieces in a flowing stream of oxygen. Heating caused by friction and static discharges can also ignite system components. In high pressure systems the probability of ignition is greater because of increased likelihood of encountering high temperatures and possible lowered ignition temperatures. High pressures generally also result in greater flow velocities, increased impact energies, and frictional heating effects.

A chemical reaction of significance that is seldom considered is the fracture or crack propagation enhancement by an oxygen atmosphere. The fatigue behavior of a high pressure oxygen container is very critical, particularly if the pressure is cycled, yet very little work has been done [Linde (1971) and Baum, Goobich, and Trainer (1962)]. Crack growth enhancement has been reported for a titanium alloy by Jackson et al (1963) and the absence of any enhancement for a nickel alloy has been reported by NASA (1970). This is an area of investigation that has been sorely neglected and, therefore, projections to high pressure are impossible.

### C. Recommended Selection Procedure

As indicated earlier, it is best to first select materials which physically fulfill the mechanical demands of the component considered. These materials are then analyzed to select the most chemically compatible material. This selection process is often based upon the material ranking of a given compatibility test. Or it may be based upon the concensus of the material ranking recommendations found in the literature, as is also frequently advocated. However, we believe that both of these suffer from two serious drawbacks: (1) no consideration is given to the uniqueness of the particular demands of the application in question and (2) the materials ranking recommendations based upon the results of individual investigations often are highly contradictory. These contradictory results are frequently due to the specialized nature of the test and the biased interpretation of the results. A case in point is the wide disparity in the ranking of aluminum and stainless steel reported by various investigators: Dean and Thompson (1961), Kirschfeld (1961), (1965), (1967) and (1968), and Nihart and Smith (1964). We believe the material selection process should be accomplished by matching the particular demands of the equipment component with the materials best satisfying these demands. Material selection on this basis assumes the existence of several types of compatibility and physical properties data for these materials. For example, if a component is likely to be impacted but not likely to be in a high temperature environment, materials with a low impact sensitivity should be considered regardless of their ranking according to ignition temperature. This procedure, apparently already used by NASA, is discussed in the report NASA, MSC-02681 (1972). The importance of equipment design, as discussed in other parts of this report, should not be ignored. For example, the introduction of slow opening valves and heat sinks, whenever possible, will reduce the probability of ignition by adiabatic compression.

The following is a priority sequence of guidelines that should be followed when selecting materials for oxygen use in the presence of ignition sources. Of course any considerations must include the effects of possible contaminants in the system.

1. Eliminate ignition - select a material which is least likely to ignite under the operational conditions.
2. Prevent continued reaction - select a material which tends to quench the reaction after ignition.
3. Reduce the rate of reaction - select materials which react as slowly as possible after ignition to permit the control of the reaction.

These recommendations encompass those suggested by McKinley (1971) and recommended by NASA - Myers (1971). The first guideline is most likely satisfied by selecting the material with highest ignition temperature but is also affected by the presence of oxide coatings or the possibility of inter-material reactions. For example, it has been reported and discussed by Key (1968), (1964), Ordin (1971), and Keeping (1971) that chlorofluoro compounds may react strongly with aluminum under shear forces. This reaction may be sufficient to ignite aluminum in the presence of oxygen. Iron rust according to Keeping (1971) significantly lowers the ignition resistance of aluminum in oxygen. Materials with a high thermal diffusivity are better in dynamic systems since local energy impulses will result in less pronounced hot spots than with low diffusivity materials. In a static system high thermal conductivity materials are more desirable for essentially the same reason. Materials whose melting point is higher than the ignition temperature should be free of sharp edges. The presence of sharp edges may result in hot spots for ignition. If the ignition temperature is sufficiently above the melting point, sharp edges will probably be smoothed by melting before ignition occurs. This has been reported to be the case for aluminum by Keeping (1971).

The second guideline, selecting a material which tends to quench itself, is influenced by several factors. The heat of combustion is the most important. If it is sufficiently low, the heat may be conducted away rapidly enough to quench the burning. The reaction products may also interfere with continued oxidation. For example, slag buildup has been reported to have a quenching effect in iron.

The materials portion of the third guideline, select slow burning materials, is affected by essentially the same factors. However, one can also utilize good design to slow down the reaction. For example, one might insert a nickel-alloy pipe section in a predominantly stainless steel pipe. The nickel alloy section, having a lower reaction intensity, would either quench or slow a reaction propagating along the pipe. The shape and size of components at strategic points in a system can be significant in controlling a reaction. Thermal anchoring of potentially reactive components to a cold heat sink can also be useful in curtailing a burn. A rapid operating system to shut down the oxygen supply upon detecting a malfunction may prevent extensive damage, unless the initial burn occurs with explosive violence. Limiting the oxygen availability by restricting oxygen flow where possible is desirable for control purposes.

Material ranking lists are most useful for design purposes if they are clearly identified as to the experimental tests upon which they are based. McKinley (1971) has compiled ranking lists based upon individual past tests. These lists and the recommendations in NASA, MSC-02681 (1972) should be consulted for material selection. The results of various compatibility experiments along with physical property data, such as melting and vaporization temperatures, thermal conductivity, specific heat, and heat of combustion, are sometimes combined to produce a weighted index of oxygen compatibility. Such an equation has been used by Linde Division of Union Carbide Corporation [Carlson (1971)]. The critical point of setting up such an equation is the choice of the weighting factor for each parameter in the

equation. In our opinion, the importance of ignition temperatures can hardly be overstressed at high pressures and the prevention of ignition should be the principle goal. Next we will discuss tests which have been devised to characterize these properties and then summarize the data which have been obtained with these tests.

### III. Material Compatibility Tests

A test to measure the compatibility of a material with oxygen basically consists of placing the material in oxygen in the presence of an ignition source and observing the sensitivity or intensity of the reaction. The tests may be conducted under different conditions, such as at different temperatures, pressures, or ignition energies, to determine any dependence on these variables. The kinds of tests possible are limited primarily by the number of possible ignition sources. However, most tests are quite realistic in simulating working conditions and common ignition sources. Somewhat arbitrarily, these tests are described below by the following ignition categories: impact, thermal, electric arc, abrasive, and fracture. Also discussed are environmental and configuration tests which involve various forms of ignition in simulation tests. There are also many experiments designed to measure specific thermodynamic properties, such as heat of combustion, thermal conductivity, specific heat, or melting point. Strictly speaking, these are not compatibility tests, but do provide a basis for understanding the results of compatibility tests. Most compatibility tests are concerned primarily with resistance to ignition (reaction sensitivity) but some also are designed to measure the burning rate or quenchant behavior (reaction intensity) after combustion is initiated.

One of the most probable ignition mechanisms is by impact in the presence of oxygen; be it by dropping a wrench in an oxygen spill (mechanical impact), by impinging a piece of weld slag on the bend of an oxygen pipeline (particle impact), or simply by rapidly opening or closing a high pressure valve (pneumatic impact). Each of these conditions are simulated by a particular impact compatibility test method.

The most common version of an impact test is the Mechanical Impact Test developed by Lucas and Riehl (1960). This test has been used extensively and has resulted in an enormous number of data, Key (1963), (1964), (1966), (1968), Jamison (1970), and NASA, MSC-02681 (1972). It



is one of only two ASTM standard tests for oxygen compatibility, ASTM (1970). The test is conducted by imparting a known amount of energy from a falling plummet to a striker pin which is in contact with the specimen in the presence of liquid or gaseous oxygen and any reaction is noted. The test is relatively simple and readily adapted to variable pressure and temperature. Compatibility by this ASTM test is defined as no reactions out of 20 impacts with the plummet impact energy adjusted to 70 ft-lbs. Key (1968) indicated that this go-no-go test has been remarkably successful in rejecting incompatible materials. However, the arguments described in the next paragraph suggest that the poor repeatability inherent in the test may lead to the rejection of some compatible as well as the incompatible materials. Blackstone and Ku (1971) have gone so far as to suggest that this test has also passed some unacceptable materials.

The mechanical impact test procedure has undergone extensive criticism by Blackstone (1970), Blackstone and Ku (1971), Blackstone, Baber, and Ku (1967), Burmeister, et al (1967), Reynales (1958), (1961), Staph et al (1962), and Jamison (1970). The criticism indicates essentially that the statistical procedure of the test is at fault rather than the test apparatus per se. Schwinghamer (1972) has refuted some of this criticism. A different statistical approach has been recommended by Jamison (1971) as a consequence of this criticism. Instead of accepting a material if it doesn't react in 20 tests at 70 ft-lbs, the test would be repeated 20 times at different energies to find the energy at which 50% reactions are obtained. This energy (determined from the drop height of the falling weight) is used to indicate the relative impact sensitivity of the material. This method is referred to as the Bruceton or "up-and-down" method of mechanical impact testing. According to Jamison (1971) the "up-and-down" method of impact testing, as an alternative to the go-no-go test, is both efficient and repeatable. That the Bruceton method is more repeatable than the go-no-go test is intuitively reasonable; however, the go-no-go test is less time consuming and therefore is considered useful

as a screening test if the occasional rejection of an acceptable material is permissible. Blackstone and Ku (1971) and Jamison (1971) give historical accounts of the development from the first impact test described by Lucas and Riehl (1960) to current models. As a result of recent attempts to improve the mechanical impact test it has been suggested that reaction intensity testing should also play a major role in material selection in conjunction with reaction sensitivity testing. Jamison (1971) has pointed out that the improved repeatability of the Bruceton method of impact sensitivity testing shows that materials are not significantly different in sensitivity. However, he indicates that these materials differ widely in intensity since some of them react violently and are totally consumed while others are only slightly charred. It appears that further statistical considerations may be in order here to take advantage of both techniques rather than to reject either totally.

Another form of impact test which has been used considerably is the Pneumatic Impact Test. The pneumatic impact test is designed to simulate the adiabatic compression resulting from a rapidly opening high pressure valve. It is usually performed in just that way with a small specimen containing test chamber suddenly opened to a high pressure reservoir. The adiabatic compression test uses the highest pressures of all the compatibility tests, except for a variation of this test using explosively generated shock waves.

Adiabatic compression tests involve the study of material ignition in the compressively heated oxygen gas. The absolute temperature,  $T$ , of an ideal gas under adiabatic compression as a function of pressure,  $P$ , for an ideal gas is given by

$$T = T_0 \frac{P}{P_0}^{\frac{n-1}{n}}$$

where  $T_0$  and  $P_0$  are initial temperature and pressure, respectively and  $n$  is the ratio of specific heat at constant pressure to specific heat at constant volume and is about 1.4 for oxygen. Nihart and Smith (1964) plotted values of  $T$  versus  $P$  for  $T_0 = 273$  K and  $P_0 = 14.7$  psia. At 10,000 psia  $T$  is 1900 K which is sufficiently high to ignite almost any structural material. Whether ignition actually occurs is determined by the temperature of the material and not just the temperature of the compressed gas. Thus the transient thermal characteristics of the system are important. The thermal diffusivity, heat capacity, and other factors such as the existence of sharp edges, determine the peak temperature of the material. For these reasons an adiabatic compression test is most meaningful if performed on a system rather than on a specimen of material.

The Particle Impact Test is the least used of the impact tests; however, its importance should not be neglected especially in high pressure systems. This test is performed by impacting particles in a flowing oxygen stream with a test specimen and any resulting reaction is recorded. This test is conducted at various temperatures, pressures, flow rates (velocities), and particle size.

Thermal tests are those in which the ignition source is essentially the temperature of the specimen and its environment. In reality, all ignition sources are thermal in that a local hot spot must be created for ignition to occur. Classed as thermal ignition tests are bomb tests, promoted ignition tests, and hot wire tests. The Oxygen Bomb Test, described by Nihart and Smith (1964) and Guter (1967) is performed as follows: a specimen is placed in an oxygen filled bomb. The temperature of the contents of the bomb is gradually raised until ignition occurs, as indicated by a rapid rise in temperature, visible flash, or audible explosion. The temperature at which ignition occurs is called the self- or auto-ignition temperature. The pressure in the chamber during the controlled temperature rise may be either constant or allowed to rise with increasing temperature. In some cases the specimen

is exposed to oxygen only after equilibrium has been reached at each temperature and the specimen is changed after each such measurement. The Oxygen Bomb Test can be used to determine gaseous oxygen compatibility of metals or non-metals in the solid, liquid or gaseous states. The Pot Test described by Guter (1967) is similar to the Bomb Test except the Pot Test is done at standard pressure and with flowing oxygen. It frequently is intended to simulate actual conditions of use and with it one can assess flow effects.

Promoted Ignition Tests are performed by burning an ignition promoting material in the presence of a specimen. Many materials have been used for promoters, however, the best materials are those that do not significantly effect the composition of the specimen surface as the promoter is burned. Contamination of the surface of the specimen by the promoter can change the specimen's ignition characteristics and thus produce erroneous results. The amount of specimen consumed by the burning of a fixed amount and type of promoter or the amount of promoter required to consume the entire specimen is used as a measure of its resistance to combustion.

The Hot Wire Test is conducted by heating a metal wire in a gaseous oxygen atmosphere. An electrical current is passed through the wire, resulting in  $I^2R$  (or Joule) heating. The temperature is increased with increasing current, resulting eventually in the wire either igniting or melting. This test can only be used on metals below their melting temperatures and its only advantage is simplicity.

Probably the most tragic oxygen accidents have involved electrical ignition sources such as electrical arcing from associated electronic equipment. The Flash and Fire Point Test, used primarily on organic materials, is performed to simulate these conditions by using an electric arc to ignite a specimen in an oxygen filled chamber. The temperature of the chamber is raised and the electric spark is generated periodically near the specimen. The temperature at which a momentary ignition occurs is defined as the

flash point; the temperature at which sustained burning occurs is called the fire point. At high oxygen pressures the flash and fire points are coincident. The relationship of flash and fire points and auto-ignition temperatures (see oxygen bomb test) is not known specifically. Intuitively, one would expect that the auto-ignition temperature is equal to or greater than the flash and fire temperature; the experimental data presented later indicate that at high pressures there is little difference between these temperatures.

Galling caused by two pieces of metal rubbing was projected as one of the possible causes of an oxygen tank truck accident and there have been a few Abrasive Tests to study such phenomena. Also the abrasive effect of fine particles in a flowing oxygen stream has been and is being studied.

A highly probable yet seldom observed accident source is Fracture. The exposure of a fresh clean surface of some metals to oxygen can cause a violent reaction. Various methods have been used from straight tensile tests to puncture by bullets or other projectiles, Jackson et al (1963). Even the effect of the projectile size and material has been considered.

Configurational - The final test of oxygen compatibility for any material is whether it will ignite in its final configuration, complete with adjacent materials and possible contaminants. Because of our lack of understanding of the ignition and combustion of metals, most critical applications also undergo an environmental test. Artificial ignition of wire harnesses or clothing, hyperbaric testing of breathing apparatus, and overloading liquid oxygen pumps are all examples of this category. These tests will always be indispensable, especially where safety is of prime concern.

In view of the controversies which exist regarding the value of various testing techniques, it is recommended that an independent group, such as NBS, study these methods and test results, using whatever expertise is necessary to establish standardized test procedures for liquid and gaseous oxygen compatibility testing. Any recommendations should be flexible enough to include new

methods or procedures as they are proven useful. As a consequence of the recent and thorough survey by Johnston (1970), it was concluded that there is considerable concern for better and improved materials selection and testing methods and safety criteria. This plea has been repeated often since 1957 with apparent little effect. Recent activity in test development and reanalysis by NASA-ASRDI may be a partial answer to these recommendations.

#### IV. Material Compatibility Data

A not insignificant portion of the materials compatibility data is unpublished. Some is difficult to obtain from the "unpublished" literature and it is especially hard to obtain corporate data. However, this is not to say that data are lacking for most technical materials. There are considerable data available, but, in some instances the inconsistencies produce a confusing picture. The principal sources containing information regarding the effect of pressure on oxygen compatibility are Attwood (1971), Baum (1962), Dean (1961), Guter (1967), Kimzey (1970), Kirschfeld (1961), (1965), (1967), (1968) and NASA MSC-02681 (1972). High pressure data from these and other sources are tabulated in Appendix I. One extensive set of unpublished data included in Appendix I is from John Austin, Marshall Space Flight Center (1972). An extensive tabulation of test data, contained in Appendix E of NASA MSC-02681, (1972), is reproduced for convenience as Appendix II. Appendix II contains the high pressure compatibility test data of both metals and non-metals, not just non-metals as indicated by the title of the source document. The document, NASA MSC-02681 (1972) is periodically updated to include the most recent NASA test data. Additional updated copies may be obtained from

Chief, Reliability Division  
Code NB  
NASA-Manned Spacecraft Center  
Houston, Texas 77058.

In several instances, data have been reported and conclusions have been drawn by the investigators which can not be neatly tabulated in Appendix I

or are difficult to summarize briefly. These data, often resulting from configuration and other non-standardized tests, are, however, very useful in assessing the oxygen compatibility of materials. To make some of these results more readily available, the summaries, conclusions, and recommendations of these papers are presented in Appendix III for the convenience of the reader. For additional detailed data, the reader is referred to the references. We are not including further summarization of these papers individually, see for example McKinley (1971); however, some of the generalizations which follow are based on the results of these papers.

The sources of oxygen compatibility information include considerable data below 3000 psia; these data are not tabulated in Appendix I unless they are useful for projections at higher pressures. The discussion of these data is separated into sections on (A) Metals and (B) Non-Metals. In Appendix I, metals are further separated into (1) Pure Metals and (2) Alloys. The non-metals are divided into (1) Halogenated Compounds, (2) Non-Halogenated Plastics, (3) Sealants, Threading Compounds and Lubricants, (4) Elastomers, and (5) Miscellaneous. The format of the tables in Appendix I is chosen to be similar to the format of NASA MSC-02681 (1972).

Table I contains miscellaneous thermal data for pure metals and alloys as well as a few selected polymers. These data are useful in the selection of materials for high pressure oxygen service.

#### A. Metals

McKinley (1971) has done a complete and objective review of the literature on ignition and combustion of metals. He includes both low and high pressures and compiles metal ranking lists according to various experiments. These lists show that nickel and copper and their alloys are most suitable for oxygen service. They also suggest that neither aluminum nor iron alloys (including stainless steel) are highly desirable. Stainless steels, however, are generally more oxygen compatible than aluminum. The overall

Table 1 - Miscellaneous Thermal Data on Metals and Alloys

Material	Reference(s)	Ignition Temp. (K)	Melting Temp. (K)	Thermal Conductivity at 300 K (W/cm K)	Thermal Diffusivity at 300 K (cm <sup>2</sup> /sec)	Heat of Combustion (J/g)
Aluminum		1000	933	2.2	0.86	31,000
Copper		1300	1360	4.0	0.28	2,400
Gold	does not ignite		1336	3.1	0.052	7,000
Iron	1200	1812	1730	0.8	0.035	4,000
Nickel	1730	1730	1730	0.6	0.38	142
Silver	does not ignite		1233	4.0		
Brass		1273	1183	1.0	0.074	3,600
Inconel		1620	1670	0.11	0.008	4,700
Hastelloy		1600	1640	0.11	0.008	5,000
Monel		1520	1600	0.25	0.016	3,400
Cr Steel		1423	1670	0.30	0.02	7,700
300 and 400 Stainless Steels		1400-1670	1670	0.15	0.01	8,000
Carbon Steel		1365	1780	0.80	0.05	7,500*
Polyethylene		450	~400	0.004	0.002*	9,000
Nylon		475	~500	0.003	0.002*	7,000
Teflon		700	~600	0.002	0.002*	1,100

\* Approximated



ranking suggested by Clark (1971) is in general agreement with these lists. Pelouch (1972) has also presented material ranking lists as a function of such parameters as strength, reaction intensity, volume, etc. and reaches essentially the same conclusions. Considering the lack of contradictory evidence at higher pressures, it is reasonable that these rankings would also be valid at high pressures.

The existing compatibility data can be summarized as follows. The ignition temperatures of metals decrease with increasing pressure. However, there are insufficient data available to quantitatively define this pressure dependence for but a few metals over relatively small pressure ranges. Figure 1 illustrates the available ignition temperature data which approach the high pressure range. It is interesting to note that the nickel alloy curve crosses the steel curve, suggesting the possibility that steels may be better suited for high pressure service. The ignition temperature data presented by Nesgorov et al (1968) were normalized to unity at low pressure. To obtain the data attributed to Nesgorov presented in figure 1, we used the low pressure ignition temperature values for nickel alloys and steels as listed in Appendix I. No ignition temperature data exist above 2000 psia. There appears to be a definite need for a careful measurement of ignition temperature as a function of pressure up to at least 10,000 psia for some of the more technically important metals. The effect of specimen size and shape should also be investigated.

The burning rate of metals varies as the square root of pressure and inversely with cross-sectional area at low pressures; but at higher pressures burning rates decrease, Kirschfeld (1961), (1965), (1967), (1968). The nature of this reversal and the pressure at which it occurs are subjects for further study.

The oxygen compatibility of metals under mechanical impact has been extensively studied; however, the repeatability of the data are in question as previously discussed. Because of this lack of repeatability, it is difficult to be certain from the available data listed in Appendices I and II if metals are

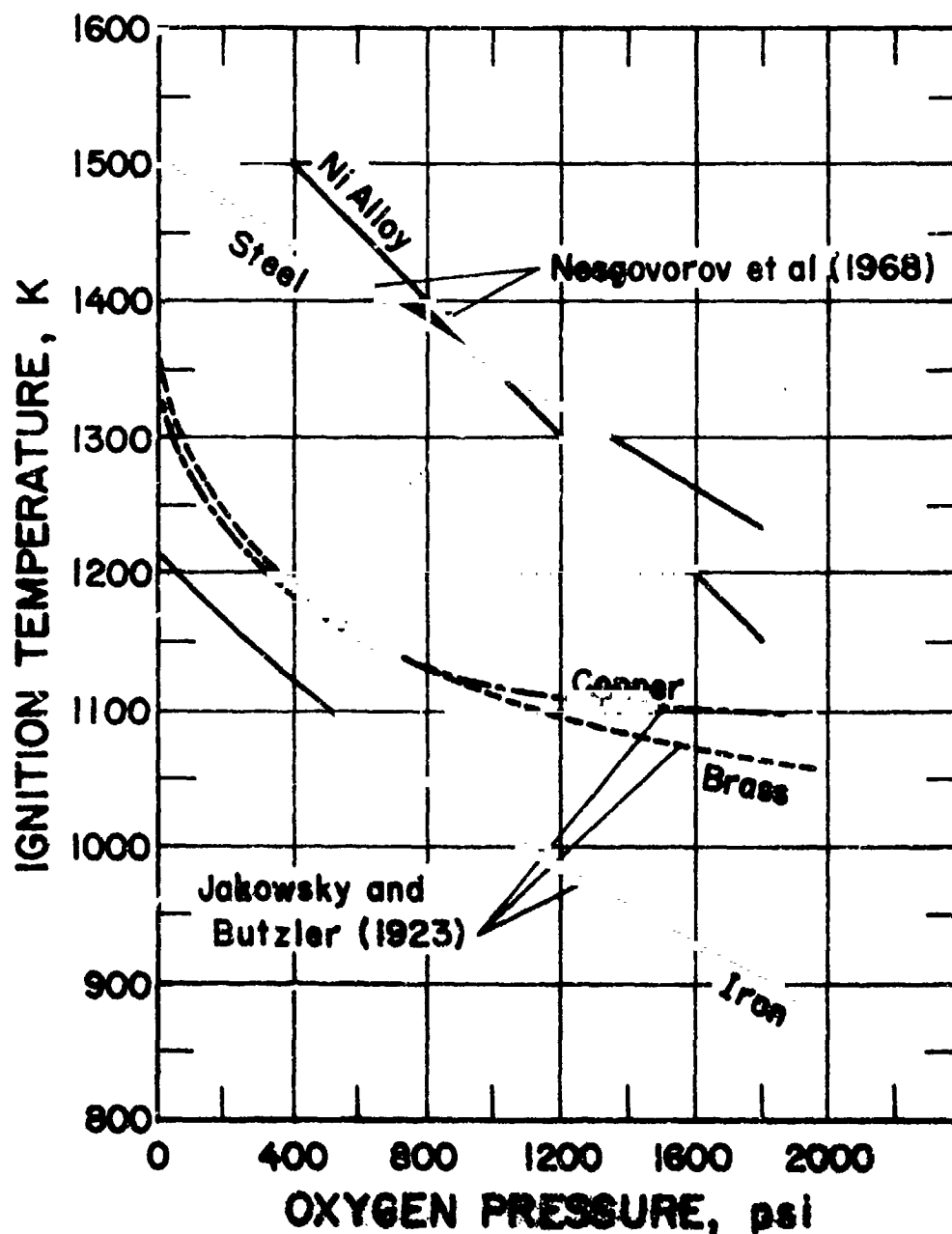


Figure 1 - Ignition temperature of metals as a function of pressure (Nesgovorov's relative data converted to absolute values by using low pressure data from Appendix I).

more or less sensitive to mechanical impact at higher pressures. The dependence on pressure, according to these data, is, at best, small. On the basis of the impact test data alone, it appears that any of the common metals and alloys, including aluminum and stainless steel, are acceptable for use. However, it is noted that the nickel and copper alloys are less sensitive to mechanical impact than aluminum and stainless steel, in particular. This can be seen in table 2 which summarizes the metals impact data of Austin (1972). This table gives the reaction frequency of each alloy class as a function of pressure. It appears that aluminum is especially impact sensitive at 100 psi. We note that the 50 psi rate is based on only 40 tests while at each of the other pressures several hundred tests were conducted. Thus the reaction frequency at 50 psi may not be statistically significant. Ignoring the data at this pressure, we see that if all metals are considered as a group, there is little pressure dependence up to 1500 psi. Table 2 also shows the lack of precision in impact testing mentioned earlier. The mechanical impact screening test was probably never intended to be subjected to such a statistical analysis; however, it is felt that the availability of a large sampling of data introduces a worthwhile degree of significance into the results of the analysis. It is recommended that all impact data listed in NASA MSC-02681 (1972) be subjected to a similar analysis. However, since other variables besides pressure are present, a statistical analysis is essentially a problem in multiple regression analysis. The analysis performed here is of course much simpler and is the reason why only Austin's data were used. In most of his data pressure was the only variable in successive tests for each material.

Other high pressure data such as ignition by electric arc, particle impact, and flash and fire point data are being determined by Stradling (1972) for both metals and non-metals. Some of these measurements will be at pressures to 10,000 psi and, therefore, will be very useful for material ranking.

In summary, it is recommended that all types of compatibility data be extended to 10,000 psia. The data compiled in NASA MSC-02681 (1972) are

Table 2 - Summary of OX Mechanical Impact Data of Austin (1972) for the Indicated Alloy Classes. Numbers in parenthesis after reaction frequency indicate number of tests.

PRESSURE, psi	REACTION FREQUENCY			
	1. Aluminum	2. Steel	3. Nickel & Copper	All (1, 2, & 3)
50	0(40)	-	0(40)	0(80)
100	0.22(167)	0(500)	0(200)	0.03(867)
500	0.04(348)	0(480)	0(200)	0.02(1028)
1000	0.05(212)	0.01(520)	0(200)	0.02(932)
1500	0.02(122)	0.06(440)	0.03(200)	0.05(762)
10,000	-	-	0(60)	0(60)

extensive; however, a statistical analysis of these along with other data is needed to obtain full benefit from this compilation.

#### B. Non-Metals

Compared to metals, most non-metals are highly combustible. Since some of the metals are considered incompatible for oxygen service, it follows that most non-metals are oxygen incompatible. Because of their unique physical properties some organics, such as the polymers polychlorotrifluoroethylene and polytetrafluoroethylene, have been used extensively in oxygen service. These are probably the most compatible of the organic materials because they are highly fluorinated with strong fluorine-hydrogen bonds. Generally, the more halogenated (particularly with fluorine) a hydrocarbon is, the more compatible it is with oxygen. The reader should refer to Appendix III for specific criticism regarding the oxygen compatibility of other organic materials. Compatibility test data for non-metals are found in Appendices I, II and III. Some general observations are given below.

The ignition temperatures, as well as the related flash and fire point temperatures of non-metals, generally decrease with increasing pressure up to about 1500 psia. Above this pressure ignition temperatures tend to be independent of pressure. A few typical curves of flash temperature versus pressure are presented in figure 2. The reader should note the close correspondence between flash point and ignition temperature. This correspondence may be even closer than appears in figure 2 because of the following: the flash points reported by Pippen and Stradling (1971) were obtained with a low pressure apparatus and a high pressure apparatus. The transition was at 50 psi. In almost all cases the flash temperatures from the low pressure apparatus were 50 to 100 K higher than the temperatures from the high pressure apparatus. The low pressure data are not shown in figure 2; however, they suggest that the flash points shown may be too low by as much as 100 K. Such an uncertainty would make high pressure

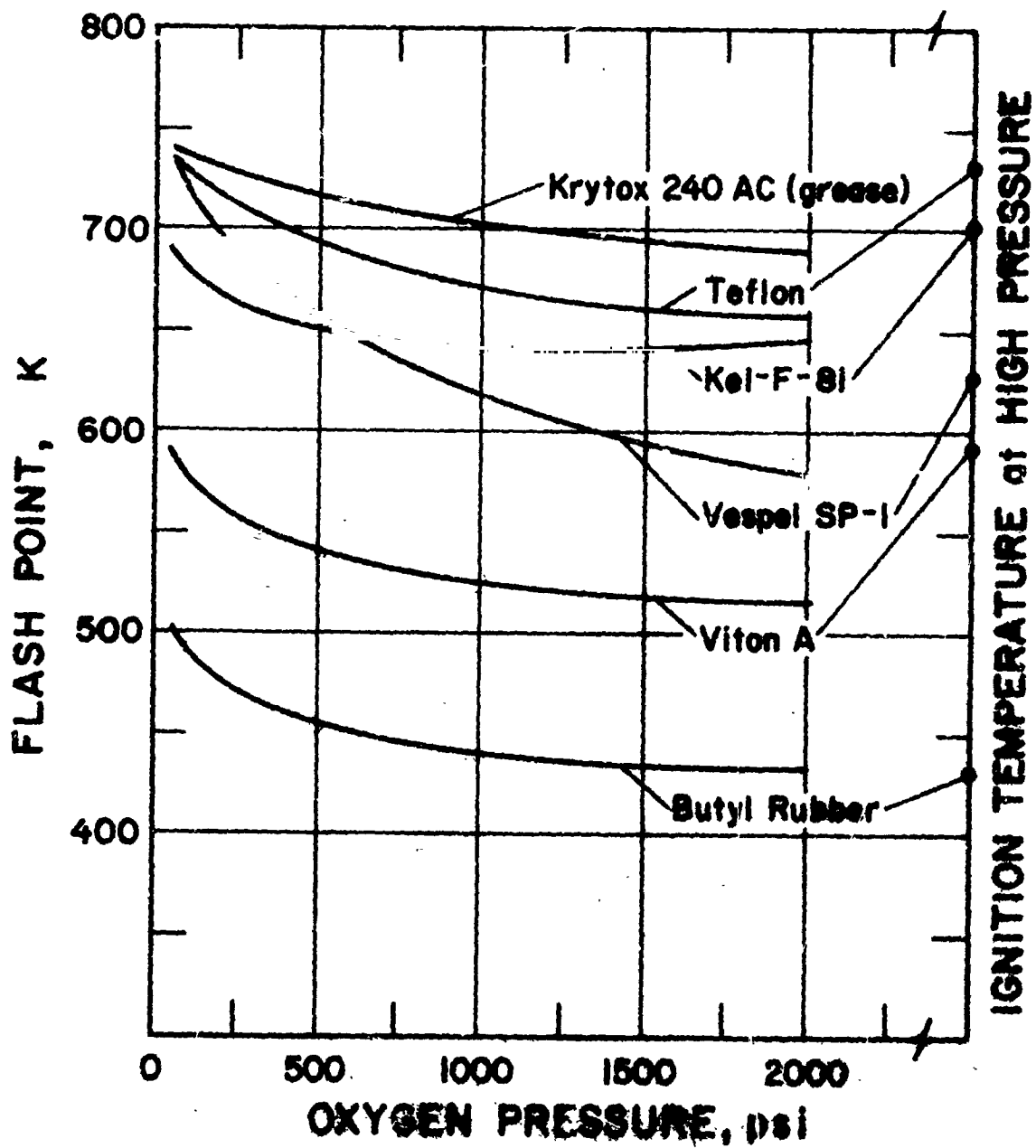


Figure 2 - Flash point temperature as a function of pressure for some non-metals.

ignition temperature and flash points the same within experimental error. It is also observed that the flash points are nearly independent of pressure at 2000 psi, strengthening the conclusion of Nihart and Smith (1964) that the ignition temperature is independent of pressure from 2000 to 7500 psi.

Due to the imprecision of the mechanical impact data on non-metals it is difficult to readily detect a pressure dependence in sensitivity. To support this, the data of Austin (1972) were combined as shown in table 3. A similar analysis of all of the impact data is a very lengthy and complicated multiple regression problem which is not considered within the scope of this project. This however, is recommended as a project which needs to be done for both metals and non-metals.

The polymers, polychlorotrifluoroethylene and polytetrafluoroethylene, often used as valve seat materials, are oxygen compatible according to the mechanical impact data listed in Appendix I. Although more compatibility data exist for non-metals than metals, additional data at high pressures are needed to confirm the pressure dependence of ignition and impact characteristics. A more critical need, however, is the investigation of other non-metals to find those with the highest oxygen compatibility. Some areas which have probably not been fully explored are the ceramics and composites.

#### V. High Pressure Oxygen Equipment

Some effort has been directed toward the acquisition of information regarding the availability of high pressure oxygen service equipment. The equipment suppliers listed below have been contacted and all have sent information regarding their off-the-shelf items. This supplier list is not intended to be complete nor is it an endorsement of these companies but rather, it is a random selection of high pressure equipment suppliers intended only to illustrate the degree of availability of such equipment. In parenthesis after each of the listings we show a few of the more common products of each of these suppliers. From an assessment of this literature it appears that considerable equipment is readily available which is, or by

Table 3 - Summary of GOX Mechanical Impact Data of Austin (1972) for the Indicated Non-Metals  
 Numbers in parenthesis after reaction frequency indicate number of tests.

PRESSURE, psi	REACTION FREQUENCY		
	1. Epoxy and Epoxy Fiberglass	2. Electrofilm	3. Everlube Fluorolube Halocarbon Inlox Krytox
100	0.35(40)	0(140)	0(480)
500	0.08(40)	0(140)	0(480)
1000	0.17(40)	0.02(140)	0(480)
1500	1.0(40)	0.12(140)	0.04(480)
			0.1(660)
			0.006(660)
			0.009(660)
			0.07(660)



specification can be made, compatible with high pressure oxygen. The manufacturers are aware of the problems with oxygen and are both willing and able to construct equipment using oxygen compatible materials. Their catalogs often do not specifically mention applications for oxygen, however, the materials lists and equipment design show that oxygen compatibility was considered. Manufacturers, of course, rely heavily on the user to assist in selecting oxygen compatible materials. Metals most commonly used in high pressure oxygen compatible equipment are 300 series stainless steels, and nickel alloys. Aluminum and 400 series steel alloys are used in fewer instances. The polymers Kel-F and Teflon are frequently used in valves and regulators. It has been recommended by Burmeister, Loser and Sneegas (1967) that these as well as other organics be replaced with metal parts whenever possible. It has been recommended that material ranking lists for various experimental tests be established. Such specifications will be necessary to remove the incompatible materials such as the organics in existing high pressure equipment.

In specifying equipment for use at high pressures one should be particularly careful of adiabatic compression heating. For this reason, safeguards such as slow opening valves and heat sinks to absorb the energy from compression heating should be included whenever possible. In a high flow rate system, the sharpness of pipe bends should be limited, solid particles should be removed from the stream, sharp edges should be eliminated, and electric charge build-up should be avoided. Whenever possible, organic materials should be replaced by metal components, such as in valve seats and regulator parts. Since materials compatibility lists used by manufacturers may differ from lists established by NASA, the purchasing agency must bear the final responsibility of materials compatibility for specific applications.

Random Selection of High Pressure Equipment Suppliers  
Contacted for Oxygen Compatibility Information

1. Airco Cryogenics Division, 1900 Main St., Irvine, Calif. 92664,  
Ph. 714-540-3010 (cryogenic pumps)
2. AiResearch Manufacturing Division of the Garrett Corporation,  
9851 Sepulveda Blvd. Los Angeles, Calif. 90009, Ph. 213-588-1153  
(storage vessels).
3. American Instrument Co., 8020 Georgia Ave. Silver Spring, Maryland,  
20910, Ph. 301-589-1727 (pumps, valves)
4. Autoclave Engineers, Inc., 2930 W. 22nd St., Erie, Pa., 16512,  
Ph. 814-838-2071 (storage and reactor vessels, valves, tubing,  
pumps, intensifiers, metal diaphragm compressors, flanges)
5. Bingham-Willamette Company, Div. of Guy F. Atkinson Company, 2800  
N. W. Front Ave., Portland, Oregon 97210, Ph. 910-464-8031  
(pumps)
6. Cosmodyne Corp., 2920 Columbia St., Torrance, Calif., 90509,  
Ph. 213-320-5650 (pumps, vaporizers, tube trailers, storage vessels)
7. CVI Corp., P.O. Box 2138, Columbus, Ohio, 43216, Ph. 614-876-7381  
(cryogenic piping, valves, vaporizers)
8. Flodyne Controls, Inc., 48 Commerce Dr., Murray Hills, New Jersey,  
07974, Ph. 201-464-6200 (valves)
9. Harwood Engineering Co., Walpole, Mass., 02081, Ph. 617-668-3600  
(tubing, fittings, valves, pumps, compressors, intensifiers, gauges)
10. High pressure Equipment Co., 1224 Linden Ave., Erie, Pa., 16505,  
Ph. 814-838-2128 (tubing, couplings, fittings, valves, pressure and  
reactor vessels, pumps, intensifiers, gauges)
11. Linde Company, Div. of Union Carbide Corporation, Tonawanda, New  
York, Ph. 716-555-1212 (pumps)
12. Ruska Instrument, 6123 Hillcraft Ave., Houston, Texas 77036, Ph.  
713-774-2533 (high pressure instrumentation)
13. Ryan Industries Inc., 4800 Allmond Ave., Louisville, Ky. 40214,  
Ph. 502-368-1633 (pumps, vaporizers, tube trailers, storage vessels)

## VI High Pressure Oxygen Facilities

At the present time the bulk of the high pressure oxygen compatibility research is being done at NASA-MSFC (Marshall Space Flight Center) and NASA-WSTF (White Sands Test Facility). Existing high pressure programs at NASA-MSFC concentrate on impact and flammability testing. High pressure programs have been initiated at NASA-WSTF on ignition by abrasion and electric arc as well as high pressure GOX and LOX impact testing and flash and fire point testing. The impact apparatus at MSFC and WSTF, although not identical, are quite similar. Present information indicates that practically no oxygen compatibility research is being conducted at private laboratories in the 3,000 to 10,000 psi range. The use of very high pressure oxygen is presently nearly restricted to NASA. One exception is the use of high pressure breathing oxygen systems in the medical profession and aircraft industries. Most of the past high-pressure research and experience stems from the development of such breathing systems as well as those used in NASA programs. Johnston (1970) has compiled characteristics of these high pressure systems, along with the failures experience of the metal and non-metals used. Rocketdyne is establishing a facility to conduct mechanical impact studies at pressures to 10,000 psia. The impact tester now being built is the same as the one used by NASA-MSFC.

The following list of facilities includes principally those that are presently doing research or engineering involving high pressure oxygen compatibility as well as a few that have considerable high pressure applications experience. Their testing capabilities and other pertinent facts are given in parentheses after each entry.

1. Battelle Memorial Institute  
Columbus, Ohio  
(past compatibility research from 2500 to 12,000 psi including effects of vibration, shock, adiabatic compression, flow, and temperature)

2. British Oxygen Co., Ltd  
England  
(ignition temperature to 3700 psi)
3. Kennedy Space Center, NASA  
Cocoa Beach, Florida  
(10,000 psi GOX usage)
4. Linde Company, Division of Union Carbide Corp.  
Tonawanda, New York  
(past: compatibility testing to 7500 psi, including adiabatic compression, galling, powder impact, promoted ignition, and mechanical impact; most not to high pressure. present: ignition and calorimetric bomb testing to 2000 psi)
5. McDonnell-Douglas Aircraft  
Huntington Beach, California  
(high pressure O<sub>2</sub> applications)
6. Manned Space Center, NASA  
Houston Texas  
(high pressure O<sub>2</sub> applications, no testing)
7. Marshall Space Flight Center, NASA  
Huntsville, Alabama  
(extensive LOX and GOX testing to 10,000 psi - mechanical impact, low pressure flammability testing)
8. Naval Ship Research and Development Center  
Annapolis Laboratory  
Annapolis, Maryland  
(ignition temperature testing to 3000 psi)  
(also some lower pressure adiabatic compression and hot O<sub>2</sub> flow)

9. Rocketdyne Division, North American-Rockwell  
Canoga Park, California  
(mechanical impact testing to 10,000 psi)
10. White Sands Test Facility, NASA  
White Sands, New Mexico  
(GOX and LOX compatibility testing to 10,000 psi - mechanical impact, abrasive impact, pneumatic, flash and fire point).

#### VII. Recommendations

The extension of GOX and LOX applications to pressures above 3000 psia is reasonable based on the present data. However, in cases where extremely high reliability is demanded, such as in manned space flight, the extension is considered marginal without further compatibility testing. Considerable compatibility data exist at pressures up to 2000 psia; the sparse compatibility data up to 7500 psia suggest no additional problems will be encountered. However, to obtain high reliability, extensive materials compatibility testing to 10,000 psia will have to be done. Some of these data are now being obtained at NASA-MSFC and WSTF. Standardization of test procedures and materials is essential to reliability and interagency comparisons, and will also encourage involvement of industry in compatibility testing. New data need to be combined with existing data to be analyzed for proper interpretation. Old tests need to be studied for degree of validity, and new tests which better describe oxygen compatibility are desirable. Design and applications guidelines will encourage safe use of oxygen and uniform practice throughout NASA. Data necessitated by future design applications must be anticipated. In support of these general recommendations, an excerpt from the Apollo 13 - High Pressure Oxygen Report (Johnston 1970) is given below:

Despite the many standards and specifications reviewed by this panel, it has become obvious that a void exists in several areas. One area of major concern is the apparent lack of sufficient detail on nonmetallic materials and their application for high pressure oxygen systems to enable a designer to select the proper material for his system.

The reason for this is that a comprehensive test program has yet to be defined and accomplished. Although some work has been started in this area, it appears that the required effort is a major one and should begin with developing a standard approach to the problem on the part of both Government and industry so that all data developed can ultimately be universally used without the requirements for interpolating test results from a many faceted approach.

The second area of concern is that no standards and/or specifications appear to exist on a total system which points out the hazards resulting from misapplication of a component which may serve its function well in some applications, but may be trigger mechanism of disaster in another application.

Based upon these generalities, the following specific recommendations are suggested:

1. Extend Measurements indicated below to high pressure (10, 000 psi) for materials of immediate interest (Include effects of contamination).

- (a) Ignition temperature
- (b) Impact sensitivity
- (c) Flash and Fire temperatures
- (d) Pertinent configuration tests

2. Develop and Standardize Tests and Materials

(a) The standardization of test procedures is essential if meaningful results are to be obtained. This standardization is probably best coordinated by a group not directly involved in conducting the measurements. Involvement of ASTM would be very desirable and possibly NBS could assist in developing standard test methods, with the cooperation of test facilities.

(b) Standard reference materials for use in compatibility tests should be established. These materials, which can be stocked for distribution by the Office of Standard Reference Materials, National Bureau of Standards, are invaluable for the intercomparison of existing apparatus as well as the standardization of new apparatus. The establishment of standards should be done through a cooperative effort of NBS and testing facilities.

(c) The development of new tests more closely related to fundamental physical or mechanical properties of materials is desirable. Examples of existing tests which fall in this category are: ignition temperature and flash and fire temperature.

(d) An independent statistical analysis of the repeatability of mechanical impact test data is needed. Past studies have not been conclusive and the continuing controversy and wealth of data is justification for an in depth study.

### 3. Analyze Data to obtain best values.

(a) A statistical analysis of all existing compatibility data to determine dependence on pressure, in particular, but also on other factors affecting the reliability of the material. Multiple regression analysis would be necessary to extract this information from the existing data. The data to be analyzed are principally those listed in this report. This analysis is not a trivial task; however, the resulting increased worth of the data justifies the effort. The general validity and uncertainty estimates of material ranking data will be considerably improved as a result of this critical analysis.

(b) More universal agreement should be obtained on material ranking lists. This can be initiated by establishing such a list for each standard test within NASA. Work should proceed to extend the acceptance of these lists by other government agencies and industry. Ultimately international acceptance is desirable. It cannot be overstressed that the test conditions are an integral part of any ranking list.

(c) A compilation of thermodynamics data relevant to material compatibility is essential to any effort to understand compatibility. Test methods, test results, ranking lists, etc. are all more meaningful when they can be related to fundamental properties. Such properties as ignition temperature, heat of combustion, thermal diffusivity, melting and vaporization temperatures of metals and their oxides should be considered.

4. Adopt Guidelines for design and procedures for oxygen systems. Participation of oxygen producers and equipment manufacturers is indispensable in this process.

(a) Oxygen system or components design can have many inherent safety features that can be spelled out for the design engineer. This should include the materials used, flow rates, valving rates, heat sinks, cleaning accessibility, filters, internal flow cross sections, temperature limits, and many others.

(b) Cleanliness standards and procedural guidelines that are NASA wide and even nation wide are essential to the safe operation of high pressure oxygen systems.

5. Fundamental Research should be pursued in all areas of ignition and combustion, because understanding always leads to better and safer applications. Two areas in particular stand out as areas of concern for high pressure oxygen:

(a) The mechanical properties of materials in the presence of high pressure oxygen has been virtually ignored. Oxygen embrittlement is small at low pressures but may be significant at 10,000 psi. Fatigue behavior and crack propagation rates in the presence of oxygen are not known for any pressures.

(b) The burning behavior at high oxygen pressure is in real doubt. Since the degree of damage is directly related to the burning rate, this should be known. The only study of burning rates versus pressure indicate possible dramatic changes around 2000 psi.



Some of the above recommendations are already being pursued by NASA. ASRDI is sponsoring some ignition research at White Sands and is establishing design and cleanliness guidelines at Lewis Research Center. MSFC is funding some lower pressure combustion studies at NBS. These should be considered an integral but initial part of NASA's pursuit of the safe applications of high pressure oxygen.

#### VIII. Summary

Based on the available data it appears that no fundamental problems would prevent the common use of high pressure GOX or LOX. There are dangers involved, of course, but with a reasonable set of rules and guidelines, these dangers can be reduced to a workable level. It appears that a large proportion of past accidents are caused by material incompatibility but an even larger proportion are caused by personal carelessness or equipment failure. With care, the added hazards due to high pressure will not increase accident rates significantly.

In high pressure systems the enhancement of existing ignition sources is more important than the decreased ignition temperature of materials. For example, in high pressure applications the effect of adiabatic compression becomes increasingly important, higher flow rates enhance the probability of ignition from friction, impact, static discharge, etc., and reaction intensities increase because of the increased density and availability of  $O_2$ . The possibility of ignition due to mechanical failures is also greater.

There are little compatibility data on most materials above 3000 psia and much is needed. It is also desirable to have more quantitative fundamental data. This requires study of the physical phenomena involved and the design of experiments to develop parameters representing these phenomena. There is a strong need for more engineering compatibility characterization measurements, such as configuration and component tests by manufacturers.

From the available data the pressure dependence of ignition and burning are not well characterized. Metal burning rates are proportional to  $\sqrt{P}$  at lower pressures but at higher pressures burning rates decrease. Only a few ignition temperature versus pressure data are available. These data show the ignition temperature decreasing with increasing pressure. It would be unwise to extend these few data to other materials without further confirming measurements. Some impact test data as a function of pressure are available but considerably more are needed. These show, but not clearly, an increasing sensitivity with pressure. Flash and fire point data also show an increased sensitivity for non-metals at higher pressures.

Equipment for the handling and storage of high pressure oxygen, both liquid and gas, is readily available. In some instances it is necessary to specify the elimination of marginal materials. This presents a problem only if a better substitute material is not yet available. Equipment manufacturers are eager to cooperate in fabrication of more reliable components.

Present high pressure compatibility testing facilities are restricted nearly totally to NASA- WSTF and MSFC. Commercial laboratories have performed various compatibility tests in the past but generally not above about 3000 psi.

It is recommended that NASA extend specific experimental tests to higher pressures, establish standard tests and reference materials, perform statistical analyses of existing data, develop material ranking lists, and encourage new test methods and fundamental research.

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APPENDIX I - HIGH PRESSURE OXYGEN COMPATIBILITY DATA



ALLOYS

Reference	Materials	Test Pressure (psi)	Ignition Temp. (K)	Test Temp. (K)	Mechanical Impact Energy (kg m)	Impact Reaction Rate	Pneumatic Impact Reaction Rate	Specimen Thickness (in)	Flash Point (K)	Fire Point (K)	Environment
Austin (1972)	Aluminum 6061-T6	100		90	10	3/7		.032			LOX
		100		90	10	16/20		.032			LOX
		100		90	7.4	4/20		.032			LOX
		100		90	10	0/20		.063			LOX
		100		90	10	0/20		.063			LOX
		500		90	10	0/20		.063			LOX
		500		90	10	0/20		.063			LOX
		1000		90	10	0/20		.063			LOX
		1500		90	10	0/20		.063			LOX
		50		300	10	0/20		.032			GOX
		100		300	10	9/20		.037			GOX
		100		300	10	0/20		.032			GOX
		500		300	10	6/20		.032			GOX
		500		300	10	0/20		.032			GOX
		1000		300	10	0/20		.032			GOX
1000		300	10	0/6		.032			GOX		
Austin (1972)	Aluminum 2014-T6	500		90	10	3/20		.063			LOX
		1000		90	7	0/20		.063			LOX
		1000		90	5	0/20		.063			LOX
		1400		90	5	6/20		.063			LOX
		100		90	10	0/20		.090			LOX
		500		90	10	0/20		.090			LOX
		1400		90	5	0/20		.090			LOX
		250		300	10	0/20		.063			GOX
		500		300	10	0/20		.063			GOX
		500		300	10	6/20		.063			GOX
		500		300	10	0/20		.063			GOX
		500		300	10	0/20		.063			GOX
		500		300	10	0/20		.063			GOX
		1000		300	10	2/20		.063			GOX
		1000		300	5	2/3		.063			GOX

ALLOYS cont.

Reference	Materials	Test Pressure (psi)	Ignition Temp. (K)	Test Temp. (K)	Mechanical Impact Energy Reaction Rate (kg m)	Pneumatic Impact Reaction Rate	Specimen Thickness (in)	Flash Point (K)	Fire Point (K)	Environment
Anstis (1972)	Aluminum 2219-T87	50		90	10	0/20	.063			LOX
		100		90	10	0/20	.063			LOX
		500		90	10	1/2	.063			LOX
		1000		90	7.62	0/20	.063			LOX
		1000		90	5.54	0/20	.063			LOX
		500		70	10	0/20	.070			LOX
		500		90	10	0/20	.090			LOX
		500		300	10	0/20	.063			GOX
		500		300	5.54	0/20	.063			GOX
		1000		300	10	1/3	.063			GOX
		1000		300	7.62	0/20	.063			GOX
		1000		300	5.54	0/20	.063			GOX
		1000		300	5	0/20	.063			GOX
		1400		300	10	1/2	.063			GOX
		1400		300	9.02	0/20	.063			GOX
		1400		300	7.62	0/20	.063			GOX
		1400		300	5.54	0/20	.063			GOX
Anstis (1972)	Ferrous Alloy A286	100		90	10	0/20	.020			LOX
		500		90	10	0/20	.020			LOX
		1000		90	10	0/20	.020			LOX
		1500		90	10	0/20	.020			LOX
		100		90	10	0/20	.050			LOX
		500		90	10	0/20	.050			LOX
		1000		90	10	0/20	.050			LOX
		1500		90	10	0/20	.050			LOX
		100		300	10	0/20	.020			GOX
		500		300	10	0/20	.020			GOX
		1000		300	10	2/20	.020			GOX
		1500		300	10	0/20	.020			GOX
		1000		300	9.02	0/20	.020			GOX
		1500		300	10	6/20	.020			GOX
		1500		300	9.02	4/20	.020			GOX
		1500		300	8.54	0/20	.020			GOX
		1500		300	7.62	0/20	.020			GOX

ALLOYS cont.

Reference	Materials	Test Pressure (psi)	Ignition Temp. (K)	Test Temp. (K)	Mechanical Energy Reaction Rate (kg m)	Pneumatic Impact Reaction Rate	Specimen Thickness (in)	Flash Point (K)	Fire Point (K)	Environment		
Austlin (1972)	304 Stainless Steel	15	90	90	10	0/30	.063			LOX		
		15	90	90	10	0/20	.063			LOX		
		100	90	90	10	0/20	.063			LOX		
		500	90	90	10	0/20	.063			LOX		
		1000	90	90	10	0/20	.063			LOX		
		1500	90	90	10	0/20	.063			LOX		
		15	90	90	10	0/20	.090			GOX		
		100	300	300	10	0/20	.090			GOX		
		500	300	300	10	0/20	.090			GOX		
		1000	300	300	10	0/20	.090			GOX		
		1500	300	300	10	2/20	.090			GOX		
		1500	300	300	9.02	0/20	.090			GOX		
		1500	300	300	8.34	0/20	.090			GOX		
		Austlin (1972)	PH 15-7 Stainless Steel	100	90	90	10	0/20	.030			LOX
				500	90	90	10	0/20	.030			LOX
1000	90			90	10	3/20	.030			LOX		
1000	90			90	9.02	0/20	.030			LOX		
1500	90			90	8.34	0/20	.030			LOX		
1500	90			90	10	5/20	.030			LOX		
1500	90			90	9.02	0/20	.030			LOX		
1500	90			90	8.34	0/20	.030			LOX		
100	90			90	10	0/20	.050			LOX		
500	90			90	10	0/20	.050			LOX		
1000	90			90	10	2/20	.050			LOX		
1500	90			90	10	3/20	.050			LOX		
1500	90			90	9.02	0/20	.050			LOX		
1500	90			90	8.34	0/20	.050			LOX		
100	90			90	10	0/20	.090			LOX		
500	90	90	10	0/20	.090			LOX				
1000	90	90	10	0/20	.10			LOX				

ALLOYS cont.

Reference	Materials	Test Pressure (psi)	Ignition Temp. (K)	Test Temp. (K)	Mechanical Impact Energy (J/m)	Reaction Rate	Pneumatic Impact Reaction Rate	Specimen Thickness (in)	Flash Point (K)	Fire Point (K)	Environment
Austen (1972)	17-7 PH Stainless Steel	15	90	90	10	2/20		.030			LOX
		15	90	90	10	0/20		.030			LOX
		1500	90	90	10	0/20		.030			LOX
		100	90	90	10	0/20		.063			LOX
		500	90	90	10	0/20		.063			LOX
		1000	90	90	10	0/20		.063			LOX
		1500	90	90	10	0/20		.063			LOX
		15	90	90	10	0/20		.070			LOX
		100	90	90	10	0/20		.070			LOX
		500	90	90	10	0/20		.070			LOX
		1000	90	90	10	0/20		.070			LOX
		1500	90	90	10	0/20		.070			LOX
		100	300	300	10	0/20		.030			GOX
		500	300	300	10	0/20		.030			GOX
		1000	300	300	10	0/20		.030			GOX
500	300	300	10	0/20		.063			GOX		
1000	300	300	10	0/20		.063			GOX		
Austen (1972)	Stainless Steel 21Ni-6Cr-9Mu	100	90	90	10	0/20		.030			LOX
		500	90	90	10	0/20		.030			LOX
		1000	90	90	10	0/20		.030			LOX
		1500	90	90	10	0/20		.030			LOX
		100	90	90	10	0/20		.020			LOX
		500	90	90	10	0/20		.063			LOX
		1000	90	90	10	0/20		.063			LOX
		1500	90	90	10	0/20		.063			LOX
		100	90	90	10	0/20		.085			LOX
		500	90	90	10	0/20		.085			LOX
		1000	90	90	10	0/20		.085			LOX
		1500	90	90	10	0/20		.085			LOX
		100	300	300	10	0/20		.031			GOX
		500	300	300	10	0/20		.031			GOX
		1000	300	300	10	0/20		.031			GOX
1500	300	300	10	0/20		.031			GOX		
Austen (1972)	Stainless Steel 22Ni-13Cr-5Mn	100	90	90	10	0/20		.050			LOX
		500	90	90	10	0/20		.050			LOX
		1000	90	90	10	0/20		.050			LOX
		1500	90	90	10	0/20		.050			LOX
		100	300	300	10	0/20		.050			GOX
		500	300	300	10	0/20		.050			GOX
		1000	300	300	10	0/20		.050			GOX
		1500	300	300	10	0/20		.050			GOX

ALLOYS cont.

Reference	Materials	Test Pressure (psi)	Ignition Temp. (K)	Test Temp. (K)	Mechanical Impact Energy Reaction Rate (kg m)	Pneumatic Impact Reaction Rate	Specimen Thickness (in)	Flash Point (K)	Fire Point (K)	Environment
Austin (1972)	Haynes alloy 186	100		90	10	0/20	.063			LOX
		500		90	10	0/20	.063			LOX
		1000		90	10	0/20	.063			LOX
		1500		90	10	0/20	.063			LOX
		100		90	10	0/20	.090			LOX
		500		90	10	0/20	.090			LOX
		1000		90	10	0/20	.090			LOX
		1500		90	10	0/20	.090			LOX
		100		300	10	0/20	.063			GOX
		500		300	10	0/20	.063			GOX
		1000		300	10	0/20	.063			GOX
		1500		300	10	0/20	.063			GOX
		100		300	10	0/20	.090			GOX
		500		300	10	0/20	.090			GOX
		1000		300	10	0/20	.090			GOX
1500		300	10	0/20	.090			GOX		
Austin (1972)	301 Stainless Steel	100		90	10	0/20	.125			LOX
		500		90	10	0/20	.125			LOX
		1000		90	10	0/20	.125			LOX
		1500		90	10	0/20	.125			LOX
		100		300	10	0/20	.125			GOX
		500		300	10	0/20	.125			GOX
		1000		300	10	0/20	.125			GOX
		1500		300	10	0/20	.125			GOX
		15		90	10	0/20	.031			LOX
		15		90	10	0/20	.031			LOX
		15		90	10	0/20	.090			LOX
		100		300	10	0/20	.031			GOX
		500		300	10	0/20	.031			GOX
		1000		300	10	0/20	.031			GOX
		1500		300	10	0/20	.031			GOX
100		300	10	0/20	.063			GOX		
500		300	10	0/20	.063			GOX		
1000		300	10	0/20	.063			GOX		
1500		300	10	0/20	.063			GOX		
Austin (1972)	Inconel 600	15		90	10	0/20	.031			LOX
		15		90	10	0/20	.031			LOX
		15		90	10	0/20	.090			LOX
		100		300	10	0/20	.031			GOX
		500		300	10	0/20	.031			GOX
		1000		300	10	0/20	.031			GOX

ALLOYS cont.

Reference	Materials	Test Pressure (psi)	Ignition Temp. (K)	Test Temp. (K)	Mechanical Impact Energy/Reaction Rate (kg m)	Pneumatic Impact Reaction Rate	Specimen Thickness (in)	Flash Point (K)	Fire Point (K)	Environment		
Austin (1972)	Inconel 718	50		90	10	0/20	.125			LOX		
		100		90	10	0/20	.125			LOX		
		500		90	10	0/20	.125			LOX		
		1000		90	10	0/20	.125			LOX		
		1500		90	10	0/20	.125			LOX		
		500		300	10	0/20	.062			GOX		
		5'		300	10	0/20	.125			GOX		
		100		300	10	0/20	.125			GOX		
		500		300	10	0/20	.125			GOX		
		1000		300	10	0/20	.125			GOX		
		1500		300	10	0/20	.125			GOX		
		10000		300	10	0/20	.012			GOX		
		Austin (1972)	Inconel 750	100		90	10	0/20	.062			LOX
				500		90	10	0/20	.062			LOX
				1000		90	10	0/20	.062			LOX
1500				90	10	0/20	.062			LOX		
100				300	10	0/20	.062			GOX		
500				300	10	0/20	.062			GOX		
1000				300	10	0/20	.062			GOX		
1500				300	10	0/20	.062			GOX		
Austin (1972)	Monel 400			15		90	10	0/20	.031			LOX
				15		90	10	0/20	.062			LOX
				100		300	10	0/20	.031			GOX
				500		300	10	0/20	.031			GOX
				1000		300	10	0/20	.031			GOX
				1500		300	10	2/20	.031			GOX
				1500		300	10	0/20	.031			GOX
		1500		300	10	9.02	.031			GOX		
		1500		300	10	9.02	.031			GOX		
		1500		300	10	8.34	.031			GOX		
		1500		300	10	8.34	.031			GOX		
		100		300	10	10	.062			GOX		
		500		300	10	10	.062			GOX		
		1000		300	10	10	.062			GOX		
		1500		300	10	10	.062			GOX		
Austin (1972)	Inconel 625	10000		420	10	0/20	.05			GOX		
		K-Monel	10000		300	10	0/20	.05			GOX	
			Inconel 718 brazed with Microbrazo alloy	10000		300	10	0/20	.05			GOX



ALLOYS cont.

Reference	Materials	Test Pressure (psi)	Ignition Temp. (K)	Test Temp. (K)	Mechanical Impact Energy Reaction Rate (kg m)	Pneumatic Impact Reaction Rate	Specimen Thickness (m)	Flash Point (K)	Fire Point (K)	Environment
Jakowsky and Butzler(1923)	Brass	15	1350							GOX
		400	1190							GOX
		800	1120							GOX
		1200	1090							GOX
		1600	1070							GOX
		2000	1050							GOX

HALOGENATED COMPOUNDS

Reference	Materials	Test Pressure (psi)	Ignition Temp. (K)	Test Temp. (K)	Mechanical Energy (kg m)	Impact Reaction Rate	Pneumatic Impact Reaction Rate	Specimen thickness (in)	Flash Point (K)	Fire Point (K)	Environment	
Jamison (1970) Pippen and Stradling (1971)	Fluorel 1059	2000	297	2.8	0/12				668	None	GOX	
	Fluorel	5							680	728	GOX	
		25							645	700	GOX	
		50							581	581	GOX	
		100							548	548	GOX	
		500							506	506	GOX	
		1000							506	506	GOX	
Marzani (1968a) (1968b)	Polychloro-trifluoroethylene (CTFE)	4000	700						505	505	GOX	
		2000							494	494	GOX	
												GOX
												GOX
												GOX
												GOX
												GOX
Jamison (1970) Pippen and Stradling (1971)	KEL-F Bar Stock	2000	299	1.4	0/18				745	None	GOX	
	KEL-F-81	5							698	None	GOX	
		25							693	724	GOX	
		50							639	639	GOX	
		1000							647	647	GOX	
		1500							643	643	GOX	
		2000							647	647	GOX	
McQuaid (1972) Marzani (1968a)	CTFE	3800	685								GOX	
	Polytetrafluoroethylene (Teflon)(TFE)	4025	735									
		2000	289	2.8	0/21							GOX
Jamison (1970)	TFE tubing	2000	286	1.4	0/21						GOX	

HALOGENATED COMPOUNDS cont.

Reference	Materials	Test Pressure (psi)	Ignition Temp. (K)	Test Temp. (K)	Mechanical Impact Energy Reaction Rate (kg m) / Rate	Pneumatic Impact Reaction Rate	Specimen Thickness (in)	Flash Point (K)	Fire Point (K)	Environment
Pippen and Stradling (1971)	Glass Filled Teflon	500			1.4 1/2					GOX
		1000			1.4 1/1					GOX
		2500				0/4				GOX
"	Teflon	5								
		25						None	None	GOX
		50						741	None	GOX
		50						754	None	GOX
		100						735	735	GOX
		200						733	733	GOX
		500						728	728	GOX
		1000						707	707	GOX
		1500						645	645	GOX
		2000						637	637	GOX
"	Virgin Teflon Sheet	4000							660	GOX
		4500								GOX
Jamison (1970)	T-EMS372 (J.L. Dore)	5000			.34 0/4					GOX
		2000	289		1.4 0/21					GOX

NON-HALOGENATED PLASTICS

Reference	Materials	Test Pressure (psi)	Ignition Temp. (K)	Test Temp. (K)	Mechanical Impact Energy (kg m)   Rate	Pneumatic Impact Reaction Rate	Specimen Thickness (in)	Flash Point (K)	Fire Point (K)	Environment	
Austria (1972)	Electrofilm 2306	100		90	1.4	0/20				LOX	
		500		90	1.4	0/20				LOX	
		1000		90	1.4	0/20				LOX	
		1500		90	1.4	0/20				LOX	
		100		300	1.4	0/20				GOX	
		500		300	1.4	0/20				GOX	
		1000		300	1.4	0/20				GOX	
		1000		300	1.2	0/20				GOX	
		1000		300	1.1	0/20				GOX	
		1500		300	1.4	4/20				GOX	
		1500		300	1.2	0/20				GOX	
		1500		300	1.1	0/20				GOX	
				100		90	1.4	0/20			LOX
				100		90	1.4	0/20			LOX
				500		90	1.4	0/20			LOX
				500		90	1.4	0/20			LOX
				1000		90	1.4	0/20			LOX
		1000		90	1.4	0/20			LOX		
		1500		90	1.4	0/20			LOX		
		1500		90	1.4	0/20			LOX		
		100		300	1.4	0/20			GOX		
		100		300	1.4	0/20			GOX		
		500		300	1.4	0/20			GOX		
		500		300	1.4	0/20			GOX		
		1000		300	1.4	0/20			GOX		
		1900		300	1.4	0/20			GOX		
		1500		300	1.4	0/20			GOX		
		1500		300	1.4	6/20			GOX		
		1500		300	1.2	5/20			GOX		
		100		90	1.4	0/20			LOX		
		500		90	1.4	0/20			LOX		
		1000		90	1.4	0/20			LOX		
		1500		90	1.4	0/20			LOX		
		100		300	1.4	0/20			GOX		
		500		300	1.4	0/20			GOX		
		1000		300	1.4	0/20			GOX		
		1500		300	1.4	0/20			GOX		
		1500		300	1.4	0/20			GOX		

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NON-HALOGENATED PLASTICS cont.

Reference	Materials	Test Pressure (psi)	Ignition Temp. (K)	Test Temp. (K)	Mechanical Energy Reaction Rate (kg m)	Impact Reaction Rate	Pneumatic Impact Reaction Rate	Specimen Thickness (in)	Flash Point (K)	Fire Point (K)	Environment
Austin(1972)	Epoxy Fiberglass	15		90	1.1	20/20		.050			LOX
		15		90	1.1	20/20		.050			LOX
		15		90	0.76	20/20		.050			LOX
		15		90	0.48	20/20		.050			LOX
		15		90	0.19	4/20		.050			LOX
		15		90	0.094	2/20		.050			LOX
		100		300	1.4	15/20		.050			GOX
		100		300	1.1	20/20		.050			GOX
		100		300	0.76	5/20		.050			GOX
		100		300	0.67	2/20		.050			GOX
		100		300	0.57	0/20		.050			GOX
		100		300	0.48	0/20		.050			GOX
		500		300	0.67	2/5		.050			GOX
		500		300	0.57	0/20		.050			GOX
		1000		300	0.57	1/6		.050			GOX
		1500		300	0.57	1/1		.050			GOX
Pippen and Stradling (1971)	Gemon 3010 Polyimide laminate	4000			1.4	0/4	0/4				GOX
		4500			1.4	1/3	0/1				GOX
Guter(1967)	German Buna Solid Black	15	737								GOX
		300	588								GOX
		750	622								GOX
Pippen and Stradling (1971)	Glass Fabric	5000			1.4	0/4					GOX
Jamison (1970)	Lexan 1100 (Polycarbonate)	2000		297	2.8	0/22					GOX
"	Nylon	2000		299	2.8	0/21					GOX
Guter(1967)	Nylon	750	601								GOX
		1500	522								GOX
		2625	461								GOX
		3750	492								GOX
Pippen and Stradling (1971)	Nylon Sheet	5							665	None	GOX
		25							677	684	GOX
		50							664	664	GOX
		50							570	570	GOX
		100							548	548	GOX
		500							507	507	GOX
		1087							494	494	GOX

NON-HALOGENATED PLASTICS cont.

Reference	Materials	Test Pressure (psi)	Ignition Temp. (K)	Test Temp. (K)	Mechanical Impact Energy (kg m)	Reaction Rate	Pneumatic Impact Reaction Rate	Specimen Thickness (in)	Flash Point (K)	Fire Point (K)	Environment
McQuaid(1972)	Nylon '66' (Valve Seat)	2400	458								GOX
"	Nylon '66'	200	575								GOX
Gutex(1967)	Perpex Block and Shavings	750 1500 2625 3750	562 557 464 497								GOX GOX GOX GOX
Marzani (1968a)	Polyethylene	2525 2400 2350 750 325 325 250 250	452 449 449 452 457.5 457.5 >740.5 >699								GOX GOX GOX GOX GOX GOX GOX GOX
"	70% Polyethylene 30% Fiber-glass	2350	458								GOX
Marzani (1968a)	85% Polyimide 15% Graphite	3350	618								COX
Schwinghamer (1971)	Polyimide #3	50 100 500 1000				0 29% 100% 100%					COX COX COX COX
Marzani (1968a)	Polyimide	3350	620								COX
McQuaid(1972)	Polyimide	3375	622								COX
Gutex(1967)	Polythene	750 1500 2625 3000	508 478 444 476								GOX GOX GOX GOX

NON-HALOGENATED PLASTICS cont.

Reference	Materials	Test Pressure (psi)	Ignition Temp. (K)	Test Temp. (K)	Mechanical Impact Energy Reaction Rate (kg m)	Pneumatic Impact Reaction Rate	Specimen Thickness (in)	Flash Point (K)	Fire Point (K)	Environment
Marzani (1968a)	Polyvinylidene Fluoride	2975	560							GOX
"	Polyurethane	2725	560							GOX
"	Polyurethane Foam, Reticulated	2650	491							GOX
"	Polyurethane Foam Reticulated, Fire Retardant	2450	471							GOX
McQuaid (1972)	Polyurethane Foam, Reticulated	2725	522							GOX
Marzani (1968a)	Polyurethane Foam, Fire Retardant	2450	471							GOX
Guter(1967)	Polyvinyl Alcohol (with H <sub>3</sub> PO <sub>4</sub> )	750 1500 3375	695 728 593							GOX GOX GOX
"	Polyvinyl Chloride (unplasticized)	15 750 1500 2625 3375	717 518 477 433 434							GOX GOX GOX GOX GOX





SEALANTS, THREAD, COMPOUNDS, AND LUBRICANTS

Reference	Materials	Test Pressure (psi)	Ignition Temp. (K)	Test Temp (K)	Mechanical Energy Reaction (kg m)	Pneumatic Impact Reaction Rate	Specimen Thickness (in)	Flash Point (K)	Pure Point (K)	Environment
Guter(1967)	Aircraft Lubricating Oil DE 2472 B/O	15 300 750 1500 2625 3750	582 513 498 483 475 480							GOX GOX GOX GOX GOX GOX
Jamison(1970)	Andox C Oil	2000		299	1.4	0/21				GOX
Nihart and Smith(1964)	Aroclor 1254	2000 7500	649 628							GOX GOX
"	Burnil Brand Microplates	2000 7500	>773 >773							GOX GOX
"	Dixon's Flake Graphite No. 1	2000 7500	>773 >773							GOX GOX
Jamison(1970)	Dow Corning 33 Grease	2000		297	1.4	0/20				GOX
Pippen and Stradling (1971)	Drilube 822	5 25 50 50 100 500 1000 1500 2000						121 648 608 561 576 525 511 473 483	None 677 608 561 576 525 511 473 483	GOX GOX GOX GOX GOX GOX GOX GOX GOX
Nihart and Smith(1964)	Everlube No. 811	2000 7500	489 523							GOX GOX
Austina(1972)	Everlube No. 811	100 500 1000 1500 100 500 1000 1500		90 90 90 90 300 300 300 300	10 10 10 10 10 10 10 10	0/20 0/20 0/20 0/20 0/20 0/20 0/20 0/20	.030 .030 .030 .030 .030 .030 .030 .030			LOX LOX LOX LOX GOX GOX GOX GOX

SEALANTS, THREAD, COMPOUNDS, AND LUBRICANTS cont.

Reference	Materials	Test Pressure (psi)	Ignition Temp. (K)	Test Temp. (K)	Mechanical Impact Energy (kg m)	Impact Rate	Pneumatic Impact Reaction Rate	Specimen Thickness (in)	Flash Point (K)	Fire Point (K)	Environment	
Austin(1972)	Everlube No. 811 B-2	100	90	90	10	0/20		.030			LOX	
		500	90	90	10	0/20		.030				LOX
		1000	90	90	10	0/20		.030				LOX
		1500	90	90	10	2/20		.030				LOX
		1500	90	90	9	0/20		.030				LOX
		1500	90	90	8.3	0/20		.030				LOX
		100	300	300	10	0/20		.030				GOX
		500	300	300	10	0/20		.030				GOX
		1000	300	300	10	0/20		.030				GOX
		1500	300	300	10	0/20		.030				GOX
		100	90	90	10	0/20		.030				LOX
		500	90	90	10	0/20		.030				LOX
		1000	90	90	10	0/20		.030				LOX
		1500	90	90	10	0/20		.030				LOX
		100	300	300	10	0/20		.030				GOX
500	300	300	10	0/20		.030				GOX		
1000	300	300	10	0/20		.030				GOX		
1500	300	300	10	0/20		.030				GOX		
Nihart and Smith(1964)	Fluorinated Hydrocarbon	50				0					GOX	
		100				20 %					GOX	
		500				50 %					GOX	
		1000				66.6 %					GOX	
Austin(1972)	Fluorolube GR 290	100	90	90	10	0/20		.030			LOX	
		500	90	90	10	0/20		.030				LOX
		1000	90	90	10	0/20		.030				LOX
		1500	90	90	10	0/20		.030				LOX
		100	300	300	10	0/20		.030				GOX
		500	300	300	10	0/20		.030				GOX
		1000	300	300	10	0/20		.030				GOX
		1500	300	300	10	0/20		.030				GOX
		1500	300	300	9	5/20		.030				GOX
		1500	300	300	8.3	0/20		.030				GOX
		1500	300	300	7.6	0/20		.030				GOX

SEALANTS, THREAD, COMPOUNDS, AND LUBRICANTS cont.

Reference	Materials	Test Pressure (psi)	Ignition Temp. (K)	Test Temp. (K)	Mechanical Impact Energy (kg m); Rate	Pneumatic Impact Reaction Rate	Specimen Thickness (in)	Flash Point (K)	Fire Point (K)	Environment
Austin(1972)	Halocarbon 4-11ES	100		90	10	0/20	.030			LOX
		500		90	10	0/20	.030			LOX
		1000		90	10	0/20	.030			LOX
		1500		90	10	0/20	.030			LOX
		100		300	10	0/20	.030			GOX
		500		300	10	0/20	.030			GOX
		1000		300	10	0/20	.030			GOX
		1500		300	10	0/20	.030			GOX
		100		90	10	0/20	.030			LOX
		500		90	10	0/20	.030			LOX
		1000		90	10	0/20	.030			LOX
		1500		90	10	0/20	.030			LOX
		100		300	10	0/20	.030			GOX
		500		300	10	0/20	.030			GOX
		1000		300	10	0/20	.030			GOX
"	Halocarbon 10-25E	100		90	10	0/20	.030			LOX
		500		90	10	0/20	.030			LOX
		1000		90	10	0/20	.030			LOX
		1500		90	10	0/20	.030			LOX
		100		300	10	0/20	.030			GOX
		500		300	10	0/20	.030			GOX
		1000		300	10	0/20	.030			GOX
		1500		300	10	0/20	.030			GOX
		100		300	8.3	12/20	.030			GOX
		500		300	7.6	2/20	.030			GOX
		1000		300	7.0	0/20	.030			GOX
		1500		300	7.0	0/20	.030			GOX
		100		90	10	0/20	.030			LOX
		500		90	10	0/20	.030			LOX
		1000		90	10	0/20	.030			LOX
1500		90	10	0/20	.030			LOX		
"	Halocarbon 14-25ES	100		90	10	0/20	.030			LOX
		500		90	10	0/20	.030			LOX
		1000		90	10	0/20	.030			LOX
		1500		90	10	0/20	.030			LOX
		100		300	10	0/20	.030			GOX
		500		300	10	0/20	.030			GOX
		1000		300	10	0/20	.030			GOX
		1500		300	10	0/20	.030			GOX
		1500		300	9	2/20	.030			GOX
		1500		300	8.3	0/20	.030			GOX
		100		90	10	0/20	.030			LOX
		500		90	10	0/20	.030			LOX
		1000		90	10	0/20	.030			LOX
		1500		90	10	0/20	.030			LOX
		100		300	10	0/20	.030			GOX
500		300	10	0/20	.030			GOX		
1000		300	10	0/20	.030			GOX		
1500		300	10	0/20	.030			GOX		



SEALANTS, THREAD, COMPOUNDS, AND LUBRICANTS cont

Reference	Materials	Test Pressure (psi)	Ignition Temp. (K)	Test Temp. (K)	Mechanical Impact Energy/Reaction Rate (kg m)	Pneumatic Impact Reaction Rate	Specimen Thickness (in)	Flash Point (K)	Fire Point (K)	Environment
Nihart and Smith(1964)	High Purity Coop	2000, 7500	684							GOX
Austin(1972)	Inlox 44	100	90	90	10	0/20	.030			LOX
		500	90	90	10	0/20	.030			LOX
		1000	90	90	10	0/20	.030			LOX
		1500	90	90	10	0/20	.030			LOX
		100	300	300	10	0/20	.030			GOX
		500	300	300	10	0/20	.030			GOX
		1000	300	300	10	0/20	.030			GOX
		1500	300	300	10	0/20	.030			GOX
Jamison(1970)	Invelco 33F Grease	2000	294	294	10	0/20				GOX
Nihart and Smith(1964)	KEL-F 90 Grease	2000	708	708						GOX
		7500	708	708						GOX
Austin(1972)	Krytox 280-AB	100	90	90	10	0/20	.030			LOX
		500	90	90	10	0/20	.030			LOX
		1000	90	90	10	0/20	.030			LOX
		1500	90	90	10	0/20	.030			LOX
		100	300	300	10	0/20	.030			GOX
		500	300	300	10	0/20	.030			GOX
		1000	300	300	10	0/20	.030			GOX
		1500	300	300	10	0/20	.030			GOX
Pippen and Stradling(1971)	Krytox 240 AC Grease	5						621	None	GOX
		25						429	None	GOX
		50						None	None	GOX
		50						739	731	GOX
		100						731	731	GOX
		500						725	725	GOX
		1000						689	689	GOX
		1500						703	703	GOX
		2000						689	689	GOX
"	Krytox 240 J.C Grease	5000	300	300	1.4	0/4				GOX
Jamison(1970)	Krytox 240 AC Grease	2000	297	297	1.4	0/20				GOX



ELASTOMERS

Reference	Materials	Test Pressure (psi)	Ignition Temp. (K)	Test Temp. (K)	Mechanical Energy Reaction Rate (kg m) / Rate	Pneumatic Impact Reaction Rate	Specimen Thickness (n)	Flash Point (K)	Fire Point (K)	Environment	
Pippen and Stradling (1971)	Burma-N Rubber	5000		300	0.34	0/4				GOX	
		1500		300	0.34	0/4				GOX	
		2000		300	0.34	0/4				GOX	
	" Butyl Rubber	5							650	None	GOX
		25							619		GOX
		50							617		GOX
50								503		GOX	
" "	100							494		GOX	
	500							453		GOX	
	1000							439		GOX	
	1500							431		GOX	
	2000									GOX	
Nihart and Smith (1964)	Duroid 5600	7500	742							GOX	
	Duroid 5650	7500	725							GOX	
	Duroid 5870	7500	730							GOX	
	Duroid 5813	7500	736							GOX	
McQuaid (1972)	Ethylene Propylene Rubber	2475	456.5							GOX	
	Ethylene Propylene Rubber	2500	457							GOX	
Marzani (1968)	Ebonite	750	455							GOX	
		1500	435							GOX	
		2625	417							GOX	
		3750	419							GOX	
Jamison (1970)	Ethylene Propylene Rubber-EMS	2000		294	1.4	5/9				GOX	
	388 (EPR)										
Pippen and Stradling (1971)	Fluorosilicone Elastomer	2500		300	1.4	0/2	0/4			GOX	
		3000		300	1.4	0/2	1/4			GOX	
		3500		300	1.4	0/2	1/2			GOX	
		4000		300	1.4	0/2	1/2			GOX	
		4500		300	1.4	0/2	4/4			GOX	
		5000		300	1.4	0/8				GOX	





ELASTOMERS cont.

Reference	Materials	Test Pressure (psi)	Ignition Temp (K)	Test Temp. (K)	Mechanical Impact Energy/Reaction Rate (kg m) Rate	Pneumatic Impact Reaction Rate	Specimen Thickness (in)	Flash Point (K)	Fire Point (K)	Environment
McQuaid (1972)	Neoprene (Valve Diaphragm)	2300	454							GOX
		1000		300		0/4				GOX
		1500		300		2/3				GOX
		4500		300		4/4				GOX
		5000		300	0.34	0/4				GOX
Guter (1967)	Neoprene	750	579							GOX
		1500	558							GOX
		2625	518							GOX
		3750	478							GOX
Pippen and Stradling (1971)	Neoprene	5							None	CO <sub>2</sub>
		25						611		CO <sub>2</sub>
		50						600	602	CO <sub>2</sub>
		50						649	649	CO <sub>2</sub>
		100						507	507	CO <sub>2</sub>
		500						506	506	CO <sub>2</sub>
		1000						496	496	CO <sub>2</sub>
		1500						496	496	CO <sub>2</sub>
		1500						460	460	CO <sub>2</sub>
		2000						465	465	CO <sub>2</sub>
"	Red Fiber Sheet	5000		300	0.34	0/4				GOX
		1500		300		0/4				GOX
		2000		300		1/2				GOX
		2500		300		1/2				GOX
		3000		300		4/4				GOX
Guter (1967)	Red Vulcanized Fiber Block	15	648							GOX
		750	545							GOX
		1500	493							GOX
		2625	483							GOX
		3750	485							GOX
Guter (1967)	Red Vulcanized Fiber Shavings	15	625							GOX
		750	546							GOX
		1500	488							GOX
		2625	462							GOX
		3750	418							GOX
"	Rubber Diaphragms	750	503							GOX
		1500	448							GOX
		3750	410							GOX

ELASTOMERS cont.

Reference	Materials	Test Pressure (psi)	Ignition Temp. (K)	Test Temp. (K)	Mechanical Energy/Reaction Rate (kg m)	Pneumatic Impact Reaction Rate	Specimen Thickness (in)	Flash Point (K)	Fire Point (K)	Environment
Nihart and Smith (1964)	Rulon A	7500	737							GOX
"	Rulon B	7500	736							GOX
"	Rulon C	7500	735							GOX
Jamison (1970)	Si Elastomer SE-342	2000	294	294	1.4	4/20				GOX
"	Si Elastomer	2000	297	297	1.4	5/9				GOX
Pippen and Stradling (1971)	Silicone Elastomer	1000	300	300	1.4	0/4				GOX
		1500	300	300	1.4	1/2				GOX
		2000	300	300	1.4	4/4				GOX
		3000	300	300			0/4			GOX
		3500	300	300			4/4			GOX
		4500	300	300	0.34	0/4				GOX
		5000	300	300	0.34	1/2				GOX
"	Silicone C-Ring	5						None	None	GOX
		25						684	702	GOX
		50						688	688	GOX
		50						610	610	GOX
		100						656	656	GOX
		500						527	527	GOX
		1000						496	496	GOX
		1500						503	503	GOX
		2000						501	501	GOX
Jamison (1970)	Silicone Rubber Primer A-4094	2000	299	299	1.4	0/21				GOX
"	Primer SS-4004	2000	297	297	1.4	3/6				GOX
Schwinghamer (1971)	Silicone	50				50%				GOX
		100				100%				GOX
		500				100%				GOX
		1000								GOX
Jamison (1970)	Silicone 5537	20	296.5	296.5	2.8	0/21				GOX
		100	299.5	299.5	2.8	3/9				GOX
		2000	296.5	296.5	1.4	7/16				GOX
Guter (1967)	Silicone Rubber	750-3750	598							GOX





MISCELLANEOUS cont.

Reference	Materials	Test Pressure (psi)	Ignition Temp. (K)	Test Temp. (K)	Mechanical Energy Reaction (kg m <sup>2</sup> /l Rate)	Impact Reaction Rate	Pneumatic Impact Reaction Rate	Specimen Thickness (in)	Flash Point (F)	Fire Point (K)	Environment
Austin(1972)	Epoxy	15		90	10	20/20		0.05			LOX
	Fiberglass	15		90	7.62	20/20		0.05			LOX
		15		90	5.54	20/20		0.05			LOX
		15		90	3.46	20/20		0.05			LOX
		15		90	1.38	4/20		0.05			LOX
		15		90	0.68	2/20		0.05			LOX
		100		300	10	15/20		0.05			GOX
		100		300	7.62	20/20		0.05			GOX
		100		300	5.54	20/20		0.05			GOX
		100		300	4.86	2/20		0.05			GOX
		100		300	4.17	0/20		0.05			GOX
		100		300	3.46	0/20		0.05			GOX
		500		300	4.86	2/5		0.05			GOX
		500		300	4.17	0/20		0.05			GOX
		1000		300	4.17	1/6		0.05			GOX
		1500		300	4.17	1/1		0.05			GOX
Guter(1967)	GACO Seats	750	673								GOX
	Grade H22	1500	604								GOX
		3750	455								GOX
Marzani (memo)	Graphite	3800	724								GOX
Guter(1967)	Lamp Black	750	646								GOX
Jamison (1970)	Loctite			294	1.4	0/20					GOX
	Grade C	2000									GOX
Pippen and Stradling (1971)	FLV Viton Tarnent	25							None	None	GOX
		50							701	701	GOX
		50							617	617	GOX
		100							632	632	GOX
		500							574	574	GOX
		1000							559	559	GOX
		1500							507	507	GOX
		2000							516	516	GOX
Jamison (1970)	RTV	2000		297	1.4	4/4					GOX
Guter(1967)	Resin Bonded Fabric	750	483								GOX
		1500	474								GOX
		3750	434								GOX
Jamison (1970)	Scot Weld Structural	2000		297	1.4	2/19					GOX
"	Viton Cement Coating Material	2000		299	1.4	0/20					GOX

**APPENDIX II - NONMETALLIC MATERIALS DESIGN GUIDELINES AND  
TEST DATA HANDBOOK, APPENDIX E MATERIALS TEST  
DATA FOR APPLICATIONS IN HIGH PRESSURE OXYGEN  
AND OTHER HAZARDOUS FLUIDS, NASA, MSC-02681 (1972)**

## APPENDIX E MATERIALS TEST DATA FOR APPLICATIONS IN HIGH PRESSURE OXYGEN AND OTHER HAZARDOUS FLUIDS

### E1.0 INTRODUCTION

The test data presented in this appendix is from a computer generated report, NB/RT-71-45, dated February 1972. It is sorted by manufacturer's designation and presents thermal reaction data for materials tested in oxygen or other hazardous fluids. These tests were initiated as a result of the Apollo 13 investigation and were incorporated as Apollo Program Office requirements by addendum 2 of MSC-PA-D-67-13, Apollo Spacecraft Nonmetallic Materials Requirements.

The tests included in this report are:

- Pneumatic impact in gaseous oxygen
- Mechanical impact in gaseous oxygen
- Thermogravimetric analysis
- Flash and fire point
- Reaction propagation in fluids other than oxygen
- Auto ignition
- Fluid impact in liquid oxygen and other fluids

E2 ENCODING KEY

MATERIAL TEST DATA BY MANUFACTURER'S DESIGNATION AS OF (DATE) **17**

MFUR'S DESIGNATION	MANUFACTURER	SPEC. THICK.	TEST RPT NO.	TEST ENVR	TEST PRESS	TEST TEMP	IMPT ENER	NO OF REACT	FLASH POINT	FIRE PT	PROP DIST	% WT LOSS	R T CODE	MATL CODE	
<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>	<b>6</b>	<b>7</b>	<b>8</b>	<b>9</b>	<b>10</b>	<b>11</b>	<b>12</b>	<b>13</b>	<b>14</b>	<b>15</b>	<b>16</b>

**1** MANUFACTURER'S DESIGNATION This column contains the identification of the material, composite, component, or assembly and the stock or formulation number or other unique designation that a manufacturer has assigned to it.

**2** MANUFACTURER This column contains names of the manufacturer, formulator or producer of the material, component, assembly, etc., which has been tested.

**3** SPECIMAN THICKNESS The thickness of the material in the particular test shown.

**4** TEST REPORT NUMBER The test report number is the number assigned to the test report by the facility performing the test. The dash number suffix indicates that multiple tests were performed for the given test type (reference 15).

**5** TEST ENVIRONMENT This column contains the environment (gaseous or liquid) in which the material was tested.

**6** TEST PRESSURE This column contains the pressure, in psia, which the material tests were performed.\*

**7** TEST TEMPERATURE This column contains the test temperature in degrees Fahrenheit (°F).\*

**8** IMPACT ENERGY This column contains impact energy notations for foot pounds per square inch.

**9** NUMBER OF REACTIONS This column contains the number of reactions per the total number of specimen tested.

**10** FLASH POINT Flash point temperature in degrees Fahrenheit (°F). For tests terminated before flash point is determined, entry is the letter "N" followed by the test termination temperature e.g., N420 indicates test terminated at 420°F. Test termination temperatures exceeding 1000°F will be entered at N999.

**11** FIRE POINT Fire point temperature in degrees Fahrenheit (°F). For tests terminated before fire point is determined, entry is the letter "N" followed by the test termination temperature; e.g., N500 indicates test terminated at 500°F. Test termination temperatures exceeding 1000°F will be entered at N999.

**12** PROPAGATION DISTANCE This column contains the flame propagation distance in inches from the point of ignition. A propagating glow will be reported as a propagating flame.

**13** PERCENTAGE WEIGHT LOSS This column shows the percent weight lost by the sample during the thermogravimetric test.

\*The temperature and pressure shown for the autoignition test No. 15 is the maximum temperature and pressure occurring during the test.



14 Results indicator code indicates the results of the test. These codes and their definitions are shown in the following tables.

Code	Result Indicator (RI) Code Definition	Code	Result Indicator (RI) Code Definition
A	No ignition (defined as no evidence of having been ignited after ignition source has been removed). (11)	K	Case burst vented or sealed container
B	Self-extinguishing (defined as, in the event of ignition, that the flame will go out within 3.0 inches of sample length after the ignition source has been removed). (10)	L	Case external wall temperature exceeded 450°F.
C	Propagated partially, (flame propagated completely across sample). (5)	M	Material transfer. Material sparked, splattered, spouted flame, dripped globules of burning matter, or otherwise gave evidence of matter transfer. (2)
D	Propagated completely. (Flame propagated completely across sample). (4)	N	No external effect (vented or sealed container).
E	Ignited explosively. (1)	P	Emission of toxic gas or fumes (vented or sealed container).
F	Light smoke, visible (8)	Q	Emission of sparks or flames (vented or sealed container).
G	Smoldering combustion: (Material combustion was evidenced by a glow rather than a flame). (9)	R	Discoloration
H	No evidence of fire; however, severe deformation of configuration resulfured. (Not to be used with sample tests.)	S	Smoke, heavy, and dark. (7)
I	Inconclusive results. (related to configuration testing--not to be used with sample tests.)	T	Evidence of combustion (no rate measured)
J	Soot and/or char detectable. (6)	V	Detonation
		W	Odor produced.
		X	Material burned at a high rate, too fast to measure, but not classified as an explosion. (3)
		Y	Melted (not accompanied by burning).
		Z	See Test Report

15 Test type code indicates type of test performed. These codes and their definitions appear in the following table.

Code	Test Type (TT) Code Definition
10	Pneumatic Impact (Gaseous Oxygen)
11	Mechanical Impact (Gaseous Oxygen)
12	Thermo-gravimetric Analysis (TGA)
13	Flame and Fire Point
14	Reaction Propagation Test
15	Autoignition Test
16	Fluid Impact Test (LOX and other fluids)

16 MATERIAL CODE Material code, a six-letter (three pair) code capable of defining materials, components, subassemblies, etc. generically and functionally. The first pair of letters of these codes describes the functional applications for which the material is tested. The second pair of letters describes the basic chemical composition of the material and the third pair of letters describes additional information, primarily of a chemical nature if available.

17 DATE OF REPORT Date report is generated.

The following information is a listing of material usage and generic identification found in the NB/PT-71-45 Test Data Listing. This code contains six letters (three groups of two each). The first group refers to the functional application of the material, while the second gives the chemical composition. The third group will give additional information, usually chemical information if available. Reference is made to all of this information as number sixteen of the key on pages E2-1 and E2-2.

E2 CODES OF MATERIAL USAGE AND GENERIC IDENTIFICATION

NASA MATERIAL CODES (COMBAT)  
DEFINITION

CODE LISTING

AA	ABSORBER	ABSORBER, N.O.C.	1
AB	ADHES	ADHESIVE, N.O.C.	1
AC	ADHES, FILM	ADHESIVE FILM	1
AD	ADHES, HOT MELT	ADHESIVE, HOT MELT	1
AE	ADHES, LIQUID	ADHESIVE, LIQUID	1
AF	ADHES, PRESS SENS	ADHESIVE, PRESSURE SENSITIVE	1
AG	ADHES, PRIMER	ADHESIVE, PRIMER	1
AH	BEARING MATL	BEARING MATERIAL, N.O.C.	1
AI	CHEMICAL	CHEMICAL, N.O.C.	1
AK	COATG	COATING, N.O.C.	1
AL	COATG, CONFORMAL	COATING, CONFORMAL	1
AH	COATG, ELEC CONDUCT	COATING, ELECTRICALLY CONDUCTIVE	1
AM	COATG, FLUIDIZED	COATING, FLUIDIZED	1
AO	COATG, FRICTION	COATING, FRICTION	1
AP	COATG, INK	COATING, INK, N.O.C.	1
AO	COATG, INK, S SCRIN	COATING, INK, SILK SCREEN	1
AR	COATG, INTUMESCENT	COATING, INTUMESCENT	1
AS	COATG, LACQUER	COATING, LACQUER	1
AT	COATG, PAINT	COATING, PAINT	1
AU	COATG, PRIMER	COATING, PRIMER	1
AV	COATG, TEMP CONTROL	COATING, TEMPERATURE CONTROL	1
AH	COMPOUND, N.O.C.	COMPOUND, N.O.C.	1
AX	COMPOUND, GREASELIKE	COMPOUND, GREASE, N.O.C.	1
AY	COMPOUND, HEATSINK	COMPOUND, HEATSINK	1
AZ	COMPOUND, MOLDING	COMPOUND, MOLDING	1
BA	COMPOUND, POTTING	COMPOUND, POTTING	1
BB	COMPOSITE	COMPOSITE, N.O.C.	1
BC	CONNECTOR, ELEC	CONNECTOR, ELECTRICAL	1
BD	ELEC PART	ELECTRICAL PART, N.O.C.	1
BE	ELEC PART, MOLDED	ELECTRICAL PART, MOLED	1
BF	FABRIC	FABRIC, N.O.C.	1
BG	FABRIC, COAT/IMPREG	FABRIC, COATED OR IMPREGNATED	1
9H	FABRIC, ELASTIC	FABRIC, ELASTIC	1
BI	FABRIC, FELT	FABRIC, FELT	1
BJ	FABRIC, FLATWEAVE	FABRIC, FLATWEAVE	1

NASA MATERIAL CODES (CONAT)  
DEFINITION

CODE LISTING

BK	FABRIC, DUCK WEAVE	FABRIC, DUCK WEAVE	1
BL	FABRIC, OPEN WEAVE	FABRIC, OPEN WEAVE	1
BM	FABRIC, WEBBING	FABRIC, WEBBING	1
BN	FASTENER	FASTENER, N.O.C.	1
BO	FASTENER, HOOK + PILE	FASTENER, HOOK AND PILE	1
BP	FILM	FILM, N.O.C.	1
CO	FILM, RUBBER	FILM, RUBBER	1
BR	FILM, DRAFTING	FILM, DRAFTING	1
BS	FILM, PHOTOGRAPHIC	FILM, PHOTOGRAPHIC	1
BT	FINISH	FINISH, N.O.C.	1
BU	FINISH, INORGANIC	FINISH, INORGANIC	1
BV	FLUID	FLUID, N.O.C.	1
BW	FLUID, HALOCARBON	FLUID, HALOCARBON, N.O.C.	1
BY	FLUID, PERFLUORO	FLUID, PERFLUORO, N.O.C.	1
BZ	FLUX	FLUX	1
CA	FOAM	FOAM, N.O.C.	1
CB	FOAM, FLEX, CLOSED CELL	FOAM, FLEXIBLE CLOSED CELL	1
CC	FOAM, FLEX, OPEN CELL	FOAM, FLEXIBLE OPEN CELL	1
CD	FOAM, METALLIC	FOAM, METALLIC	1
CE	FOAM, RIGID, CLOSED CELL	FOAM, RIGID, CLOSED CELL	1
CF	FOAM, RIGID, OPEN CELL	FOAM, RIGID, OPEN CELL	1
CG	FOOD	FOOD, N.O.C.	1
CH	GASKETING/SEAL	GASKETING OR SEAL, N.O.C.	1
CI	GASKETING/SEAL, RFI	GASKETING OR SEAL, RADIO FREQUENCY INTERFERENCE SHIELD	1
CJ	IMPREGNANT	IMPREGNANT, N.O.C.	1
CK	INSUL, THERM	INSULATION, THERMAL, N.O.C.	1
CL	INSUL, THERM, COMPOS	INSULATION, THERMAL, COMPOSITE	1
CM	INSUL, THERM, FILM	INSULATION, THERMAL, FILM	1
CN	LABEL	LABEL, N.O.C.	1
CO	LAM	LAMINATE, N.O.C.	1
CP	LAM, ASBESTOS BASE	LAMINATE, ASBESTOS BASE	1
CQ	LAM, COTTON CL BASE	LAMINATE, COTTON CLOTH BASE	1
CR	LAM, GLASS FIBER BASE	LAMINATE, GLASS FIBER BASE	1
CS	LAM, MICA BASE	LAMINATE, MICA BASE	1

NASA MATERIAL CODES (CONT)

CODE LISTING

CODE	DEFINITION	
CT	LAM, PAPER BASE	1
CU	LAM, PREPREG	1
CV	LEATHER, N.O.C.	1
CA	LEATHER, NATURAL	1
CY	LEATHER, SYNTHETIC	1
CZ	LUBE	1
DA	LUBE, DRY FILM	1
DR	LUBE, GREASE	1
DC	LUBE, OIL	1
DD	MISC	1
DE	MISC, BAG	1
DF	MISC, BOTTLE	1
DG	MISC, PAD	1
DH	MISC, WAX	1
DI	PAPER	1
DJ	PHARMACEUTICALS	1
DK	PLASTIC	1
DL	PLASTIC, MOLD RESIN	1
DM	ROD	1
DN	ROD, PLASTIC	1
DO	RUBBER	1
DP	SEALANT MATL	1
DD	SEALANT MATL, 1 PART	1
DR	SEALANT MATL, 2 PART	1
DS	SEALANT MATL, THREAD	1
DT	SHEET	1
DU	SHEET, PLASTIC	1
DV	SHEET, RUBBER	1
UN	SLEEVE, SOLDER	1
DX	SOLVENT	1
DY	TAPE	1
DZ	TAPE, ADHES SURF	1
EA	TAPE, ELASTIC	1
EB	TAPE, ELECTRICAL	1
EC	TAPE, LACING	1
	LAMINATE, PAPER BASE	1
	LAMINATE, PREIMPREGNATED	1
	LEATHER, N.O.C.	1
	LEATHER, NATURAL	1
	LEATHER, SYNTHETIC	1
	LUBRICANT, N.O.C.	1
	LUBRICANT, DRY FILM	1
	LUBRICANT, GREASE	1
	LUBRICANT, OIL	1
	MISCELLANEOUS, N.O.C.	1
	MISCELLANEOUS, BAG	1
	MISCELLANEOUS, BOTTLE	1
	MISCELLANEOUS, PAD	1
	MISCELLANEOUS, WAX	1
	PAPER, N.O.C.	1
	PHARMACEUTICALS, N.O.C.	1
	PLASTIC, N.O.C.	1
	PLASTIC, MOLDING RESIN, N.O.C.	1
	ROD, N.O.C.	1
	ROD, PLASTIC	1
	RUBBER, N.O.C.	1
	SEALANT MATERIAL (EXCLUDES GASKETING, ETC. SEE GASKETING)	1
	SEALANT MATERIAL, 1 PART	1
	SEALANT MATERIAL, 2 PART	1
	SEALANT MATERIAL, THREAD	1
	SHEET, N.O.C.	1
	SHEET, PLASTIC	1
	SHEET, RUBBER	1
	SLEEVE, SOLDER, N.O.C.	1
	SOLVENT, N.O.C.	1
	TAPE, N.O.C.	1
	TAPE, ADHESIVE SURFACE	1
	TAPE, ELASTIC	1
	TAPE, ELECTRICAL	1
	TAPE, LACING	1

NASA MATERIAL CODES (CONAT)  
DEFINITION

CODE LISTING

CODE	DEFINITION	1
ED	THREAD	1
EF	TUBING	1
EG	TUBING, FLEXIBLE	1
EH	TUBING, HEATSHRINK	1
EI	TUBING, PLASTIC	1
EJ	TUBING, RIGID	1
EK	TUBING, RUBBER	1
EL	WIRE	1
EM	WIRE, CABLE	1
EN	WIRE, CABLE, SHLD	1
EO	WIRE, COAX	1
EP	WIRE, INSULATED	1
EQ	WIRE, SHIELED	1
ER	WIRE, MAGNET	1
ES	FOAM, FLEX	1
ET	FOAM, RIGID	1
EU	CORD	1
EV	COMP, ABLATIVE	1
EX	ASSY	1
EY	CONTAINER	1
EZ	ASSY, FLEC	1
FA	ASSY, HYD	1
FB	ASSY, COMPLEX	1
FC	ASSY, MECH	1
FD	ASSY, PANEL	1
FE	ASSY, PNEU	1
FF	ASSY, WIREBDL	1
FG	ASSY, SUIT	1
FH	FOAM, LIQUID	1
FI	DISK	1
FJ	INSULATION	1
FK	SOLDERING MATL	1
FL	BRAZING MATL	1
FM	WELDING MATL	1
	THREAD, N.O.C.	1
	TUBING, N.O.C.	1
	TUBING, FLEXIBLE	1
	TUBING, HEAT SHRINK	1
	TUBING, PLASTIC	1
	TUBING, RIGID	1
	TUBING, RUBBER	1
	WIRE, N.O.C.	1
	WIRE, CABLE	1
	WIRE, CABLE, SHIELDED	1
	WIRE, COAXIAL	1
	WIRE, INSULATED	1
	WIRE, SHIELDED	1
	WIRE, MAGNET	1
	FOAM, FLEXIBLE, N.O.C.	1
	FOAM, RIGID, N.O.C.	1
	CORD (NOT ELECTRICAL)	1
	COMPOUND, ABLATIVE	1
	ASSEMBLY, N.O.C.	1
	CONTAINER	1
	ASSEMBLY, ELECTRICAL	1
	ASSEMBLY, HYDRAULIC	1
	ASSEMBLY, COMPLEX	1
	ASSEMBLY, MECHANICAL	1
	ASSEMBLY, PANEL	1
	ASSEMBLY, PNEUMATIC	1
	ASSEMBLY, WIREBUNDLE, INCLD HARNESS WITH/NO CLMPS, CNECT	1
	ASSEMBLY, SUIT OR MAJOR PORTIONS THEREOF.	1
	FOAM, LIQUID	1
	DISK, N.O.C.	1
	INSULATION, N.O.C.	1
	SOLDERING MATL, N.O.C.	1
	BRAZING MATL, N.O.C.	1
	WELDING, N.O.C.	1

NASA MATERIAL CODES (CORAT)  
DEFINITION

CODE LISTING

PS	PROCESS SPECS USED ON	DETAIL DMS	1
XX		N.O.C.	1

NASA MATERIAL CODES (CONAT)  
DEFINITION

CODE LISTING

AA	ACRYLIC LATEX	ACRYLIC LATEX	2
AB	EPOXY ESTER	EPOXY ESTER	2
AC	LATEX	LATEX, N.O.C.	2
AD	MODIFIED	MODIFIED (FOR USE IN COLUMNS 5 + 6)	2
AE	PVC, PLASTISOL	POLYVINYL CHLORIDE, PLASTISOL OR ORGANOSOL	2
AF	SHELLAC	SHELLAC	2
AG	URETHANE, H2O CURED	URETHANE, MOISTURE CURED	2
AH	ZINC CHROMATE PIGT	ZINC CHROMATE PIGMENTED	2
AI	ABS	ACRYLONITRILE-BUTADIENE-STYRENE	2
AJ	ACETAL, POM	ACETAL, E.G., COPOLYMER (CELCON), HOMOPOLYMER (DELTRIN)	2
AK	ACRYLIC	ACRYLIC, N.O.C.	2
AL	ACRYLIC, BUTYL METH.	ACRYLIC, BUTYL METHACRYLATE	2
AM	ACRYLIC, PHMA, CAST	ACRYLIC, METHYL METHACRYLATE, CAST	2
AN	ACRYLIC, PHMA, MLDG	ACRYLIC, METHYL METHACRYLATE, MOLDING TYPE	2
AO	ALKYD	ALKYD, N.O.C.	2
AP	ALLYL	ALLYL, N.O.C.	2
AQ	ALLYL, DAP	ALLYL, DIALLYL PHTHALATE	2
AR	AMINO	AMINO, N.O.C.	2
AS	AMINO, MELA-FORM(MF)	AMINO, MELAMINE-FORMALDEHYDE (MF)	2
AT	AMINO, UREA-FORM(UF)	AMINO, UREA-FORMALDEHYDE	2
AU	CELLULOSIC	CELLULOSIC, N.O.C.	2
AV	CELLULOSE ACETATE	CELLULOSE ACETATE	2
AH	CELLULOSE ACET-BUT	CELLULOSE ACETATE-BUTYRATE	2
AX	CELLULOSE, ETHYL	ETHYL CELLULOSE	2
AY	CELLULOSE NITRATE	CELLULOSE NITRATE	2
AZ	CELLULOSE PROPION.	CELLULOSE PROPIONATE	2
BA	CELLULOSE TRIACET.	CELLULOSE TRIACETATE	2
BB	CHLORIN, POLYETHER	CHLORINATED POLYETHER (E.I. PENTRON)	2
	FREONS	NO CODE-TRADE NAME DUPONT	
	ISOCYANATES	NO CODE-SEE URETHANE.	
	MELAMINE	NO CODE-SEE AMINO	
	SPANDEX	SEE URETHANE, SPANDEX FOR CODE	
	UREA	NO CODE-SEE AMINO	



NASA MATERIAL CODES (COMAT)  
DEFINITION

CODE LISTING

BC	CHLOROFLUORO	CHLOROFLUORO,N.O.C.	2
BD	CTFE	CHLOROTRIFLUOROETHYLENE,N.O.C.	2
BE	CTFE, FILLED	POLYCHLOROTRIFLUOROETHYLENE, FILLED	2
BF	CTFE RESIN	POLYCHLOROTRIFLUOROETHYLENE RESIN (E.G.,KEL-F 81,82)	2
BG	EPOXY	EPOXY,N.O.C.	2
BH	EPOXY, AMINE CURED	EPOXY, AMINE CURED	2
BI	EPOXY, ANHYD. CURED	EPOXY, ANHYDRIDE CURED	2
BJ	EPOXY, CATALYT. CURED	EPOXY, CATALYTICALLY CURED (E.G.,RF3-400 CURED)	2
BK	EPOXY, NOVOLAK	EPOXY, NOVOLAK	2
BL	EPOXY, POLYAM. CURED	EPOXY, POLYAMIDE CURED	2
BM	EPOXY, PROPRI. OR UNK	EPOXY, PROPRIETARY OR UNKNOWN	2
BN	EVA (ETH-VINYLACET)	EVA (ETHYLENE-VINYL ACETATE),N.O.C.	2
BO	FEP	PERFLUORO (ETHYLENE-PROPYLENE) COPOLYMER	2
BP	FLUORO	FLUORO,N.O.C.	2
BQ	FURAN	FURAN,N.O.C.	2
BR	IONOMER	IONOMER,N.O.C.(E.G.,SURLYN A)	2
BS	NYLON	NYLON,N.O.C.	2
BT	NYLON (6,6)	NYLON, 6,6 TYPE	2
BU	NYLON, SOLUBLE	NYLON, SOLUBLE	2
BV	NYLON, AROMATIC	NYLON, AROMATIC (E.G.,NOMEX)	2
BW	PARYLENE, N.O.C.	PARYLENE,N.O.C.	2
BX	PHENOLIC (PF)	PHENOLIC(PF)(PHENOL-FORMALDEHYDE)	2
BY	PLASTICS	PLASTICS,N.O.C.	2
BZ	POLYBUTYLENE	POLYBUTYLENE,N.O.C.	2
CA	POLYCARBONATE(PC)	POLYCARBONATE,N.O.C.	2
CB	POLYESTHER	POLYESTHER,N.O.C.	2
CC	PE TEREPHTHALATE	POLYETHYLENE TEREPHTHALATE(PETP)	2
CD	POLYIMIDE	POLYIMIDE,N.O.C.	2
CE	POLYOLEFIN	POLYOLEFIN,N.O.C.	2
CF	POLYOLEFIN, PE	POLYOLEFIN, POLYETHYLENE	2
CG	POLYOLEFIN, PP	POLYOLEFIN, POLYPROPYLENE	2
CH	POLYPHENYL OXIDE	POLYPHENYLENE OXIDE,N.O.C. (E.G.,PPO)	2
CI	POLYSULFONE	POLYSULFONE,N.O.C.	2
CJ	PVF	POLYVINYL FLUORIDE (E.G., TEDLAR)	2
CK	SILICONE	SILICONE,N.O.C.	2

NASA MATERIAL CODES (CONT.)  
DEFINITION

CODE LISTING

CODE	DEFINITION	2
CL	SILICONE, RESINOUS	2
CM	STYRENE-ACRYLONITR	2
CN	TFE	2
CO	TFE, PTFE RESIN	2
CP	TFE, PTFE FILLED	2
CC	URETHANE	2
CP	URETHANE, RESINOUS	2
CS	URETHANE, SPANDEX	2
CT	VF2	2
CU	VINYL	2
CV	VINYL, PVAC	2
CH	VINYL, PVAL	2
CX	ACRYLIC RUBBER	2
CY	BUTADIENE (BR)	2
CZ	BUTYL (IR)	2
DA	CHLOROFUORO ELAST	2
DB	CHLOROPRENE (CR)	2
DC	CHLOROSULF. PE (CSM)	2
DD	ETH-PROP. RUB.	2
DE	FLUOROELAST	2
DF	FLUOROELAST FPM	2
DG	FLUOROSILICONE RUB.	2
DH	ISOPRENE (NAT), NR	2
DI	ISOPRENE (SYN), IR	2
DJ	NITRILE RUBBER (NBR)	2
DK	POLYISOBUTYLENE RUB	2
DL	POLYSULFIDE	2
DM	POLYSULFIDE, FILLED	2
DN	POLYSULFIDE, LIQUID	2
DC	RECLAIMED RUBBER	2
DP	SILIC. RUB	2
DO	SILIC. RUB, FILLED	2
DR	SILIC. RUB, RTV 1PART	2
DS	SILIC. RUB, RTV 2PART	2
	SILICONE, RESINOUS	2
	STYRENE-ACRYLONITRILE	2
	TETRAFLUOROETHYLENIC, F.O.C.	2
	TFE, PTFE RESIN (E.P., TEFLO) TFE, MALON TFE, THIKOL TFE	2
	TFE, PTFE FILLED (E.G., KULON, FLUOROGREEN)	2
	URETHANE, N.O.C. (SEE ALSO RUBBER AND COATINGS LISTS)	2
	URETHANE, RESINOUS, F.O.C.	2
	URETHANE, SPA. DEX (E.G. KYTAR)	2
	VINYL, N.O.C.	2
	VINYL, POLYVINYL ACETATE	2
	VINYL, POLYVINYL ALCOHOL	2
	ACRYLIC RUBBER, N.O.C.	2
	BUTADIENE RUBBER, N.O.C.	2
	BUTYL RUBBER, N.O.C.	2
	CHLOROFUORO ELASTOMER, N.O.C.	2
	CHLOROPRENE, N.O.C. (NEOPRENE)	2
	CHLOROSULFONATED POLYETHYLENE, F.O.C. (E.G., HYPALON)	2
	ETHYLENE PROPYLENE RUBBER (EPM, EPR), N.O.C.	2
	FLUOROELASTOMER, N.O.C. (E.G., FLUOREL)	2
	VINYLLIDE FLUORIDE AND HEXAFLUORO-PROPYLENE COPOLYMER	2
	FLUOROSILICONE RUBBER (FSI), F.O.C. (E.G., SILASTIC LS)	2
	NATURAL ISOPRENE RUBBER	2
	SYNTHETIC ISOPRENE RUBBER	2
	NITRILE RUBBER, N.O.C.	2
	POLYISOBUTYLENE RUBBER, N.O.C.	2
	POLYSULFIDE, N.O.C.	2
	POLYSULFIDE RUBBER, MILLED	2
	POLYSULFIDE RUBBER, LIQUID	2
	RECLAIMED RUBBER	2
	SILICONE RUBBER, F.O.C.	2
	SILICONE RUBBER, FILLED (SEE ALSO FLUOROSILICONE.)	2
	SILICONE RUBBER, RTV 1PART	2
	SILICONE RUB, RTV 2PART	2

NASA MATERIAL CODES (CONAT)  
DEFINITION

CODE LISTING

DT	,STY-BUTADI,RUB,SBR	STYRENE-BUTADIENE RUBBER	2
DU	,URETH.RUB	URETHANE RUBBER,N.O.C.	2
DV	,URETH.RUB,MILLED	URETHANE RUBBER,FILLED	2
DW	,URETH.RUB,LIO AMINE	URETHANE RUBBER,LIQUID,AMINE CURE	2
DX	,URETH.RUB,LIO CATAL	URETHANE RUBBER,LIQUID,CATALYTICALLY CURED	2
DY	,URETH.RUB,LIO POLYO	URETHANE RUBBER,LIQUID,POLYUL CURE	2
DZ	,ET-GLYCOL-H2O 35-36	ETHYLENE-GLYOL 35 PCT,WATER 65 PCT,N.O.C.	2
EA	,HEAT TRANSFER	HEAT TRANSFER,N.O.C.	2
EB	,PROCESSING	PROCESSING,N.O.C.	2
EC	,PROPYLENE GLYC-H2O	PROPYLENE GLYCOL-WATER,N.O.C.	2
ED	,DIESTER	DIESTER,N.O.C.	2
EE	,DIFSTER,PHOSPATE	DIESTER,PHOSPATE TYPE	2
EF	,FLUOROCARB.TELOMER	FLUOROCARBON TELOMER,N.O.C.	2
EG	,FLUCROSILICONE	FLUOROSILICONE,N.O.C.	2
EH	,GRAPHITE BASE	GRAPHITE BASE,N.O.C.	2
EI	,METAL BASE,	METALLIC BASE,N.O.C.	2
EJ	,MOLYDISULFIDE BASE	MOLYBDENUM DISULFIDE BASE,N.O.C.	2
EK	,HYDROCARBON BASE	HYDROCARBON BASE,N.O.C.	2
EL	,SOAP BASE	SOAP BASE,N.O.C.	2
EM	,SOAP	PLUS SOAP	2
EN	,VEGETABLE OIL BASE	VEGETABLE OIL HASE (E.G.,CASTOR),N.O.C.	2
EO	,ACETONE	ACETONE	2
EP	,METHANOL	METHANOL	2
EQ	,METHYLENE CHLORIDE	METHYLENE CHLORIDE	2
ER	,METHYL ETHYL KETONE	METHYL ETHYL KETONE,(MEK),N.O.C.	2
ES	,MIXED LACO THICKNER	MIXED LACQUER THINNER,N.O.C.	2
ET	,MIXED PAINT THINNER	MIXED PAINT THINNER,N.O.C.	2
EU	,TOLUENE	TOLUENE,N.O.C.	2
EY	,TRICHLOROETHYLENE	TRICHLOROETHYLENE,N.O.C.	2
EW	,XYLENE	XYLENE,N.O.C.	2
EX	,ASPIRIN	ASPIRIN,N.O.C.	2
EY	,BENZEDRINE	BENZEDRINE,N.O.C.	2
EZ	,BENZOIC ACID	BENZOIC ACID,N.O.C.	2
FA	,CHLOROPHENYLPHENOL	CHLOROPHENYLPHENOL,N.O.C.	2
FB	,FLUOPESCEIN	FLUOPESCEIN	2

\* Prior to using this code in assigning a NASA MATERIAL CODE, refer to Page E2-16.

NASA MATERIAL CODES (CONT)  
DEFINITION

CODE LISTING

FC	,GERMICIDE	GERMICIDE	2
FD	,ISOPROPANOL	ISOPROPANOL	2
FE	,LOTION	LOTION,N.O.C.	2
FF	,PENICILLIN	PENICILLIN,N.O.C.	2
FG	,PILL	PILL,N.O.C.	2
FH	,PROPYLENE GLYCOL	PROPYLENE GLYCOL	2
FI	,NA ORTHOPHENYLPHENOL	SODIUM ORTHOPHENYLPHENOL,N.O.C.	2
FJ	,ALUMINIZED	ALUMINIZED,N.O.C.	2
FK	,ALUMINUM	ALUMINUM,N.O.C.	2
FL	,ASBESTOS	ASBESTOS,N.O.C.	2
FH	,BINDER	PLUS BINDER,N.O.C.	2
FN	,CADMIUM	CADMIUM,N.O.C.	2
FO	,CARBON	CARBON,N.O.C.	2
FP	,CHAMOIS	CHAMOIS	2
FR	,CORK	CORK,N.O.C.	2
FS	,COTTON	COTTON,N.O.C.	2
FT	,DYE	DYE,N.O.C.	2
FU	,FIBER	FIBER,N.O.C.	2
FV	,FIBER, GLASS	FIBER, GLASS	2
FW	,FILLED	FILLED,N.O.C.	2
FX	,FILLER	FILLER,N.O.C.	2
FY	,FILLER, INORGANIC	FILLER, INORGANIC,N.O.C.	2
FZ	,FILLER, METAL	FILLER, METAL,N.O.C.	2
GA	,FILLER, ORGANIC	FILLER, ORGANIC,N.O.C.	2
GB	,FINISH	FINISH,N.O.C.	2
GC	,FINISH, FRICTION	FINISH, FRICTION	2
GD	,GLASS FIBER	GLASS FIBER,N.O.C.	2
GE	,GALVANIZE	GALVANIZE	2
GF	,GRAPHITE	GRAPHITE,N.O.C.	2
GG	,HYDROCARBON	HYDROCARBON,N.O.C.	2
GH	,LITHIUM HYDROXIDE	LITHIUM HYDROXIDE,N.O.C.	2
GI	,METAL	METAL,N.O.C.	2
GJ	,METALIZED	METALLIZED,N.O.C.	2
GK	,METALIZED, AL	METALLIZED WITH ALUMINUM,N.O.C. NOT ALUMINIZED	2

\* Prior to using this code in assigning  
a NASA MATERIAL CODE, refer to Page E2-16.

MASA MATERIAL CODES (CONT)

CODE LISTING

CODE	LISTING	DEFINITION	
GL	.1PART	ONE PART	2
GN	.PAPEP	PAPEP	2
GO	.POLYLEND	POLYLEND, N.O.C.	2
GP	.RAYON	RAYON	2
GQ	.SILICATE	SILICATE	2
GR	.SILVER	SILVER	2
GS	.TREATED	TREATED	2
GT	.2PART	TWO PART	2
GU	.UNKNOWN	UNKNOWN, N.O.C.	2
GV	.UNKNOWN, PROPRIETARY	UNKNOWN, PROPRIETARY	2
GW	.VULCANIZED FIBER	VULCANIZED FIBER	2
GX	.WAX	WAX	2
GY	.WOOD	WOOD	2
GZ	.WOOD FLOUR	WOOD FLOUR	2
HA	.WOOL	WOOL	2
HB	.ZINC	ZINC	2
HC	.POLYSTYRENE (PS)	POLYSTYRENE, N.O.C.	2
HD	.VINYL, PVC	VINYL, POLYVINYL CHLORIDE	2
HE	.RUBBER, N.O.C.	RUBBER, N.O.C.	2
HF	.PBI	POLYBENZIMIDAZOLE, NOC	2
HG	.MICA	MICA, NOC	2
HH	.FOOF	PLUS FOOL	2
HI	.ISOPRENE	ISOPRENE, N.O.C.	2
HJ	.MOMEL	MOMEL	2
HK	.CARBOXYNITROSO	CNR RUBBER, FOR EXAMPLE	2
HL	.SILICA	SILICA, QUARTZ, NCC	2
HM	.BETA FIBER	BETA GLASS FIBER, NUC	2
HN	.MONEYCB	MONEYCOME-LIKE STRUCTURE	2
HO	.COPPER	COPPER, NUC	2
HP	.CEPATIC	CERAMIC, NCC	2
HQ	.RESORCINOL	RESORCINOL	2
HR	.FORMALDEHYDE	FORMALDEHYDE, NUC	2
HS	.FOILERPLATE	FOILERPLATE, LARGE SCALE	2
HT	.COATED	COATED	2
	.EXPTL	EXPERIMENTAL	2

\* Prior to using this code in assigning  
a MASA MATERIAL CODE, refer to Page E2-16.

NASA MATERIAL CODES (CONT)

CODE LISTING

HU	, POTTED	POTTED	2
HV	, SEALED	SEALED	2
HW	, VENTED	VENTED	2
HX	, JACK-UP	LOCK-UP OR LUMPY	2
HY	, RADIOACTIVE MATL	RADIOACTIVE MATERIAL	2
HZ	, NYLON 6	CAPROLACTAM TYPE NYLON	2
IA	, GLASS	GLASS, MGC	2
IB	, CARBORANESILOXANE	POLYCARBORA SILOXANE	2
IC	, POLYQUINOXALINE REST	POLYQUINOXALINE REST	2
ID	, SILICA GEL	SILICA GEL	2
IX	, SEE REMARKS	NO CLASSIFICATION	2
YT			2

NASA MATERIAL CODES (CONAT)  
DEFINITION

CODE LISTING

In order to facilitate the assignment of NASA MATERIAL CODES for metals as required for TEST CATEGORIES 'D' and 'J,' a special code table, "MATERIAL CODES FOR METALS," has been prepared and is tabulated below. Those codes identified on the previous pages by an asterisk (\*) have been assigned a new code beginning with the letter 'M' which shall be used in identifying TEST CATEGORY 'D' and 'J' metals. The 2nd pair of the NASA MATERIAL CODE will identify the base metal and the 3rd pair will identify the primary alloying element.

\* MATERIAL CODES FOR METALS \*

MA	ALUMINUM	ALUMINUM	2
MB	ANTIMONY	ANTIMONY	2
MC	COPPER	COPPER	2
MD	STEEL	STEEL, N.O.C.	2
ME	MANGANESE	MANGANESE	2
MF	CHROMIUM	CHROMIUM	2
MG	IRON	IRON	2
MH	CARBON	CARBON	2
MI	PLATINUM	PLATINUM	2
MJ	MOLYBDENUM	MOLYBDENUM	2
MK	MAGNESIUM	MAGNESIUM	2
ML	NICKEL	NICKEL	2
MM	COBALT	COBALT	2
MN	LEAD	LEAD	2
MO	MERCURY	MERCURY	2
MP	SILVER	SILVER	2
MQ	TIN	TIN	2
MR	TITANIUM	TITANIUM	2
MS	GOLD	GOLD	2
MT	VANADIUM	VANADIUM	2
MU	TUNGSTEN	TUNGSTEN	2
MV	BERYLLIUM	BERYLLIUM	2
MW			
MX			
MY			

NASA MATERIAL CODES (COMAT)  
DEFINITION

CODE LISTING

2

ZINC

MZ ,ZINC



MATERIAL TEST DATA BY MANUFACTURER'S DESIGNATION AS OF 31 JAN 73

PAGE 1

MFR'S DESIGNATION	MANUFACTURER	SPEC. THICK.	TEST RPT NO.	TEST ENVR	TEST PRESS	TEST TIME	TEST TPT	NO OF REACT	FLUX	FIPF	REND	WT	P T	MATE
						TEMP		FNER	PRINT	PT	LIST	LOSS	T	COMP
A-286 CRES STEEL	NR DOWNEY	.0750	10-88-12	GDX	1000.0								A 13	
A-286 CRES STEEL	NR DOWNEY	.0750	69-1346770-X	GDX	1000.0	707		50					T 15	DTMDXX
A-286 STEEL	GAC	.0750	70-2035	GDX	1500.0			00/04					A 11	DTMDXX
A-286 STEEL	GAC	.0750	70-2035-1	GDX	1500.0			00/04					A 10	DTMDXX
A-286 STEEL	GAC	.0750	71-2319	A-50	570.0	462							T 15	DMMDXX
A-286 STEEL	GAC	.0750	71-2319-1	A-50	701.0	487							T 15	DMMDXX
A-286 STEEL	GAC	.0750	71-2319-2	A-50	779.0	517							T 15	DMMDXX
A-286 STEEL	GAC	.0750	71-2319-3	A-50	711.0	509							T 15	DMMDXX
A-286 IRON BASE ALLOY	GAC	.0750	70-2106	GDX	4500.0			00/04					A 10	DMMTXX
A-286 IRON BASE ALLOY	GAC	.0750	70-2106-1	GDX	2000.0			50					A 11	DMMTXX
ADHESIVE 281	DDM CORNING CORP		71-2670	GDX	1500.0			C1/02					T 10	AECKGS
ADHESIVE 281	DDM CORNING CORP		71-2670-1	GDX	1000.0					15	515		R 13	AECKGS
ADHESIVE 281	DDM CORNING CORP		71-2670-2	GDX	1500.0			50					A 11	AECKGS
AG COATED CU WIRE	GAC	.0750	71-2704	A-50	783.0	523							T 15	ELMCMR
AG COATED CU WIRE	GAC	.0750	71-2704-1	A-50	777.0	516							T 15	ELMCMR
AGC-3-126	AGC INC.		71-2378	GDX	500.0			50					A 11	DVCKXX
AGC-3-126	AGC INC.		71-2378-1	GDX	500.0			00/04					T 10	DVCKXX
AGC-3-126	AGC INC.		71-2378-2	GDX	250.0			01/04					T 10	DVCKXX
AGC-3-126	AGC INC.		71-2378-3	GDX	100.0			00/04					A 10	DVCKXX
AGC-3-54-6 SILICONE	AGC INC.		71-2412	GDX	250.0					530	530		D 13	DVCKXX
AGC-3-54-6 SILICONE	AGC INC.		71-2412-1	GDX	75.0								D 13	DVCKXX
ALLOY 52	ALLOY 52		71-2589	GDX	1500.0			00/04					A 10	EXRTHM
ALLOY 6262-19	ALLOY 6262-19		71-2690	GDX	1500.0			50					A 11	EXMAXX
ALLOY 6262-19	ALLOY 6262-19		71-2690-1	GDX	1500.0			00/04					A 10	EXMAXX
ALNICO 5	ALNICO 5		71-2598	A-50	776.0	514							T 15	DMMAMN
ALNICO 5	ALNICO 5		71-2598-1	A-50	776.0	514							T 15	DMMAMN
ALNICO 6/AU PLATE	PARKER AIRCRAFT		71-25 8-1	A-50	781.0	517							T 15	DTMDMU
ALNICO 6/AU PLATE	PARKER AIRCRAFT		71-2421	A-50	754.0	504							T 15	DTMDMU
ALP. 3 FLUX NO. 90	ALPHA METALS		71-2421-1	A-50	771.0	498							T 15	DTMDMU
ALPHA FLUX NO. 90	ALPHA METALS		71-2270	GDX	50.0	1000		50		N999	N999		A 11	BZXXXX
ALPHA FLUX NO. 90	ALPHA METALS		71-2270-1	GDX	50.0	1000							A 10	BZXXXX
ALPHA FLUX NO. 90	ALPHA METALS		71-2270-2	GDX	50.0	1000							A 10	BZXXXX
ALSTIMAG TEFLON COATED	AMERICAN LAVA CORP		70-1874	GDX	50.0	1000				N999	N999		A 13	BBXXXX
ALSTIMAG 645	AMERICAN LAVA CORP		10-99	GDX	4000.0			00/01					A 10	BBXXXX
ALSTIMAG 645	AMERICAN LAVA CORP		10-99-1	GDX	4500.0			00/01					A 10	BBXXXX
ALSTIMAG 645	AMERICAN LAVA CORP		10-99-2	GDX	5000.0			00/04					A 10	BBXXXX
ALSTIMAG 645	AMERICAN LAVA CORP		10-99-3	GDX	4000.0			200					A 11	BBXXXX
ALSTIMAG 645	AMERICAN LAVA CORP		10-99-4	GDX	4000.0			200					A 11	BBXXXX
ALUM PHOSPHATE/ASBESTOS	G.E. CHEM MATL		10-88-10	GDX	50.0								T 13	DTFLXX
ALUM PHOSPHATE/ASBESTOS	G.E. CHEM MATL		10-88-12	GDX	1000.0					921	N999		A 13	DTFLXX
ALUM PHOSPHATE/ASBESTOS	G.E. CHEM MATL		10-88-8	GDX	50.0					N999	N999		A 13	DTFLXX
ALUM PHOSPHATE/ASBESTOS	G.E. CHEM MATL		10-88-9	GDX	1000.0					N999	N999		A 13	DTFLXX
ALUM PHOSPHATE/ASBESTOS	G.E. CHEM MATL	.0750	10-88-1	GDX	2500.0			00/01					A 10	DTFLXX
ALUM PHOSPHATE/ASBESTOS	G.E. CHEM MATL	.0750	10-88-1	GDX	3000.0			00/01					A 10	DTFLXX
ALUM PHOSPHATE/ASBESTOS	G.E. CHEM MATL	.0750	10-88-2	GDX	3500.0			00/01					A 10	DTFLXX

MATERIAL TEST DATA BY MANUFACTURER'S DESIGNATION AS OF 31 JAN 72

MFR'S DESIGNATION	MANUFACTURER	SPEC. THICK.	TEST RPT NO.	TEST ENVR	TEST PRESS	TEST TEMP	TEST ENER	IMPT NO (IF REACT)	FLASH PRINT PT	LOSS	R T	MATL CODE
ALUM PHOSPHATE/ASBESTOS G-E	CHEM MATL DEPT	.0750	10-88-3	GOX	4000.0			00/01			A	10 DTFLXX
ALUM PHOSPHATE/ASBESTOS G-E	CHEM MATL DEPT	.0750	10-88-4	GOX	4500.0			00/01			A	10 DTFLXX
ALUM PHOSPHATE/ASBESTOS G-E	CHEM MATL DEPT	.0750	10-88-5	GOX	5000.0			00/04			A	10 DTFLXX
ALUM PHOSPHATE/ASBESTOS G-E	CHEM MATL DEPT	.0750	10-88-6	GOX	4000.0		200	00/01			A	11 DTFLXX
ALUM PHOSPHATE/ASBESTOS G-E	CHEM MATL DEPT	.0750	10-88-7	GOX	5000.0		200	00/04			A	11 DTFLXX
ALUMINA POWDER-MANDREL	ROSEMONT ENG. CORP		70-1985	GOX	1500.0		50	00/04			A	11 DDMAXX
ALUMINA POWDER-MANDREL	ROSEMONT ENG. CORP		70-1985	GOX	1500.0			00/04			A	10 DDMAXX
ALUMINUM POWDER-MANDREL	ROSEMONT ENG. CORP		70-1985-1	GOX	1500.0	1000		00/04	N899		A	13 DDMAXX
ALUMINUM ALLOY 1145	GAC	.0750	70-2110	GOX	2000.0			00/04			A	10 FIMAXX
ALUMINUM ALLOY 1145	GAC	.0750	70-2110-1	GOX	2500.0		50	00/04			A	11 FIMAXX
ALUMINUM FOIL REFLECTOR	BEECH AIRCRAFT		70-1995	GOX	500.0		50	00/04			A	10 DTMAXX
ALUMINUM FOIL REFLECTOR	BEECH AIRCRAFT		70-1995	GOX	500.0		50	00/04			A	10 DTMAXX
ALUMINUM FOIL REFLECTOR	BEECH AIRCRAFT		70-1995-1	GOX	1500.0		50	00/04			A	11 DTMAXX
ALUMINUM FOIL REFLECTOR	BEECH AIRCRAFT		70-1995-1	GOX	1000.0			00/04			A	10 DTMAXX
ALUMINUM LEMINATE	NR		70-2520	MNH	811.0	514			N899		A	13 DTMAXX
ALUMINUM LEMINATE	NR		71-2520-1	MNH	646.0	479					T	15 EXMAXX
ALUMINUM 2014 CHROMIC ANGAC	ANGAC		70-2151	GOX	4500.0			00/04			T	15 EXMAXX
ALUMINUM 2014 CHROMIC ANGAC	ANGAC		70-2151-1	GOX	2500.0		50	00/04			A	11 DTMAXX
ALUMINUM 2024	GAC		71-2334	A-50	777.0	499					T	15 DTMAXX
ALUMINUM 2024	GAC		71-2334-1	A-50	738.0	497					T	15 DTMAXX
ALUMINUM 2024	GAC		71-2334-2	A-50	771.0	511					T	15 DTMAXX
ALUMINUM 2024	GAC		71-2334-3	A-50	788.0	509					T	15 DTMAXX
ALUMINUM 2024	GAC		71-2391	A-50	795.0	509					T	15 DTMAXX
ALUMINUM 2024	GAC		71-2391-1	A-50	818.0	513					T	15 DTMAXX
ALUMINUM 2024	GAC		71-2396	A-50	769.0	496					T	15 DTMAXX
ALUMINUM 2024	GAC		71-2396-1	A-50	785.0	510					T	15 DTMAXX
ALUMINUM 2024 SULF AN	GAC	.0750	70-2157	GOX	5000.0		50	00/04			A	11 DTMAXX
ALUMINUM 2024 SULF AN	GAC		70-2157-1	GOX	5000.0			00/04			A	10 DTMAXX
ALUMINUM 2024 SULF AN	GAC		70-2157-2	GOX	6800.0			00/04			A	10 DTMAXX
ALUMINUM 2024-T351	GAC	.0750	70-2191	GOX	1500.0			00/04			A	10 DTMAXX
ALUMINUM 2024-T351	GAC	.0750	70-2191-1	GOX	1500.0		50	00/04			A	10 DTMAXX
ALUMINUM 356 ALDODINE FINGAC	GAC	.0750	70-2135	GOX	2000.0			00/04			A	10 FIMAXX
ALUMINUM 356-T6	V + W AIRCRAFT CASTINGS	.0750	70-2202	GOX	1500.0			00/04			A	10 DTMAXX
ALUMINUM 356-T6	V + W AIRCRAFT CASTINGS	.0750	70-2202-1	GOX	1500.0		50	00/04			A	10 DTMAXX
ALUMINUM 6061	GAC		71-2332	A-50	781.0	499					A	11 DTMAXX
ALUMINUM 6061	GAC		71-2332-1	A-50	805.0	499					T	15 DTMAXX
ALUMINUM 6061	GAC		71-2333	A-50	803.0	508					T	15 DTMAXX
ALUMINUM 6061	GAC		71-2333-1	A-50	766.0	487					T	15 DTMAXX
ALUMINUM 6061	GAC		71-2335	A-50	789.0	504					T	15 DTMAXX
ALUMINUM 6061	GAC		71-2335-1	A-50	701.0	486					T	15 DTMAXX
ALUMINUM 6061 + ALDODINE	GAC		70-2149	GOX	2000.0			00/04			A	10 DTMAXX
ALUMINUM 6061 + ALDODINE	GAC		70-2149-1	GOX	2500.0		50	00/04			A	11 DTMAXX
ALUMINUM 6061 ANODIZED	GAC		70-2167	GOX	2000.0			00/04			A	10 DTMAXX

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MATERIAL TEST DATA BY MANUFACTURER S DESIGNATION AS OF 31 JAN 72

MFG S DESIGNATION	MANUFACTURER	SPEC. THICK.	TEST RPT NO.	TEST ENVR PRESS	TEST TEST	TEST IMPT NO OF FLASH FIF PROP	WT DIST LOSS	R T MATL
ALUMINUM 6061 HARD AN	GAC		70-2152	G0X 2000.0		00/04		A 10 DTMXX
ALUMINUM 6061 HARD AN	GAC		70-2153	G0X 4500.0		00/04		A 10 DTMXX
ALUMINUM 6061 HARD AN	GAC		70-2153-1	G0X 5000.0		50 00/04		A 11 DTMXX
ALUMINUM 6061 HARD AN	GAC		70-2153-2	A-50 750.0	496			T 15 DTMXX
ALUMINUM 6061 HARD AN	GAC		70-2153-3	A-50 760.0	504			T 15 DTMXX
ALUMINUM 6061 HARD AN	GAC		70-2153-4	A-50 758.0	496			T 14 DTMXX
ALUMINUM 6061 HARD AN	GAC		70-2153-5	A-50 760.0	504			T 14 DTMXX
ALUMINUM 6061 SULF AN	GAC	.0750	70-2156	G0X 4500.0		00/04		A 10 DTMXX
ALUMINUM 6061 SULF AN	GAC	.0750	70-2156-1	G0X 5000.0		50 00/04		A 11 DTMXX
ALUMINUM 6061-T6	HARVEY ALUMINUM		70-2062	A-50 759.0	496			T 15 DTMXX
ALUMINUM 6061-T6	HARVEY ALUMINUM		70-2062-1	A-50 744.0	498			T 15 DTMXX
ALUMINUM 7075	GAC		71-2397	A-50 756.0	496			T 15 DTMXX
ALUMINUM 7075	GAC		71-2397-1	A-50 805.0	520			T 15 DTMXX
ALUMINUM 7075 SULF AN	GAC	.0750	70-2155	G0X 3500.0		50 00/04		A 11 DTMXX
ALUMINUM 7075-T 651	REYNOLDS ALUM		70-2239	G0X 1500.0		50 00/04		A 11 DTMXX
ALUMINUM 7075-T 651	REYNOLDS ALUM		70-2239-1	G0X 1500.0		50 00/04		A 10 DTMXX
AM 350	ADVANCED ALLOYS		71-2402-1	A-50 797.0	504			T 15 DTMXX
AM 350	ADVANCED ALLOYS		71-2402-1	A-50 747.0	498			T 15 DTMXX
AM 355	ADVANCED ALLOYS		71-2399	A-50 750.0	498			T 15 DTMXX
AM 355	ADVANCED ALLOYS		71-2399-1	A-50 682.0	488			T 15 DTMXX
AMPCOLOY 45	PACIFIC METALS		70-2234	G0X 1500.0		50 00/04		A 11 DTMXX
AMPCOLOY 45	PACIFIC METALS		70-2234-1	G0X 1500.0		50 00/04		A 11 DTMXX
AMS-3651 SVSK 81370-12A HAMILTON STANDARD	HAMILTON STANDARD		71-2293	G0X 5000.0		01/01		T 15 DTMXX
AMS-3651 SVSK 81370-12A HAMILTON STANDARD	HAMILTON STANDARD		71-2293-1	G0X 5000.0		50 00/04		A 11 DTMXX
AMS-3651 SVSK 81370-12A HAMILTON STANDARD	HAMILTON STANDARD		71-2293-2	G0X 3000.0		50 00/04		A 11 DTMXX
AMS-4031 SVSK 81370-29A HAMILTON STANDARD	HAMILTON STANDARD		71-2293-3	G0X 3000.0		50 00/04		A 11 DTMXX
AMS-4031 SVSK 81370-29A HAMILTON STANDARD	HAMILTON STANDARD		71-2296	G0X 4000.0		50 00/04		A 11 DTMXX
AMS-4921 SVSK 81730-16A HAMILTON STANDARD	HAMILTON STANDARD		71-2294	G0X 2500.0		50 00/04		A 11 DTMXX
AMS-5616 SVSK 81370-34B HAMILTON STANDARD	HAMILTON STANDARD		71-2297	G0X 2000.0		50 00/04		A 11 DTMXX
AMS-5648 SVSK 81370-14 HAMILTON STANDARD	HAMILTON STANDARD		71-2290	G0X 2500.0		50 00/04		A 11 DTMXX
AMS-5665 SVSK 81730-27A HAMILTON STANDARD	HAMILTON STANDARD		71-2295	G0X 5000.0		50 00/04		A 11 DTMXX
ANAMID-M COATED WIRE	ANACONDA WIRE + CABLE CO		70-2218	G0X 1500.0		00/04		A 10 DTMXX
ANAMID-M COATED WIRE	ANACONDA WIRE + CABLE CO		70-2218-1	G0X 1500.0		00/04		A 10 DTMXX
ANAMID-M COATED WIRE	ANACONDA WIRE + CABLE CO		70-2218-2	G0X 1000.0		50 00/04		A 10 DTMXX
ARMALON 4062-116	E-I. DUPONT CO., INC.		71-2367	A-50 765.0	498			T 15 RGGDCG
ARMALON 4062-116	E-I. DUPONT CO., INC.		71-2367-1	A-50 773.0	496			T 15 RGGDCG
ARMALON 4062-116	E-I. DUPONT CO., INC.		71-2367-2	MMH 781.0	503			T 15 RGGDCG
ARMALON 4062-116	E-I. DUPONT CO., INC.		71-2367-3	MMH 783.0	506			T 15 RGGDCG
ARMSTRONG A-14	ARMSTRONG		71-2555	MMH 797.0	514			T 15 ABHGX
ARMSTRONG A-14	ARMSTRONG		71-2555-1	MMH 767.0	497			T 15 ABHGX
ARGLOR 1242	MONSANTO CORP		71-2590	G0X 1500.0		00/04		A 10 DC-K4D
ARGLOR 1242	MONSANTO CORP		71-2590-1	G0X 6.2		412 446		D 13 DCEK4D



MATERIAL TEST DATA BY MANUFACTURER'S DESIGNATION AS OF 31 JAN 72

MFGR S DESIGNATION	MANUFACTURER	SPEC.	TEST RPT NO.	TEST TEST ENVR PRESS	TEST IMPR NO (S)	FLASH P/INT P/	PL 2	WT	5 T	MTL
		THICK.			TEMP ENFR REACT	PT	TEST LOSS		1 T	CODE
BRAYCOTE 617	BRAY OIL CO		69-1424-5	GOX 500.0		454		454	0 13	DBRPXX
BRAYCOTE 617	BRAY OIL CO		69-1424-6	GOX 1000.0		451		451	0 13	DBRPXX
BRAYCOTE 617	BRAY OIL CO		69-1424-7	GOX 1500.0		417		417	0 13	DBRPXX
BRAYCOTE 617	BRAY OIL CO		69-1424-8	GOX 2000.0		404		404	0 13	DBRPXX
BRAYCOTE 617	BRAY OIL CO	.0050	69-1424-9	GOX 3500.0	00/04				A 10	DBRPXX
BRAYCOTE 631A	BRAY OIL CO		70-1746-1	GOX 25.0	1000	N999		N999	Y 13	DABPEF
BRAYCOTE 631A	BRAY OIL CO		70-1746-2	GOX 50.0	1000	N999		N999	Y 13	DABPEF
BRAYCOTE 631A	BRAY OIL CO		70-1746-3	GOX 62.0	1000	N999		N999	Z 13	DABPEF
BRAYCOTE 631A	BRAY OIL CO		70-1746-4	GOX 165.0	1000	N999		N999	Z 13	DABPEF
BRAYCOTE 631A	BRAY OIL CO		70-1746-5	GOX 100.0		822		822	0 13	DABPEF
BRAYCOTE 631A	BRAY OIL CO		70-1746-6	GOX 500.0		700		700	0 13	DABPEF
BRAYCOTE 631A	BRAY OIL CO		70-1746-7	GOX 1000.0		683		683	0 13	DABPEF
BRAYCOTE 631A	BRAY OIL CO		70-1746-8	GOX 1500.0		687		687	0 13	DABPEF
BRAYCOTE 631A	BRAY OIL CO		70-1746-9	GOX 2000.0		673		673	0 13	DABPEF
BRAYCOTE 631A	BRAY OIL CO		70-1981	GOX 1500.0	50				A 11	FLXXXX
BRAYCOTE 631A	BRAY OIL CO		70-1981-1	GOX 1500.0					A 10	FLXXXX
BRAYCOTE 631A	BRAY OIL CO		70-2199	GOX 1500.0		N999		N999	Z 13	FLXXXX
BRAYCOTE 631A	BRAY OIL CO		70-2199-1	GOX 1500.0					A 11	DMXXXX
BRAYCOTE 631A	BRAY OIL CO		71-2779-1	GOX 2500.0					0 10	CHDJXX
BRAYCOTE 631A	BRAY OIL CO		71-2779-2	GOX 1500.0					0 10	CHDJXX
BRAYCOTE 631A	BRAY OIL CO		71-2779-3	GOX 1000.0					0 10	CHDJXX
BRAYCOTE 631A	BRAY OIL CO		71-2777-1	GOX 2500.0					0 10	CHDJXX
BRAYCOTE 631A	BRAY OIL CO		71-2777-2	GOX 1000.0					0 10	CHDJXX
BRAYCOTE 631A	BRAY OIL CO		71-2777-3	GOX 500.0					0 10	CHDJXX
BRAYCOTE 631A	BRAY OIL CO		71-2784-1	GOX 2500.0					0 10	CHDJXX
BRAYCOTE 631A	BRAY OIL CO		71-2784-2	GOX 2000.0					0 10	CHDJXX
BRAYCOTE 631A	BRAY OIL CO		71-2784-3	GOX 1500.0					0 10	CHDJXX
BRAYCOTE 631A	BRAY OIL CO		71-2784-4	GOX 1000.0					0 10	CHDJXX
BRAYCOTE 631A	BRAY OIL CO		71-2784-5	GOX 500.0					0 10	CHDJXX
BRAYCOTE 631A	BRAY OIL CO		70-1965	A-50 451.0	514				T 15	DVCZXX
BRAYCOTE 631A	BRAY OIL CO		70-1965-1	A-50 604.0	611				T 15	DVCZXX
BRAYCOTE 631A	BRAY OIL CO		70-1965-2	A-50 651.0	649				T 15	DVCZXX
BRAYCOTE 631A	BRAY OIL CO		70-1965-3	A-50 568.0	507				T 15	DVCZXX
BRAYCOTE 631A	BRAY OIL CO		70-1965-4	A-50 460.0	496				T 15	DVCZXX
BRAYCOTE 631A	BRAY OIL CO		70-1965-5	MMH 760.0	505				T 15	DVCZXX
BRAYCOTE 631A	BRAY OIL CO		70-1965-6	MMH 767.0	509				T 15	DVCZXX
BRAYCOTE 631A	BRAY OIL CO		71-2601	A-50 804.0	514				T 15	CHCZXX
BRAYCOTE 631A	BRAY OIL CO		71-2601-1	A-50 773.0	516				T 15	CHCZXX
BRAYCOTE 631A	BRAY OIL CO		71-2652	A-50 762.0	506				T 15	DMDXX
BRAYCOTE 631A	BRAY OIL CO		71-2652-1	A-50 771.0	507				T 15	DMDXX
BRAYCOTE 631A	BRAY OIL CO	.0750	10-48	GOX 1000.0					A 10	CHOBXX
BRAYCOTE 631A	BRAY OIL CO	.0750	10-48-1	GOX 1500.0					0 10	CHDBXX



MATERIAL TEST DATA BY MANUFACTURER S DESIGNATION AS OF 31 JAN 72

MFGR S DESIGNATION	MANUFACTURER	SPEC. THICK.	TEST RPT NO.	TEST ENVR	TEST PRESS	TEST TEMP	TEST IMPRT ENER	NO OF REACT PT	FLASH POINT	FIF PT	WT LOSS	F T	MATL T CODE
CERROBEND AND CU BE WIREMSFC			70-2042	GOX	6.2	1000			1999	N999		Y	13 AMGIMC
CERROBEND AND CU BE WIREMSFC			70-2042-1	GOX	16.5	1000			N999	N999		Y	13 AMGIMC
CERROBEND-COPPER PARTCLSMSFC			70-2041	GOX	6.2	1000			N999	N999		Y	13 AMGIMC
CERROBEND-COPPER PARTCLSMSFC			70-2041-1	GOX	16.5	1000			N999	N999		J	13 AMGIMC
CFX LUBRICANT	MARCHEM		71-2572	GOX	5000.0		50	00/04				A	11 CZGF8P
CFX LUBRICANT	MARCHEM		71-2572-1	GOX	2500.0			01/01				T	10 CZGF8P
CFX LUBRICANT	MARCHEM		71-2572-2	GOX	2000.0			01/01				T	10 CZGF8P
CFX LUBRICANT	MARCHEM		71-2572-3	GOX	1500.0			01/01				T	10 CZGF8P
CFX LUBRICANT	MARCHEM		71-2572-4	GOX	1000.0			01/02				T	10 CZGF8P
CFX LUBRICANT	MARCHEM		71-2572-5	GOX	500.0			00/04				A	10 CZGF8P
CHEM CERAM/GLASS LAMINATE	WHITTAKER (PACE DIV.)		70-1978	GOX	1500.0		50	00/04				A	10 CRHOHT
CHEM CERAM/GLASS LAMINATE	WHITTAKER (PACE DIV.)		70-1978-1	GOX	1000.0	1000			N999	N999		A	11 CRHOHT
CHEM CERAM/GLASS LAMINATE	WHITTAKER (PACE DIV.)		71-2434	GOX	100.0				270	270		A	13 CRHOHT
CHEM CERAM/GLASS LAMINATE	WHITTAKER (PACE DIV.)		71-2434-1	GOX	1550.0		50	00/04				A	11 ABCKXX
CHEM CERAM/GLASS LAMINATE	WHITTAKER (PACE DIV.)		71-2434-2	GOX	1550.0			01/01				T	10 ABCKXX
CHEM CERAM/GLASS LAMINATE	WHITTAKER (PACE DIV.)		70-1961	A-50	85.0	291						T	15 DVHJXX
CHEM CERAM/GLASS LAMINATE	WHITTAKER (PACE DIV.)		70-1961-1	A-50	115.0	303						T	15 DVHJXX
CHEM CERAM/GLASS LAMINATE	WHITTAKER (PACE DIV.)		70-1961-2	A-50	132.0	295						T	15 DVHJXX
CHEM CERAM/GLASS LAMINATE	WHITTAKER (PACE DIV.)		70-1961-3	A-50	156.0	310						T	15 DVHJXX
CHEM CERAM/GLASS LAMINATE	WHITTAKER (PACE DIV.)		70-1961-4	MHH	122.0	302						T	15 DVHJXX
CHEM CERAM/GLASS LAMINATE	WHITTAKER (PACE DIV.)		70-1961-5	MHH	314.0	411						T	15 DVHJXX
CHEM CERAM/GLASS LAMINATE	WHITTAKER (PACE DIV.)		70-1977	A-50	133.0	294						T	15 DVHJXX
CHEM CERAM/GLASS LAMINATE	WHITTAKER (PACE DIV.)		70-1977-1	A-50	131.0	304						T	15 DVHJXX
CHEM CERAM/GLASS LAMINATE	WHITTAKER (PACE DIV.)		70-1977-2	A-50	120.0	290						T	15 DVHJXX
CHEM CERAM/GLASS LAMINATE	WHITTAKER (PACE DIV.)		70-1977-3	A-50	112.0	279						T	15 DVHJXX
CHEM CERAM/GLASS LAMINATE	WHITTAKER (PACE DIV.)		70-1977-4	MHH	778.0	470						T	15 DVHJXX
CHEM CERAM/GLASS LAMINATE	WHITTAKER (PACE DIV.)		70-1977-5	MHH	757.0	473						T	15 DVHJXX
CHEM CERAM/GLASS LAMINATE	WHITTAKER (PACE DIV.)		70-1977-6	MHH	259.0	382			N999	N999		T	15 DVHJXX
CHEM CERAM/GLASS LAMINATE	WHITTAKER (PACE DIV.)		70-2054	GOX	6.2	1000			N999	N999		Y	13 AMMOF1
CHEM CERAM/GLASS LAMINATE	WHITTAKER (PACE DIV.)		70-2054-1	GOX	16.5	1000			N999	N999		Y	13 AMMOF1
CHEM CERAM/GLASS LAMINATE	WHITTAKER (PACE DIV.)		71-2271	GOX	1500.0		50	00/04				A	11 EXMRMC
CHEM CERAM/GLASS LAMINATE	WHITTAKER (PACE DIV.)		71-2271-1	GOX	1500.0			00/04				A	10 EXMRMC
CHEM CERAM/GLASS LAMINATE	WHITTAKER (PACE DIV.)		71-3001	GOX	3000.0		50	00/04				A	11 EGCOXX
CHEM CERAM/GLASS LAMINATE	WHITTAKER (PACE DIV.)		71-3001-1	GOX	3000.0			01/02				M	10 EGCOXX
CHEM CERAM/GLASS LAMINATE	WHITTAKER (PACE DIV.)		71-3001-2	GOX	2500.0			00/04				A	10 EGCOXX
CHEM CERAM/GLASS LAMINATE	WHITTAKER (PACE DIV.)		71-3001-3	GOX	2000.0			00/01				A	10 EGCOXX
CHEM CERAM/GLASS LAMINATE	WHITTAKER (PACE DIV.)		71-2672	A-50	748.0	513						T	15 DTMCXX
CHEM CERAM/GLASS LAMINATE	WHITTAKER (PACE DIV.)		71-2672-1	A-50	757.0	515						T	15 DTMCXX
CHEM CERAM/GLASS LAMINATE	WHITTAKER (PACE DIV.)		71-2672-2	MHH	757.0	522						T	15 DTMCXX
CHEM CERAM/GLASS LAMINATE	WHITTAKER (PACE DIV.)		71-2672-3	MHH	826.0	551						T	15 DTMCXX
CHEM CERAM/GLASS LAMINATE	WHITTAKER (PACE DIV.)		71-2651	A-50	753.0	504						T	15 ELMCXX
CHEM CERAM/GLASS LAMINATE	WHITTAKER (PACE DIV.)		71-2651-1	A-50	772.0	521						T	15 ELMCXX
CHEM CERAM/GLASS LAMINATE	WHITTAKER (PACE DIV.)		70-2040	GOX	6.2	1000			N999	N999		Y	13 AMPCFZ

MATERIAL TEST DATA BY MANUFACTURER S DESIGNATION AS OF 31 JAN 72

MFGR S DESIGNATION	MANUFACTURER	SPEC. THICK.	TEST RPT NO.	TEST ENVK PRESS	TEST TEMP	TEST EMER REACT	FLASH POINT	FIRE PT	PROP DIST LOSS	WT	R T	MATL
COPPER-INDIUM BISMUTH	MSFC		70-2040-1	GOX 16.5	1000						Y 13	AMCFZ
COPPER/TIN COATED	ANACONDA WIRE + CABLE CO		70-2097	A-50 801.0	520						T 15	DDMCS
COPPER/TIN COATED	ANACONDA WIRE + CABLE CO		70-2097-1	A-50 775.0	485						T 15	DDMCS
COPPER/TIN COATED	ANACONDA WIRE + CABLE CO		70-2097-2	MMH 754.0	515						T 15	DDMCS
COPPER/TIN COATED	ANACONDA WIRE + CABLE CO		70-2097-3	MMH 750.0	516						T 15	DDMCS
COPPER/TIN PLATED	GAC		71-2702	A-50 757.0	513						T 15	DTMCS
COPPER/TIN PLATED	GAC		71-2702-1	A-50 779.0	520						T 15	DTMCS
CORNING 0010 GLASS	CORNING GLASS		70-2203	A-50 779.0	403						T 15	DMIAXX
CORNING 0010 GLASS	CORNING GLASS		70-2203-1	A-50 713.0	486						T 15	DMIAXX
CORNING 0010 GLASS	CORNING GLASS		70-2203-2	A-50 775.0	498						T 15	DMIAXX
CRESS CHROMIUM PLATED	NR		71-2382	GOX 1500.0		50	00/04				A 11	EXMHI
CRESS CHROMIUM PLATED	NR		71-2382-1	GOX 1500.0			00/04				A 10	EXMHI
CRYSTAL SVSK81370-22	HAMILTON STANDARD		71-2263	GOX 5000.0			00/04				A 10	EXMHI
CRYSTAL SVSK81370-22	HAMILTON STANDARD		71-2263-1	GOX 6800.0			00/04				A 10	ODIAXX
CRYSTAL SVSK81370-22	HAMILTON STANDARD		71-2263-2	GOX 3030.0	1000						A 13	DDIAXX
CU WIRE-MGRH-2	PHELPS DODGE		71-2673	MMH 775.0	515						T 15	ELMCSX
CU WIRE-MGRH-2	PHELPS DODGE		71-2673-1	MMH 783.0	520						T 15	ELMCSX
CYCLEWELD 55-9-100	CHRYSLER CORP		71-2495	GOX 1500.0		50	00/04				A 11	AB8CXX
CYCLEWELD 55-9-100	CHRYSLER CORP		71-2495-1	GOX 1500.0			00/04				A 10	AB8CXX
CYCLEWELD 55-9-100	CHRYSLER CORP		71-2495-2	GOX 1000.0				554			D 13	AB8CXX
DALUM PHOSPHATE ASBESTOSG-E. CHEM MATL	CHRYSLER CORP		10-88-11	GOX 50.0				N999			A 13	DTFLXX
DC-A-4094 PRIMER	DGM CORNING CORP		71-2497	GOX 1500.0		50	00/04				A 10	AUCPXX
DC-A-4094 PRIMER	DGM CORNING CORP		71-2497-1	GOX 1500.0							A 10	AUCPXX
DC-A-4094 PRIMER	DGM CORNING CORP		71-2497-2	GOX 1000.0	1000						A 13	AUCPXX
DC-V90-006 RTV	DGM CORNING CORP		70-1954	A-50 524.0	447						T 15	DR8GCS
DC-V90-006 RTV	DGM CORNING CORP		70-1954-1	A-50 239.0	373						T 15	DR8GCS
DC-V90-006 RTV	DGM CORNING CORP		70-1954-2	A-50 341.0	391						T 15	DR8GCS
DC-V90-006 RTV	DGM CORNING CORP		70-1954-3	A-50 370.0	409						T 15	DR8GCS
DC-3110	DGM CORNING CORP		70-2029	GOX 1500.0		50	00/04				A 11	BADPXX
DC-3110	DGM CORNING CORP	.0750	70-2029-1	GOX 1500.0							A 10	BADPXX
DC-3110	DGM CORNING CORP	.0750	70-2029-2	GOX 200.0				504			D 13	BADPXX
DC-3110	DGM CORNING CORP		70-2029-3	GOX 1000.0				450			T 15	CZCKXX
DC-33	DGM CORNING CORP		71-2705	A-50 773.0	509						T 15	CZCKXX
DC-3400	DGM CORNING CORP		71-2527	GOX 1500.0	511						A 11	DAGHXX
DC-3400	DGM CORNING CORP		71-2527-1	GOX 1500.0		50	00/04				A 10	DAGHXX
DC-3400	DGM CORNING CORP		71-2527-2	GOX 1500.0							J 13	DAGHXX
DC-3400	DGM CORNING CORP		71-2527-3	GOX 1000.0	1000						O 13	DAGHXX
DC-55M	DGM CORNING CORP		71-2273	A-50 630.0	481						T 15	DBCKAD
DC-7	DGM CORNING CORP		71-2273-1	A-50 758.0	498						T 15	BTCLXX
DC-7	DGM CORNING CORP		71-2592	A-50 815.0	476						T 15	AXCKXX
DC-7	DGM CORNING CORP		71-2592-1	A-50 788.0	501						T 15	AXCKXX
DC-704 PUMP FLUID	DGM CORNING CORP		70-2227	GOX 4500.0		50	00/04				A 11	BVXXXX
DC-704 PUMP FLUID	DGM CORNING CORP		70-2227-1	GOX 5000.0		50	01/04				T 11	BVXXXX



MATERIAL TEST DATA BY MANUFACTURER S DESIGNATION AS OF 31 JAN 72

MFR S DESIGNATION	MANUFACTURER	SPEC. THICK.	TEST RPT NO.	TEST ENVR	TEST PRESS	TEST TEMP	TEST FNFR	TEST IMPT NO	NO OF REACT	FLASH POINT	FIRI PT	PRIP WT	WT LOSS	R T I	MATI I	CUID=
DC-704 PUMP FLUID			70-2227-2	GDX	2500.0				00/04					A 10	BVXXX	
DC-704 PUMP FLUID			70-2227-3	GDX	3000.0				01/02					T 10	BVXXX	
DC-704 PUMP FLUID			70-2227-4	GDX	3500.0				01/02					T 10	BVXXX	
DC-704 PUMP FLUID			70-2227-5	GDX	4000.0				01/02					T 10	BVXXX	
DC-704 PUMP FLUID			70-2227-6	GDX	4500.0				01/01					T 10	BVXXX	
DC-704 PUMP FLUID			70-2227-7	GDX	5000.0				01/01					T 10	BVXXX	
DC-994 VARNISH	DOW CORNING CORP		71-2404	GDX	2500.0				00/04	N999	N999			A 10	BTCLXX	
DC-994 VARNISH	DOW CORNING CORP	.0050	71-2404-1	GDX	750.0	1000			00/04					A 10	BTCLXX	
DC-997 VARNISH	DOW CORNING CORP		70-2189	GDX	1500.0				00/04	289	289			D 13	BTCLXX	
DC-997 VARNISH	DOW CORNING CORP		70-2189-1	GDX	1000.0				00/04					A 11	BTCLXX	
DC-997 VARNISH	DOW CORNING CORP		70-2189-2	GDX	1500.0		50		00/04	N999	N999			A 13	BTCLXX	
DC-997 VARNISH	DOW CORNING CORP		70-2189-3	GDX	1000.0	1000				643	643			D 13	BTCLXX	
DC-997 VARNISH	DOW CORNING CORP		70-2189-4	GDX	500.0					580	580			D 13	BTCLXX	
DC-997 VARNISH	DOW CORNING CORP		70-2189-5	GDX	1000.0					387	387			D 13	BTCLXX	
DC-997 VARNISH	DOW CORNING CORP		70-2189-6	GDX	1500.0					370	370			D 13	BTCLXX	
DC-997 VARNISH	DOW CORNING CORP		70-2189-7	GDX	2000.0									T 15	BTCLXX	
DC-997 VARNISH	DOW CORNING CORP		71-2480	A-50	767.0	471								T 15	BTCLXX	
DC-997 VARNISH	DOW CORNING CORP		71-2480-1	A-50	771.0	501				287	291			D 13	A4BXXX	
DC-997 VARNISH	MSFC		70-2066	GDX	6.2					529	N999			Y 13	DLAJXX	
DELRI	E.I. DUPONT CO., INC.		10-102	GDX	5.0	1000				509	509			D 13	DLAJXX	
DELRI	E.I. DUPONT CO., INC.		10-102-1	GDX	25.0									D 11	DLAJXX	
DELRI	E.I. DUPONT CO., INC.	.0750	10-102-10	GDX	250.0		200		01/02					D 11	DLAJXX	
DELRI	E.I. DUPONT CO., INC.	.0750	10-102-11	GDX	500.0		200		03/04					D 11	DLAJXX	
DELRI	E.I. DUPONT CO., INC.	.0750	10-102-12	GDX	1000.0		200		07/04					D 11	DLAJXX	
DELRI	E.I. DUPONT CO., INC.		10-102-7	GDX	50.0					485	485			D 13	DLAJXX	
DELRI	E.I. DUPONT CO., INC.		10-102-3	GDX	50.0					457	457			D 13	DLAJXX	
DELRI	E.I. DUPONT CO., INC.		10-102-4	GDX	500.0					382	382			D 13	DLAJXX	
DELRI	E.I. DUPONT CO., INC.		10-102-5	GDX	1000.0					373	373			D 13	DLAJXX	
DELRI	E.I. DUPONT CO., INC.	.0750	10-102-6	GDX	500.0				00/04					A 10	DLAJXX	
DELRI	E.I. DUPONT CO., INC.	.0750	10-102-7	GDX	1000.0				01/03					D 10	DLAJXX	
DELRI	E.I. DUPONT CO., INC.	.0750	10-102-8	GDX	1500.0				01/02					D 10	DLAJXX	
DELRI	E.I. DUPONT CO., INC.	.0750	10-102-9	GDX	2000.0				04/04					D 10	DLAJXX	
DELRI	E.I. DUPONT CO., INC.		70-1993	GDX	500.0		50		00/04					A 11	BF6DXX	
DELRI	E.I. DUPONT CO., INC.		70-1993-1	GDX	500.0				00/04					A 10	BF6DXX	
DELRI	E.I. DUPONT CO., INC.		70-1993-2	GDX	1500.0		50		00/04					A 11	BF6DXX	
DELRI	E.I. DUPONT CO., INC.		70-1993-3	GDX	500.0	1000			00/04	N999	N999			A 13	BF6DXX	
DELRI	E.I. DUPONT CO., INC.		71-2435	GDX	1500.0	1000				N999	N999			D 13	BF6DXX	
DELRI	E.I. DUPONT CO., INC.		71-2435-1	GDX	1000.0					390	390			A 11	RGHSXX	
DELRI	E.I. DUPONT CO., INC.		71-2435-2	GDX	1500.0		50		00/04					T 10	RGHSXX	
DELRI	E.I. DUPONT CO., INC.	.0750	70-2209	GDX	500.0				00/04					A 10	DMYXX	
DELRI	E.I. DUPONT CO., INC.	.0750	70-2209-1	GDX	500.0		50		02/04					A 11	DMYXX	
DELRI	E.I. DUPONT CO., INC.		70-2209-2	GDX	1500.0		50		00/04					A 11	DMYXX	

MFGR S DESIGNATION	MANUFACTURER	SPEC. THICK.	TEST RPT NO.	TEST FNVR PRESS.	TEST IMPT NO. (IF TEST TEMP ENER REACT NO.)	FLASH POINT	FIRF PT	PRUP DIST LOSS	WT	R T	MATL
DRILL ROD											
DURLOCK #22	DRILUBE CO.		70-2209-3	G0X 1500.0	00/04	672	672			A 10	CMXXX
DURLOCK 204	PHYSICAL SCIENCES CORP		10-56	G0X 6.2						D 13	DACNXX
DUROCK 204	PHYSICAL SCIENCES CORP		70-1937	G0X 1500.0	50					A 11	CHIAXX
DUROCK 204	PHYSICAL SCIENCES CORP	.0750	70-1937-1	G0X 1000.0	1000					Y 13	CHIAXX
DUROCK 204	PHYSICAL SCIENCES CORP		70-1937-2	G0X 1500.0						A 10	CHIAXX
DUROID 5813	ROGERS CORP		70-1937-3	G0X 1500.0	1000					A 13	CHIAXX
DUROID 5813	ROGERS CORP		70-2222	G0X 1500.0						A 10	DUCPA
DUROID 5813	ROGERS CORP		70-2222-1	G0X 1500.0	50					A 11	DUCPA
DUROID 5813	ROGERS CORP		70-2222-10	G0X 1000.0						T 10	DUCPA
DUROID 5813	ROGERS CORP		70-2222-11	G0X 500.0						A 10	DUCPA
DUROID 5813	ROGERS CORP		70-2222-2	G0X 1000.0						D 13	DUCPA
DUROID 5813	ROGERS CORP		70-2222-3	G0X 2500.0						T 10	DUCPA
DUROID 5813	ROGERS CORP		70-2222-4	G0X 1500.0						T 10	DUCPA
DUROID 5813	ROGERS CORP		70-2222-5	G0X 1000.0						T 10	DUCPA
DUROID 5813	ROGERS CORP		70-2222-6	G0X 500.0						A 10	DUCPA
DUROID 5813	ROGERS CORP		70-2222-7	G0X 5000.0	50					A 11	DUCPA
DUROID 5813	ROGERS CORP		70-2222-8	G0X 2500.0						T 10	DUCPA
DUROID 5813	ROGERS CORP		70-2222-9	G0X 1500.0						T 10	DUCPA
DUROID 5813	GAC		70-2159	G0X 4500.0	00/04					A 10	DTMJMH
D6AC-NICKEL PLATED											
E-515-8	PARKER SEAL/LOS ANGLS		69-1565	G0X 5.0	1000					950	N999
E-515-8	PARKER SEAL/LOS ANGLS		69-1565-1	G0X 10.0	1000					930	N999
E-515-8	PARKER SEAL/LOS ANGLS		69-1565-10	G0X 1000.0						299	299
E-515-8	PARKER SEAL/LOS ANGLS		69-1565-11	G0X 1087.0						296	296
E-515-8	PARKER SEAL/LOS ANGLS		69-1565-12	G0X 1265.0						321	321
E-515-8	PARKER SEAL/LOS ANGLS		69-1565-13	G0X 1500.0						282	282
E-515-8	PARKER SEAL/LOS ANGLS		69-1565-14	G0X 1565.0						331	331
E-515-8	PARKER SEAL/LOS ANGLS		69-1565-15	G0X 2000.0						290	290
E-515-8	PARKER SEAL/LOS ANGLS	.0750	69-1565-16	G0X 1500.0							
E-515-8	PARKER SEAL/LOS ANGLS	.0750	69-1565-17	G0X 2000.0	00/04						
E-515-8	PARKER SEAL/LOS ANGLS	.0750	69-1565-18	G0X 2500.0	04/04						
E-515-8	PARKER SEAL/LOS ANGLS	.0750	69-1565-19	G0X 500.0	200						
E-515-8	PARKER SEAL/LOS ANGLS		69-1565-2	G0X 20.0	1000					920	N999
E-515-8	PARKER SEAL/LOS ANGLS	.0750	69-1565-20	G0X 1000.0	200						
E-515-8	PARKER SEAL/LOS ANGLS	.0750	69-1565-21	G0X 1500.0	200						
E-515-8	PARKER SEAL/LOS ANGLS	.0750	69-1565-22	G0X 2000.0	200						
E-515-8	PARKER SEAL/LOS ANGLS		69-1565-3	G0X 25.0						604	621
E-515-8	PARKER SEAL/LOS ANGLS		69-1565-4	G0X 30.0	1000					920	N999
E-515-8	PARKER SEAL/LOS ANGLS		69-1565-5	G0X 40.0						510	510
E-515-8	PARKER SEAL/LOS ANGLS		69-1565-6	G0X 50.0						510	510
E-515-8	PARKER SEAL/LOS ANGLS		69-1565-7	G0X 50.0						435	435
E-515-8	PARKER SEAL/LOS ANGLS		69-1565-8	G0X 100.0						368	368
E-515-8	PARKER SEAL/LOS ANGLS		69-1565-9	G0X 500.0						297	297
E-515-8	PARKER SEAL/LOS ANGLS		70-1970	A-5U 746.0	505						
E-515-8	PARKER SEAL/LOS ANGLS		70-1970-1	A-5U 760.0	508						

MATERIAL TEST DATA BY MANUFACTURER S DESIGNATION AS OF 31 JAN 72

MFGR S DESIGNATION	MANUFACTURER	SPEC. THICK.	TEST RPT NO.	TEST ENVR	TEST PRESS	TEST TEMP	IMPT NO OF REACT	NO OF FLASH PT	FIRF PT	PRIP DIST	WT LOSS	R T I T	MATL CODE
E-515-8	PARKER SEAL/LOS ANGLS		70-1970-2	A-50	748.0	510						T 15	DUCDXX
E-515-8	PARKER SEAL/LOS ANGLS		70-1970-3	A-50	805.0	497						T 15	DODDXX
E-540-8	PARKER SEAL/LOS ANGLS		70-1972	A-50	267.0	416						T 15	DVGDXX
E-540-8	PARKER SEAL/LOS ANGLS		70-1972-1	A-50	768.0	489						T 15	DVDDXX
E-540-8	PARKER SEAL/LOS ANGLS		70-1972-2	A-50	508.0	457						T 15	DVCDXX
E-540-8	PARKER SEAL/LOS ANGLS		70-1972-3	A-50	760.0	487						T 15	DVCDXX
E-540-8	PARKER SEAL/LOS ANGLS		70-1972-4	A-50	758.0	500						T 15	DVCDXX
E-617-9	PARKER SEAL/LOS ANGLS		69-1564	GDX	5.0			586	649			D 13	CHDDXX
E-617-9	PARKER SEAL/LOS ANGLS		69-1564-1	GDX	25.0			450	536			D 13	CHDDXX
E-617-9	PARKER SEAL/LOS ANGLS	.0750	69-1564-11	GDX	4500.0		50	00/04				A 11	CHDDXX
E-617-9	PARKER SEAL/LOS ANGLS	.0750	69-1564-12	GDX	4500.0			01/01				T 10	CHDDXX
E-617-9	PARKER SEAL/LOS ANGLS		69-1564-13	GDX	4000.0			01/01				D 13	CHDDXX
E-617-9	PARKER SEAL/LOS ANGLS		69-1564-14	GDX	3000.0			278	278			D 13	CHDDXX
E-617-9	PARKER SEAL/LOS ANGLS		69-1564-15	GDX	3000.0		50	00/04				D 13	CHDDXX
E-617-9	PARKER SEAL/LOS ANGLS		69-1564-16	GDX	5000.0			01/01				A 11	CHDDXX
E-617-9	PARKER SEAL/LOS ANGLS		69-1564-17	GDX	500.0			01/01				T 10	CHDDXX
E-617-9	PARKER SEAL/LOS ANGLS		69-1564-18	GDX	1000.0			01/01				T 10	CHDDXX
E-617-9	PARKER SEAL/LOS ANGLS		69-1564-19	GDX	1500.0			01/01				D 13	CHDDXX
E-617-9	PARKER SEAL/LOS ANGLS		69-1564-2	GDX	50.0			496	496			D 13	CHDDXX
E-617-9	PARKER SEAL/LOS ANGLS		69-1564-20	GDX	2500.0			01/01				T 10	CHDDXX
E-617-9	PARKER SEAL/LOS ANGLS		69-1564-21	GDX	1000.0		50	00/04				A 11	CHDDXX
E-617-9	PARKER SEAL/LOS ANGLS		69-1564-22	GDX	1000.0		200	01/02				T 11	CHDDXX
E-617-9	PARKER SEAL/LOS ANGLS		69-1564-23	LOX	14.7		50	00/04				A 16	CHDDXX
E-617-9	PARKER SEAL/LOS ANGLS		69-1564-24	LOX	14.7		200	00/04				A 16	CHDDXX
E-617-9	PARKER SEAL/LOS ANGLS		69-1564-3	GDX	50.0			324	324			D 13	CHDDXX
E-617-9	PARKER SEAL/LOS ANGLS		69-1564-4	GDX	100.0			329	329			D 13	CHDDXX
E-617-9	PARKER SEAL/LOS ANGLS		69-1564-5	GDX	500.0			287	287			D 13	CHDDXX
E-617-9	PARKER SEAL/LOS ANGLS		69-1564-6	GDX	1000.0			270	270			D 13	CHDDXX
E-617-9	PARKER SEAL/LOS ANGLS		69-1564-7	GDX	1500.0			273	273			D 13	CHDDXX
E-617-9	PARKER SEAL/LOS ANGLS		69-1564-8	GDX	2000.0			284	284			D 13	CHDDXX
E-617-9	PARKER SEAL/LOS ANGLS		69-1564-8	GDX	5.0	1000		638	N999			Y 13	ASXXXX
EA-40 ADHESIVE	SMOOTH-ON MFG CO.	.0050	SP-6918	GDX	25.0			659	675			D 13	ABXXXX
EA-40 ADHESIVE	SMOOTH-ON MFG CO.	.0050	SP-6918-1	GDX	1500.0			304	304			D 13	ABXXXX
EA-40 ADHESIVE	SMOOTH-ON MFG CO.		SP-6918-10	GDX	50.0			521	521			D 13	ABXXXX
EA-40 ADHESIVE	SMOOTH-ON MFG CO.		SP-6918-11	GDX	500.0			465	465			D 13	ABXXXX
EA-40 ADHESIVE	SMOOTH-ON MFG CO.		SP-6918-12	GDX	2000.0			259	259			D 13	ABXXXX
EA-40 ADHESIVE	SMOOTH-ON MFG CO.		SP-6918-13	GDX	100.0			507	507			D 13	ABXXXX
EA-40 ADHESIVE	SMOOTH-ON MFG CO.		SP-6918-14	GDX	1000.0			304	304			D 13	ABXXXX
EA-40 ADHESIVE	SMOOTH-ON MFG CO.	.0050	SP-6918-15	GDX	50.0			637	671			D 13	ABXXXX
EA-40 ADHESIVE	SMOOTH-ON MFG CO.	.0050	SP-6918-2	GDX	62.0	1000		669	669			D 13	ABXXXX
EA-40 ADHESIVE	SMOOTH-ON MFG CO.	.0050	SP-6918-3	GDX	165.0							D 13	ABXXXX
EA-40 ADHESIVE	SMOOTH-ON MFG CO.	.0050	SP-6918-4	GDX	3500.0							A 10	ABXXXX
EA-40 ADHESIVE	SMOOTH-ON MFG CO.	.0050	SP-6918-5	GDX	4000.0							A 10	ABXXXX
EA-40 ADHESIVE	SMOOTH-ON MFG CO.	.0050	SP-6918-6	GDX	4500.0							D 10	ABXXXX
EA-40 ADHESIVE	SMOOTH-ON MFG CO.	.0050	SP-6918-7	GDX	4500.0							D 10	ABXXXX

MATERIAL TEST DATA BY MANUFACTURER S DESIGNATION AS OF 31 JAN 72

MFGR S DESIGNATION	MANUFACTURER	SPEC. THICK.	TEST RPT NO.	TEST ENVR	TEST PRESS	TEST TEMP	TEST ENER	IMPT NO OF REACT	FLASH POINT	FIRE PT	PPOP DIST	WT LOSS	R T I T	MATL CODE
EA-40 ADHESIVE	SMOOTH-ON MFG CO.	.0050	SP-6918-R	GOX	750.0		200	04/04					D 11	ABXXX
EA-40 ADHESIVE	SMOOTH-ON MFG CO.	.0050	SP-6918-9	GOX	500.0		200	01/01					D 11	ABXXX
EASY FLOW 45	HANDY AND HARMON		71-2528	GOX	1500.0		50	00/04					A 10	FKRMC
EASY FLOW 45	HANDY AND HARMON		71-2528-1	GOX	1500.0			00/04					A 10	FKRMC
EASY-FLO 45	GAC		70-2138	GOX	2000.0			00/04					A 10	FKRXX
EASY-FLO 45	GAC		70-2138-1	A-50	754.0	496							T 15	FKRXX
EASY-FLO 45	GAC		70-2138-2	A-50	775.0	501							T 15	FKRXX
EC-9-1-M GLASS YARN	OWENS CORNING FIBGLS		70-2093	GOX	1500.0		50	00/04					A 11	EDGXX
EC-9-1-M GLASS YARN	OWENS CORNING FIBGLS		70-2093-1	GOX	1500.0			00/04					A 10	EDGXX
EC-9-1-M GLASS YARN	OWENS CORNING FIBGLS		70-2093-2	GOX	1000.0				N999	N999			A 13	EDGXX
ECCO-STOCK R-19	EMERSON CURING INC		71-2762	GOX	150.0		50	00/04					D 13	FJBYXX
ECCO-STOCK R-19	EMERSON CURING INC		71-2762-1	GOX	250.0				431	431			A 11	FJBYXX
ECCO-STOCK R-19	EMERSON CURING INC		71-2762-2	GOX	250.0			00/04					A 10	FJBYXX
ECCOFAN	EMERSON CURING INC		70-1953	A-50	401.0	505							T 15	CFQXX
ECCOFAN	EMERSON CURING INC		70-1953-1	A-50	771.0	515							T 15	CFQXX
ELASTOMER EMS-338	AIRESEARCH INDST DIV		71-2825	GOX	100.0				517	517			D 13	DDFXX
ELASTOMER EMS-338	AIRESEARCH INDST DIV		71-2825-1	GOX	250.0		50	00/04					A 11	DDFXX
ELASTOMER EMS-338	AIRESEARCH INDST DIV		71-2825-2	GOX	250.0			00/04					A 10	DDFXX
ELASTOMER SVSK 81370-1	HAMILTON STANDARD		71-2289	GOX	2000.0			00/04					A 10	DDCPXX
ELASTOMER SVSK 81370-1	HAMILTON STANDARD		71-2289-1	GOX	5000.0		50	01/01					T 10	DDCPXX
ELASTOMER SVSK 81370-1	HAMILTON STANDARD		71-2289-2	GOX	5000.0			00/04					A 11	DDCPXX
ELASTOMER SVSK 81370-1	HAMILTON STANDARD		71-2289-3	GOX	1500.0				525	525			D 13	DDCPXX
ELASTOMER SVSK 81370-1	HAMILTON STANDARD		71-2289-4	GOX	3000.0				486	486			D 13	DDCPXX
ELECTROFILM 1000	ELECTROFILM INC.		70-1876	GOX	1500.0			00/04					A 10	DAEJFM
ELECTROFILM 1000	ELECTROFILM INC.		70-1876-1	GOX	62.0	1000			N999	N999			A 13	DAEJFM
ELECTROFILM 1000	ELECTROFILM INC.		70-1876-10	GOX	1500.0				606	606			D 13	DAEJFM
ELECTROFILM 1000	ELECTROFILM INC.		70-1876-11	GOX	2000.0				598	598			D 13	DAEJFM
ELECTROFILM 1000	ELECTROFILM INC.		70-1876-12	GOX	950.0				450	450			D 13	DAEJFM
ELECTROFILM 1000	ELECTROFILM INC.		70-1876-2	GOX	165.0	1000			N999	N999			A 13	DAEJFM
ELECTROFILM 1000	ELECTROFILM INC.		70-1876-3	GOX	900.0				413	413			D 13	DAEJFM
ELECTROFILM 1000	ELECTROFILM INC.		70-1876-4	GOX	25.0	1000			N999	N999			J 13	DAEJFM
ELECTROFILM 1000	ELECTROFILM INC.		70-1876-5	GOX	50.0	1000		50	00/04				A 11	DAEJFM
ELECTROFILM 1000	ELECTROFILM INC.		70-1876-6	GOX	50.0	1000			N999	N999			A 13	DAEJFM
ELECTROFILM 1000	ELECTROFILM INC.		70-1876-7	GOX	100.0	1000			N999	N999			J 13	DAEJFM
ELECTROFILM 1000	ELECTROFILM INC.		70-1876-8	GOX	500.0				581	581			D 13	DAEJFM
ELECTROFILM 1000	ELECTROFILM INC.		70-1576-9	GOX	1000.0				621	621			D 13	DAEJFM
EMS-308	AIRESEARCH INDST DIV		67-0247	GOX	1565.0				495	495			D 13	BGCDP
EMS-342	AIRESEARCH INDST DIV		67-0794	GOX	1087.0				458	438			D 13	DDCKXX
EMS-342	AIRESEARCH INDST DIV		67-0794-1	GOX	1565.0				492	492			D 13	DDCKXX
EMS-342	AIRESEARCH INDST DIV		67-0794-2	GOX	1500.0			01/02					T 10	DDCKXX
EMS-342	AIRESEARCH INDST DIV		67-0794-3	GOX	1500.0		50	00/04					A 11	DDCKXX
EMS-342	AIRESEARCH INDST DIV		67-0794-4	GOX	250.0			00/04					A 10	DDCKXX
EMS-363	AIRESEARCH INDST DIV		SP-6929	GOX	25.0				651	651			D 13	DDCKXX

MATERIAL TEST DATA BY MANUFACTURER S DESIGNATION AS OF 31 JAN 72

MFGR S DESIGNATION	MANUFACTURER	SPEC. THICK.	TEST RPT NO.	TEST ENVR	TEST PRESS	TEST TFMP	TEST ENER	IMP1 NO OF REACT	FLASH POINT	FIRE PT	PROP DIST LOSS	WT LOSS	R T I T	MATL CODE
EMS-363	AIRESEARCH	.0750	SP-6929-1	GOX	50.0				606	606			D 13	00CQXX
EMS-363	AIRESEARCH	.0750	SP-6929-10	GOX	3000.0			04/04					D 10	00CQXX
EMS-363	AIRESEARCH	.0750	SP-6929-11	GOX	500.0		200	00/01					A 11	00CQXX
EMS-363	AIRESEARCH	.0750	SP-6929-12	GOX	1000.0		200	00/01					A 11	00CQXX
EMS-363	AIRESEARCH	.0750	SP-6929-13	GOX	1500.0		200	00/01					A 11	00CQXX
EMS-363	AIRESEARCH	.0750	SP-6929-14	GOX	2000.0		200	00/04					D 13	00CQXX
EMS-363	AIRESEARCH	.0750	SP-6929-15	GOX	150.0				373	373			A 11	00CQXX
EMS-363	AIRESEARCH	.0750	SP-6929-16	GOX	500.0		50	00/04					T 10	00CQXX
EMS-363	AIRESEARCH	.0750	SP-6929-17	GOX	500.0		50	00/04					A 11	00CQXX
EMS-363	AIRESEARCH	.0750	SP-6929-18	GOX	1500.0								T 10	00CQXX
EMS-363	AIRESEARCH	.0750	SP-6929-19	GOX	1500.0			01/04					D 13	00CQXX
EMS-363	AIRESEARCH	.0750	SP-6929-20	GOX	1000.0				566	676			D 13	00CQXX
EMS-363	AIRESEARCH	.0750	SP-6929-21	GOX	500.0				291	291			D 13	00CQXX
EMS-363	AIRESEARCH	.0750	SP-6929-22	GOX	50.0				211	211			D 13	00CQXX
EMS-363	AIRESEARCH	.0750	SP-6929-23	GOX	100.0				290	290			D 13	00CQXX
EMS-363	AIRESEARCH	.0750	SP-6929-24	GOX	1000.0				29b	286			D 13	00CQXX
EMS-363	AIRESEARCH	.0750	SP-6929-25	GOX	1500.0				345	345			D 13	00CQXX
EMS-363	AIRESEARCH	.0750	SP-6929-26	GOX	2000.0				201	201			D 13	00CQXX
EMS-363	AIRESEARCH	.0750	SP-6929-3	GOX	165.0				223	223			D 13	00CQXX
EMS-363	AIRESEARCH	.0750	SP-6929-4	GOX	200.0			00/04	640	643			D 13	00CQXX
EMS-363	AIRESEARCH	.0750	SP-6929-5	GOX	500.0			01/02					D 10	00CQXX
EMS-363	AIRESEARCH	.0750	SP-6929-6	GOX	1000.0			01/02					D 10	00CQXX
EMS-363	AIRESEARCH	.0750	SP-6929-7	GOX	1500.0			01/02					D 10	00CQXX
EMS-363	AIRESEARCH	.0750	SP-6929-8	GOX	2000.0			01/02					D 10	00CQXX
EMS-363	AIRESEARCH	.0750	SP-6929-9	GOX	2500.0			01/02					D 10	00CQXX
EMS-382	AIRESEARCH	.0750	SP-6926	GOX	50.0				572	572			D 13	00CQXX
EMS-382	AIRESEARCH	.0750	SP-6926-1	GOX	62.0				567	606			D 13	00CQXX
EMS-382	AIRESEARCH	.0750	SP-6926-10	GOX	500.0		50	00/01					A 11	00CQXX
EMS-382	AIRESEARCH	.0750	SP-6926-11	GOX	750.0		50	00/01					A 11	00CQXX
EMS-382	AIRESEARCH	.0750	SP-6926-17	GOX	1000.0		50	00/01					A 11	00CQXX
EMS-382	AIRESEARCH	.0750	SP-6926-13	GOX	1250.0		50	00/01					A 11	00CQXX
EMS-382	AIRESEARCH	.0750	SP-6926-14	GOX	1500.0		50	00/01					A 10	00CQXX
EMS-382	AIRESEARCH	.0750	SP-6926-15	GOX	100.0			00/01					A 10	00CQXX
EMS-382	AIRESEARCH	.0750	SP-6926-16	GOX	200.0			00/01					A 10	00CQXX
EMS-382	AIRESEARCH	.0750	SP-6926-17	GOX	300.0			00/01					A 10	00CQXX
EMS-382	AIRESEARCH	.0750	SP-6926-18	GOX	400.0			00/01					A 10	00CQXX
EMS-382	AIRESEARCH	.0750	SP-6926-19	GOX	500.0			00/04					A 10	00CQXX
EMS-382	AIRESEARCH	.0750	SP-6926-2	GOX	435.0				572	572			D 13	00CQXX
EMS-382	AIRESEARCH	.0750	SP-6926-20	GOX	1000.0			01/02					D 10	00CQXX
EMS-382	AIRESEARCH	.0750	SP-6926-21	GOX	1500.0			04/04					D 10	00CQXX
EMS-382	AIRESEARCH	.0750	SP-6926-22	GOX	14.7		200	01/01					T 11	00CQXX
EMS-382	AIRESEARCH	.0750	SP-6926-3	GOX	50.0		50	00/04					A 11	00CQXX
EMS-382	AIRESEARCH	.0750	SP-6926-4	GOX	100.0		50	00/04					A 11	00CQXX

MATERIAL TEST DATA BY MANUFACTURER S DESIGNATION AS OF 31 JAN 72

MFGR S DESIGNATION	MANUFACTURER	SPEC. THICK.	TEST RPT NO.	TEST ENVR PRESS	TEST TEMP	TEST IMPT ENER	NO OF REACT	FLASH POINT	FIRE PT	PROP DIST LOSS	WT LOSS	R T MATL I T CODE
EMS-382	AIRESEARCH INDST DIV	.0750	SP-6926-5	GOX	150.0	50	00/04					A 11 DODIXX
EMS-382	AIRESEARCH INDST DIV	.0750	SP-6926-6	GOX	200.0	50	00/04					A 11 DODIXX
EMS-382	AIRESEARCH INDST DIV	.0750	SP-6926-7	GOX	40.0	200	01/01					D 11 DODIXX
EMS-382	AIRESEARCH INDST DIV	.0750	SP-6926-8	GOX	100.0	200	01/01					D 11 DODIXX
EMDXX 1	INDIANA GENERAL CORP	.0750	SP-6926-9	GOX	1500.0	200	01/01					D 11 DODIXX
EMDXX 1	INDIANA GENERAL CORP	.0750	71-2269	GOX	1500.0	50	00/04					A 11 EXMDMI
EP1BOND 123/HARDNER 931	FURANE PLASTICS INC.	.0050	70-1768-1	GOX	1500.0	50	00/04	476	476			A 10 EXMDMI
EP1BOND 123/HARDNER 931	FURANE PLASTICS INC.	.0050	70-1768-2	GOX	1565.0	50	00/04					D 13 AEBGGS
EP1BOND 123/HARDNER 931	FURANE PLASTICS INC.	.0050	70-1768-10	GOX	2000.0	50	01/02					A 11 AEBGGS
EP1BOND 123/HARDNER 931	FURANE PLASTICS INC.	.0050	70-1768-11	GOX	1500.0	50	01/03					T 10 AEBGGS
EP1BOND 123/HARDNER 931	FURANE PLASTICS INC.	.0050	70-1768-12	GOX	2000.0	50	04/04					T 10 AEBGGS
EP1BOND 123/HARDNER 931	FURANE PLASTICS INC.	.0050	70-1768-13	GOX	3500.0	50	01/01					T 10 AEBGGS
EP1BOND 123/HARDNER 931	FURANE PLASTICS INC.	.0050	70-1768-14	GOX	4500.0	50	01/01					T 10 AEBGGS
EP1BOND 123/HARDNER 931	FURANE PLASTICS INC.	.0050	70-1768-15	GOX	500.0	50	00/04					A 11 AEBGGS
EP1BOND 123/HARDNER 931	FURANE PLASTICS INC.	.0050	70-1768-16	GOX	500.0	50	00/04					A 11 AEBGGS
EP1BOND 123/HARDNER 931	FURANE PLASTICS INC.	.0050	70-1768-17	GOX	1500.0	50	00/04					A 10 AEBGGS
EP1BOND 123/HARDNER 931	FURANE PLASTICS INC.	.0050	70-1768-18	GOX	1500.0	50	00/04					T 10 AEBGGS
EP1BOND 123/HARDNER 931	FURANE PLASTICS INC.	.0050	70-1768-19	GOX	25.0	50	01/01	659	659			D 13 AEBGGS
EP1BOND 123/HARDNER 931	FURANE PLASTICS INC.	.0050	70-1768-20	GOX	2500.0	50	01/02					T 11 AEBGGS
EP1BOND 123/HARDNER 931	FURANE PLASTICS INC.	.0050	70-1768-21	GOX	50.0	50	01/02	655	655			D 13 AEBGGS
EP1BOND 123/HARDNER 931	FURANE PLASTICS INC.	.0050	70-1768-22	GOX	150.0	50	01/02	533	533			D 13 AEBGGS
EP1BOND 123/HARDNER 931	FURANE PLASTICS INC.	.0050	70-1768-23	LOX	1000.0	50	00/04	399	399			D 13 AEBGGS
EP1BOND 123/HARDNER 931	FURANE PLASTICS INC.	.0050	70-1768-24	LOX	14.7	50	00/04					A 16 AEBGGS
EP1BOND 123/HARDNER 931	FURANE PLASTICS INC.	.0050	70-1768-25	LOX	14.7	200	00/04					A 16 AEBGGS
EP1BOND 123/HARDNER 931	FURANE PLASTICS INC.	.0050	70-1768-26	GOX	1000.0	50	00/04					A 11 AEBGGS
EP1BOND 123/HARDNER 931	FURANE PLASTICS INC.	.0050	70-1768-3	GOX	3000.0	50	04/04					T 11 AEBGGS
EP1BOND 123/HARDNER 931	FURANE PLASTICS INC.	.0050	70-1768-4	GOX	500.0	200	04/04					T 11 AEBGGS
EP1BOND 123/HARDNER 931	FURANE PLASTICS INC.	.0050	70-1768-5	GOX	1000.0	200	01/01					T 11 AEBGGS
EP1BOND 123/HARDNER 931	FURANE PLASTICS INC.	.0050	70-1768-6	GOX	2000.0	200	01/01					T 11 AEBGGS
EP1BOND 123/HARDNER 931	FURANE PLASTICS INC.	.0050	70-1768-7	GOX	3000.0	200	01/01					T 11 AEBGGS
EP1BOND 123/HARDNER 931	FURANE PLASTICS INC.	.0050	70-1768-8	GOX	4000.0	200	01/01					T 11 AEBGGS
EP1BOND 123/HARDNER 931	FURANE PLASTICS INC.	.0050	70-1768-9	GOX	1000.0	200	00/04					A 10 AEBGGS
EP1BOND 123/HARDNER 931	FURANE PLASTICS INC.	.0050	70-2208	GOX	1500.0	50	01/02	450	450			T 10 AEBGGS
EP1BOND 123/HARDNER 931	FURANE PLASTICS INC.	.0050	70-2208-1	GOX	1000.0	50	01/02	566	566			D 13 AEBGGS
EP1BOND 123/HARDNER 931	FURANE PLASTICS INC.	.0050	70-2208-2	GOX	1000.0	50	01/02	566	566			D 13 AEBGGS
EPON 8/CAT A	SHELL CHEMICAL CORP		70-1774	GOX	1500.0	50	00/04					A 11 AEBLGS
EPON 8/CAT A	SHELL CHEMICAL CORP		70-1774	GOX	1500.0	50	01/03					T 10 AEBLGS
EPON 8/CAT A	SHELL CHEMICAL CORP		70-1774-1	GOX	25.0	50	01/03	657	657			D 13 AEBLGS
EPON 8/CAT A	SHELL CHEMICAL CORP		70-1774-10	GOX	950.0	50	01/03	661	661			D 13 AEBLGS
EPON 8/CAT A	SHELL CHEMICAL CORP		70-1774-11	GOX	950.0	50	01/03	290	290			D 13 AEBLGS
EPON 8/CAT A	SHELL CHEMICAL CORP		70-1774-12	GOX	950.0	50	01/03	327	327			D 13 AEBLGS

MATERIAL TEST DATA BY MANUFACTURER S DESIGNATION AS OF 31 JAN 72

MFGR S DESIGNATION	MANUFACTURER	SPEC. THICK.	TEST RPT NO.	TEST TEST ENVR PRESS	TEST IMPT NO OF REACT	FLASH POINT	FIRE PT	PROP DIST LOSS	WT	R T MATL I T CODE
EPDM 8/CAT A	SHELL CHEMICAL CORP		70-1774-13	GOX 4500.0	50	00/04				A 11 AEBLGS
EPDM 8/CAT A	SHELL CHEMICAL CORP		70-1774-14	GOX 1500.0		01/01				T 10 AEBLGS
EPDM 8/CAT A	SHELL CHEMICAL CORP		70-1774-15	GOX 1000.0		01/02				T 10 AEBLGS
EPDM 8/CAT A	SHELL CHEMICAL CORP		70-1774-16	GOX 500.0		00/04				A 10 AEBLGS
EPDM 8/CAT A	SHELL CHEMICAL CORP		70-1774-17	GOX 1000.0	263					D 15 AEBLGS
EPDM 8/CAT A	SHELL CHEMICAL CORP		70-1774-18	GOX 50.0			524			D 13 AEBLGS
EPDM 8/CAT A	SHELL CHEMICAL CORP		70-1774-2	GOX 62.0			665			D 13 AEBLGS
EPDM 8/CAT A	SHELL CHEMICAL CORP		70-1774-3	GOX 100.0			483			D 13 AEBLGS
EPDM 8/CAT A	SHELL CHEMICAL CORP		70-1774-4	GOX 165.0			664			D 13 AEBLGS
EPDM 8/CAT A	SHELL CHEMICAL CORP		70-1774-5	GOX 500.0			352			D 13 AEBLGS
EPDM 8/CAT A	SHELL CHEMICAL CORP		70-1774-6	GOX 900.0			333			D 13 AEBLGS
EPDM 8/CAT A	SHELL CHEMICAL CORP		70-1774-7	GOX 1000.0			343			D 13 AEBLGS
EPDM 8/CAT A	SHELL CHEMICAL CORP		70-1774-8	GOX 1500.0			291			D 13 AEBLGS
EPDM 8/CAT A	SHELL CHEMICAL CORP		70-1774-9	GOX 2000.0			287			D 13 AEBLGS
EPOXY E-9405	FIBERITE WEST COAST CORP		71-2265-1	GOX 1500.0	50	00/04				A 11 HABGXX
EPOXY E-9405	FIBERITE WEST COAST CORP		71-2265-10	GOX 1000.0	271					D 15 HABGXX
EPOXY E-9405	FIBERITE WEST COAST CORP		71-2265-11	GOX 25.0			766			D 13 HABGXX
EPOXY E-9405	FIBERITE WEST COAST CORP		71-2265-12	GOX 50.0			650			D 13 HABGXX
EPOXY E-9405	FIBERITE WEST COAST CORP		71-2265-13	GOX 50.0			831			D 13 HABGXX
EPOXY E-9405	FIBERITE WEST COAST CORP		71-2265-14	GOX 100.0			530			D 13 HABGXX
EPOXY E-9405	FIBERITE WEST COAST CORP		71-2265-15	GOX 500.0			534			D 13 HABGXX
EPOXY E-9405	FIBERITE WEST COAST CORP		71-2265-16	GOX 1500.0			232			D 13 HABGXX
EPOXY E-9405	FIBERITE WEST COAST CORP		71-2265-17	GOX 2000.0			232			D 13 HABGXX
EPOXY E-9405	FIBERITE WEST COAST CORP		71-2265-18	GOX 5050.0			232			D 13 HABGXX
EPOXY E-9405	FIBERITE WEST COAST CORP		71-2265-2	GOX 1000.0	50	00/04				A 11 HABGXX
EPOXY E-9405	FIBERITE WEST COAST CORP		71-2265-3	GOX 4000.0		01/01	295			D 13 HABGXX
EPOXY E-9405	FIBERITE WEST COAST CORP		71-2265-4	GOX 3500.0		01/01				T 10 HABGXX
EPOXY E-9405	FIBERITE WEST COAST CORP		71-2265-5	GOX 3000.0		01/01				T 10 HABGXX
EPOXY E-9405	FIBERITE WEST COAST CORP		71-2265-6	GOX 2500.0		01/02				T 10 HABGXX
EPOXY E-9405	FIBERITE WEST COAST CORP		71-2265-7	GOX 2000.0		01/01				T 10 HABGXX
EPOXY E-9405	FIBERITE WEST COAST CORP		71-2265-8	GOX 1500.0		01/01				T 10 HABGXX
EPOXY E-9405	FIBERITE WEST COAST CORP		71-2265-9	GOX 1000.0		00/04				T 10 HABGXX
EPOXY E-9405	FIBERITE WEST COAST CORP		70-2224	GOX 2000.0		00/04				T 10 FJBGXX
EPOXY SHEET TYPE 1	HY SOL CORP	.0750	70-2224-1	GOX 4500.0		01/04	440			G 13 FJBGXX
EPOXY SHEET TYPE 1	HY SOL CORP	.0750	70-2224-10	GOX 500.0			341			D 13 FJBGXX
EPOXY SHEET TYPE 1	HY SOL CORP		70-2224-11	GOX 1000.0			351			D 13 FJBGXX
EPOXY SHEET TYPE 1	HY SOL CORP		70-2224-12	GOX 1150.0			375			D 13 FJBGXX
EPOXY SHEET TYPE 1	HY SOL CORP		70-2224-13	GOX 1500.0			345			D 13 FJBGXX
EPOXY SHEET TYPE 1	HY SOL CORP		70-2224-14	GOX 2000.0			349			D 13 FJBGXX
EPOXY SHEET TYPE 1	HY SOL CORP		70-2224-15	GOX 5000.0	50	00/04				A 11 FJBGXX
EPOXY SHEET TYPE 1	HY SOL CORP		70-2224-16	GOX 4500.0	50	00/04				A 11 FJBGXX
EPOXY SHEET TYPE 1	HY SOL CORP		70-2224-2	GOX 2000.0	50	00/04				A 11 FJBGXX
EPOXY SHEET TYPE 1	HY SOL CORP		70-2224-3	GOX 4500.0	50	00/04				A 11 FJBGXX

REFR S DESIGNATION	MANUFACTURER	SPEC. THICK.	TEST RPT NO.	TEST TEST ENVRK PRESS	TEST TEMP	TEST ENFR	TEST ENFR	NO OF REACT	FLASH POINT	FIRE PT	PROP DIST	WT LOSS	R T I T	MATL CODE
EPOXY SHEET TYPE 1	HYCOL CORP		70-2224-4	GOX 1150.0					432	432			D 13	FJBGXX
EPOXY SHEET TYPE 1	HYCOL CORP		70-2224-5	GOX 3000.0					402	402			D 13	FJBGXX
EPOXY SHEET TYPE 1	HYCOL CORP		70-2224-6	A-50 824.0	510								T 15	FJBGXX
EPOXY SHEET TYPE 1	HYCOL CORP		70-2224-7	A-50 826.0	513								T 15	FJBGXX
EPOXY SHEET TYPE 1	HYCOL CORP		70-2224-8	GOX 50.0					560	560			D 13	FJBGXX
EPOXY SHEET TYPE 1	HYCOL CORP		70-2224-9	GOX 100.0					557	557			D 13	FJBGXX
EPOXY 175053	SIMMONS		71-2719	A-50 663.0	496								T 15	BABGGS
EPOXY 175053	SIMMONS		71-2719-1	A-50 759.0	507								T 15	BABGGS
EPOXY 250	3M CO. ST. PAUL		71-2492	A-50 665.0	480								T 15	BABGXX
EPOXY 250	3M CO. ST. PAUL		71-2492-1	A-50 776.0	507								T 15	BABGXX
EPOXYLITE 5302	EPOXYLITE CORP		71-2313	GOX 2000.0				01/02	417	417			T 10	DTBGXX
EPOXYLITE 5302	EPOXYLITE CORP		71-2313-1	GOX 1500.0									D 13	DTBGXX
EPOXYLITE 6001-16	EPOXYLITE CORP		70-2169-14	A-50 785.0	503								T 14	ABGGXX
EPOXYLITE 6001-16	EPOXYLITE CORP		70-2169-15	A-50 785.0	506								T 14	ABGGXX
EPOXYLITE 6001-16	EPOXYLITE CORP	.0050	70-2169	GOX 2000.0				01/02	303	303			T 10	ABGGXX
EPOXYLITE 6001-16	EPOXYLITE CORP		70-2169-1	GOX 1400.0									D 13	ABGGXX
EPOXYLITE 6001-16	EPOXYLITE CORP		70-2169-10	GOX 500.0					325	325			D 13	ABGGXX
EPOXYLITE 6001-16	EPOXYLITE CORP		70-2169-11	GOX 1000.0					310	310			D 13	ABGGXX
EPOXYLITE 6001-16	EPOXYLITE CORP		70-2169-12	GOX 1500.0					265	265			D 13	ABGGXX
EPOXYLITE 6001-16	EPOXYLITE CORP		70-2169-13	GOX 2000.0					282	282			D 13	ABGGXX
EPOXYLITE 6001-16	EPOXYLITE CORP		70-2169-14	GOX 1400.0	260								D 15	ABGGXX
EPOXYLITE 6001-16	EPOXYLITE CORP		70-2169-15	GOX 2.0					752	752			D 13	ABGGXX
EPOXYLITE 6001-16	EPOXYLITE CORP		70-2169-16	GOX 50.0					618	618			D 13	ABGGXX
EPOXYLITE 6001-16	EPOXYLITE CORP		70-2169-2	GOX 5000.0			50	00/04					A 11	AFBGXX
EPOXYLITE 6001-16	EPOXYLITE CORP		70-2169-3	GOX 2500.0				01/01					T 10	ABGGXX
EPOXYLITE 6001-16	EPOXYLITE CORP		70-2169-4	GOX 1000.0				01/01					T 10	ABGGXX
EPOXYLITE 6001-16	EPOXYLITE CORP		70-2169-5	GOX 500.0				00/04					A 10	ABGGXX
EPOXYLITE 6001-16	EPOXYLITE CORP		70-2169-6	A-50 785.0	503								T 15	ABGGXX
EPOXYLITE 6001-16	EPOXYLITE CORP		71-2169-7	A-50 785.0	506								T 15	ABGGXX
EPOXYLITE 6001-16	EPOXYLITE CORP		70-2169-8	GOX 50.0					314	314			D 13	ABGGXX
EPOXYLITE 6001-16	EPOXYLITE CORP		70-2169-9	GOX 100.0					392	392			D 13	ABGGXX
EPOXYLITE 6203	EPOXYLITE CORP		70-2170	GOX 1500.0				00/04	450	450			A 10	BABJGS
EPOXYLITE 6203	EPOXYLITE CORP		70-2170-1	GOX 1000.0				00/04	466	466			D 13	BABJGS
EPOXYLITE 6203	EPOXYLITE CORP		70-2170-11	GOX 2000.0				00/04	452	452			D 13	BABJGS
EPOXYLITE 6203	EPOXYLITE CORP		70-2170-10	GOX 1500.0	415								D 13	BABJGS
EPOXYLITE 6203	EPOXYLITE CORP		70-2170-12	GOX 3000.0	480								D 13	BABJGS
EPOXYLITE 6203	EPOXYLITE CORP		70-2170-13	GOX 1000.0	480								D 15	BABJGS
EPOXYLITE 6203	EPOXYLITE CORP		70-2170-14	GOX 50.0					714	714			D 13	BABJGS
EPOXYLITE 6203	EPOXYLITE CORP		70-2170-15	GOX 25.0					709	709			D 13	BABJGS
EPOXYLITE 6203	EPOXYLITE CORP		70-2170-2	GOX 1400.0					472	472			D 13	BABJGS
EPOXYLITE 6203	EPOXYLITE CORP		70-2170-2	GOX 4500.0				01/03					T 10	BABJGS
EPOXYLITE 6203	EPOXYLITE CORP		70-2170-3	GOX 3000.0					407	407			D 13	BABJGS
EPOXYLITE 6203	EPOXYLITE CORP		70-2170-4	A-50 785.0	509								T 15	BABJGS

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MATERIAL TEST DATA BY MANUFACTURER S DESIGNATION AS OF 31 JAN 72

MFGR S DESIGNATION	MANUFACTURER	SPEC. THICK.	TEST RPT NO.	TEST ENVR	TEST PRESS	TEST TEMP	TEST ENER	IMPT NO OF REACT	FLASH POINT	F.P. PT	PROP DIST	WT LOSS	R T I T	MATL CCOE
EPOXYLITE 6203	EPOXYLITE CORP		70-2170-5	A-50	822.0	506							T 15	BABJGS
EPOXYLITE 6203	EPOXYLITE CORP		70-2170-6	GOX	50.0				641	641			D 13	BABJGS
EPOXYLITE 6203	EPOXYLITE CORP		70-2170-7	GOX	100.0				620	620			D 13	BABJGS
EPOXYLITE 6203	EPOXYLITE CORP		70-2170-8	GOX	500.0				497	497			D 13	BABJGS
EPOXYLITE 6203	EPOXYLITE CORP		70-2170-9	GOX	1400.0				461	461			D 13	BABJGS
EPR ELASTOMER	EPOXYLITE CORP		70-2198	GOX	1500.0		50	00/04					A 11	BABJGS
EPR ELASTOMER	AIRESEARCH INDS DIV		70-1955	A-50	397.0	446							T 15	DIDDXX
EPR ELASTOMER	AIRESEARCH INDS DIV		70-1955-1	A-50	496.0	612							T 15	DIDDXX
EPR ELASTOMER	AIRESEARCH INDS DIV		70-1955-2	A-50	310.0	461							T 15	DIDDXX
EPR ELASTOMER	AIRESEARCH INDS DIV		70-1955-3	A-50	297.0	491							T 15	DIDDXX
EPR ELASTOMER	AIRESEARCH INDS DIV		70-1955-4	A-50	555.0	451							T 15	DIDDXX
EPR ELASTOMER	AIRESEARCH INDS DIV		70-1955-5	MMH	731.0	496							T 15	DIDDXX
EPR ELASTOMER	AIRESEARCH INDS DIV		70-1955-6	MMH	544.0	462							T 15	DIDDXX
EPR ELASTOMER	AIRESEARCH INDS DIV		70-1955-7	MMH	317.0	487							T 15	DIDDXX
EPR 515-8	GAC		71-2275	A-50	826.0	516							T 15	CHDDXX
EPR 515-8	GAC		71-2275-1	A-50	762.0	500							T 15	CHDDXX
EPY-400 CEMENT	BLH ELECTRONICS		71-2379	GOX	500.0		50	00/04					A 11	ABGGXX
EPY-400 CEMENT	BLH ELECTRONICS		71-2379-1	GOX	500.0								A 10	ABGGXX
EPY-400 CEMENT	BLH ELECTRONICS		71-2379-2	GOX	100.0				535	535			D 13	A98GXX
ER-560 AG BRAZE ALLOY	HANDY AND HARRON		70-2213	GOX	500.0								A 10	FLMRXX
ER-560 AG BRAZE ALLOY	HANDY AND HARRON		70-2213-1	GOX	500.0		50	00/04					A 11	FLMRXX
EUTECTIC 1800	EUTECTIC CORP		71-2603	A-50	741.0	510							T 15	FLMRXX
EUTECTIC 1800	EUTECTIC CORP		71-2603-1	A-50	759.0	512							T 15	FLMRXX
EUTECTIC 1801-1801B	FLUXEUTECTIC CORP		70-1889-1	GOX	1500.0								A 10	6ZXXXX
EUTECTIC 1801-1801B	FLUXEUTECTIC CORP		70-1889-2	GOX	1500.0		50	00/04					A 11	BZXXXX
EUTECTIC 1801-1801B	FLUXEUTECTIC CORP		70-1889-3	GOX	900.0	1000			N999	N999			R 13	BVPBXX
FC-43 TRANSFER FLUID	3M CO. ST. PAUL		70-1947	GOX	6.2	1000							A 13	BVPBXX
FC-43 TRANSFER FLUID	3M CO. ST. PAUL		70-1947-2	GOX	16.5								D 13	BVPBXX
FERRITE STEEL IF5-3C587C	FERRITE STEEL		70-2212	GOX	500.0								A 10	DTMDMI
FERRITE STEEL IF5-3C587C	FERRITE STEEL		70-2212-1	GOX	500.0		50	00/04					A 11	DTMDMI
FERRITE STEEL IF5-3C587C	FERRITE STEEL		71-2501	GOX	1500.0		50	00/04					A 10	DTMDGR
FERRITE STEEL IF5-3C587C	FERRITE STEEL		71-2501-1	GOX	1500.0		50	00/04					A 11	DTMDGR
FERRITE STEEL IF5-3C587C	FERRITE STEEL		71-2501-2	GOX	1500.0		200	00/04					A 11	DTMDGR
FERRITE STEEL IF5-3C587C	FERRITE STEEL		71-2501-3	A-50	775.0	480							T 15	DTMDGR
FERRITE STEEL IF5-3C587C	FERRITE STEEL		71-2501-4	A-50	752.0	508							T 15	DTMDGR
FERRITE STEEL IF5-3C587C	FERRITE STEEL		71-2501-5	MMH	765.0	492							T 15	DTMDGR
FERRITE STEEL IF5-3C587C	FERRITE STEEL		71-2501-6	MMH	604.0	487							T 15	DTMDGR
FERRITE STEEL IF5-3C587C	FERRITE STEEL		75-2200	GOX	1500.0		50	00/04					A 11	FIGTXX
FERRITE STEEL IF5-3C587C	FERRITE STEEL		70-2100-1	GOX	1500.0								A 10	FIGTXX
FERRITE STEEL IF5-3C587C	FERRITE STEEL		70-2100-2	GOX	1000.0				633	633			D 13	FIGTXX
FERRITE STEEL IF5-3C587C	FERRITE STEEL		70-2101	GOX	1500.0		50	00/04					A 11	DKFWGU
FERRITE STEEL IF5-3C587C	FERRITE STEEL		70-2101-1	GOX	1500.0								A 10	DKFWGU
FERRITE STEEL IF5-3C587C	FERRITE STEEL		70-2101-2	GOX	1000.0		50	00/04					D 13	DKFWGU
FERRITE STEEL IF5-3C587C	FERRITE STEEL		70-2102	GOX	1500.0		50	00/04					A 11	DKFWGU

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MFGR S DESIGNATION	MANUFACTURER	SPEC. THICK.	TEST RPT NO.	TEST ENVR	TEST PRESS	TEST TEMP	TEST IMPR ENER	NO OF REACT	FLASH POINT	FIRE PT	PROP DIST	WT LOSS	R T J T	MATL CODE
FEUROLON C	BEMOL CORP		70-2102-1	GOX	1500.0			00/04	752	752			A 10	DK=MGU
FEUROLON C	BEMOL CORP		70-2102-2	GOX	1000.0								D 13	DK=MGU
FEUROLON C	BEMOL CORP		70-2103	GOX	1500.0		50	00/04					A 11	DK=FMGU
FEUROLON C	BEMOL CORP		70-2103-1	GOX	1500.0			00/04					A 10	DK=FMGU
FEUROLON C	BEMOL CORP		70-2103-2	GOX	1000.0				596	596			D 13	DK=FMGU
FIBERGLASS INSUL-E	OWENS CORNING FBRGLS		70-1996	GOX	500.0		50	00/04					A 11	FJFVXX
FIBERGLASS INSUL-E	OWENS CORNING FBRGLS		70-1996-1	GOX	500.0								A 10	FJFVXX
FIBERGLASS INSUL-E	OWENS CORNING FBRGLS		70-1996-1	GOX	1500.0			01/01					T 10	FJFVXX
FIBERGLASS INSUL-E	OWENS CORNING FBRGLS		70-1996-2	GOX	1500.0		50	00/04	699	699			A 11	FJFVXX
FIBERGLASS NO. 27	GAC		71-2596	GOX	80.0								D 13	FJFVXX
FIBERGLASS NO. 27	GAC		71-2596	A-50	782.0	516							T 15	FJFVCK
FIBERGLASS TAPE	CAROLINA NARROW FABRIC		71-2491	A-50	758.0	518							T 15	FJFVCK
FIBERGLASS TAPE	CAROLINA NARROW FABRIC		71-2491-1	A-50	797.0	508							T 15	OZFMXX
FIBERGLASS TAPE	CAROLINA NARROW FABRIC		71-2491-2	A-50	682.0	484							T 15	OZFMXX
FIBROUS ASBESTOS	WHITTAKER CLARK & DANIELS		71-2707	A-50	478.0	440							T 15	OZFMXX
FIBROUS ASBESTOS	WHITTAKER CLARK & DANIELS		71-2707-1	A-50	784.0	517							T 15	FJFLXX
FLUOREL L-3583-2	RAYBESTOS MANHATTAN INC.		69-1410	GOX	769.0	516							T 15	FJFLXX
FLUOREL L-3583-2	RAYBESTOS MANHATTAN INC.		69-1410-1	GOX	5.0	1000			741	N999			J 13	OVDEXX
FLUOREL L-3583-2	RAYBESTOS MANHATTAN INC.		69-1410-2	GOX	25.0				760	851			D 13	OVDEXX
FLUOREL L-3583-2	RAYBESTOS MANHATTAN INC.		69-1410-3	GOX	50.0				703	798			D 13	OVDEXX
FLUOREL L-3583-2	RAYBESTOS MANHATTAN INC.		69-1410-4	GOX	50.0				555	555			D 13	OVDEXX
FLUOREL L-3583-2	RAYBESTOS MANHATTAN INC.		69-1410-5	GOX	100.0				520	520			D 13	OVDEXX
FLUOREL L-3583-2	RAYBESTOS MANHATTAN INC.		69-1410-6	GOX	510.0				449	449			D 13	OVDEXX
FLUOREL L-3583-2	RAYBESTOS MANHATTAN INC.		69-1410-7	GOX	1000.0				451	451			D 13	OVDEXX
FLUOREL L-3583-2	RAYBESTOS MANHATTAN INC.		69-1410-8	GOX	1500.0				451	451			D 13	OVDEXX
FLUOREL 10104 LOT 742	MOHITES.G.A.		71-2588	GOX	2000.0	6.2			836	892			D 13	OVDEXX
FLUOREL 1059	MOHITES.G.A.		70-1624	GOX	25.0				637	840			D 13	OVDEXX
FLUOREL 1059	MOHITES.G.A.		70-1624-1	GOX	50.0				670	826			D 13	OVDEXX
FLUOREL 1059	MOHITES.G.A.		70-1624-10	GOX	50.0				598	598			D 13	OVDEXX
FLUOREL 1059	MOHITES.G.A.		70-1624-11	GOX	1000.0				549	549			D 13	OVDEXX
FLUOREL 1059	MOHITES.G.A.		70-1624-12	GOX	1500.0				570	570			D 13	OVDEXX
FLUOREL 1059	MOHITES.G.A.		70-1624-13	GOX	2000.0				547	547			D 13	OVDEXX
FLUOREL 1059	MOHITES.G.A.		70-1624-2	GOX	50.0				616	616			D 13	OVDEXX
FLUOREL 1059	MOHITES.G.A.		70-1624-3	GOX	62.0				836	859			D 13	OVDEXX
FLUOREL 1059	MOHITES.G.A.		70-1624-4	GOX	165.0				685	860			D 13	OVDEXX
FLUOREL 1059	MOHITES.G.A.	.0750	70-1624-5	GOX	2000.0			00/04					A 10	OVDEXX
FLUOREL 1059	MOHITES.G.A.	.0750	70-1624-6	GOX	2500.0			01/01					T 10	OVDEXX
FLUOREL 1059	MOHITES.G.A.	.0750	70-1624-7	GOX	3000.0			04/04					T 10	OVDEXX
FLUOREL 1059	MOHITES.G.A.	.0750	70-1624-8	GOX	2000.0		200	00/04	686	686			A 11	OVDEXX
FLUOREL 1059	MOHITES.G.A.	.0750	70-1624-9	GOX	100.0								D 13	OVDEXX
FLUOREL 1079-K	MOHITES.G.A.	.0750	70-1819	GOX	500.0		50	00/01					A 11	OVDEXX
FLUOREL 1079-K	MOHITES.G.A.	.0750	70-1819-1	GOX	3000.0		50	00/01					A 11	OVDEXX
FLUOREL 1079-K	MOHITES.G.A.	.0750	70-1819-2	GOX	3500.0		50	00/01					A 11	OVDEXX

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MFGR S DESIGNATION	MANUFACTURER	SPEC. THICK.	TEST RPT NO.	TEST ENVR	TEST PRESS	TEST TEMP	TEST ENER	IMPT NO	NO OF REACT	FLASH POINT	FIRE PT	PROP DIST LOSS	MT	R T	MATL	
FLUOREL 1079-K	MOSITES-G.A., FT. WORTH	.0750	70-1819-3	GOX	4000.0	50	00/01							A	11	DVDEXX
FLUOREL 1079-K	MOSITES-G.A., FT. WORTH	.0750	70-1819-4	GOX	4500.0	50	00/01							A	11	DVDEXX
FLUOREL 1079-K	MOSITES-G.A., FT. WORTH	.0750	70-1819-5	GOX	5000.0	50	00/04							A	11	DVDEXX
FLUOREL 1079-K	MOSITES-G.A., FT. WORTH	.0750	70-1819-6	GOX	3000.0	50	00/04							A	10	DVDEXX
FLUOROBESTOS LS-9225	RAYBESTOS MANHATTAN INC.		71-2405	GOX	250.0	1000	00/04			N999	N999			A	10	DTDEFL
FLUOROCARBON CTD GLS TRADDIDGE INDUSTRIES, INC.	RAYBESTOS MANHATTAN INC.		71-2387	GOX	500.0	50	00/04							A	11	EDCNGD
FLUOROCARBON CTD GLS TRADDIDGE INDUSTRIES, INC.	RAYBESTOS MANHATTAN INC.		71-2387-1	GOX	500.0	50	00/04							A	10	EDCNGD
FLUOROCARBON CTD GLS TRADDIDGE INDUSTRIES, INC.	RAYBESTOS MANHATTAN INC.		71-2387-2	GOX	100.0	1000	00/04			N999	N999			D	13	EDCNGD
FLUOROFLEX-T BLK R500-4 RESISTOFLEX CORP	RESISTOFLEX CORP		71-2661	GOX	2000.0	50	00/04							A	11	EFCOXX
FLUOROFLEX-T BLK R500-4 RESISTOFLEX CORP	RESISTOFLEX CORP		71-2661-1	GOX	2000.0	50	01/03							T	10	EFCOXX
FLUOROFLEX-T BLK R500-4 RESISTOFLEX CORP	RESISTOFLEX CORP		71-2661-2	GOX	2000.0	50	01/01							T	10	EFCOXX
FLUOROFLEX-T BLK R500-4 RESISTOFLEX CORP	RESISTOFLEX CORP		71-2661-3	GOX	1000.0	50	00/04							T	10	EFCOXX
FLUOROFLEX-T WMT R500-4 RESISTOFLEX CORP	RESISTOFLEX CORP		71-2662	GOX	2000.0	50	00/04							A	11	EFCOXX
FLUOROFLEX-T WMT R500-4 RESISTOFLEX CORP	RESISTOFLEX CORP		71-2662-1	GOX	1000.0	50	00/04							A	10	EFCOXX
FLUOROFLEX-T WMT R500-4 RESISTOFLEX CORP	RESISTOFLEX CORP		71-2662-2	GOX	1500.0	50	01/01							O	10	EFCOXX
FLUOROLUBE LG-160 HOOKER CHEMICAL	HOOKER CHEMICAL		71-2251	GOX	500.0	50	00/04							A	11	DBEGEM
FLUOROLUBE LG-160 HOOKER CHEMICAL	HOOKER CHEMICAL		71-2251-1	GOX	500.0	50	00/04			690	690			D	13	DBEGEM
FLUOROLUBE LG-160 HOOKER CHEMICAL	HOOKER CHEMICAL		71-2251-2	GOX	100.0	50	00/04							A	10	DVDEXX
FLUOROLAST SVSK B1370-4 HAMILTON STANDARD	HAMILTON STANDARD		71-2288	GOX	2000.0	50	00/04							D	13	DVDEXX
FLUX LLOYDS SS JOHNSON MFG CO.	JOHNSON MFG CO.		71-2372	GOX	1500.0	50	00/04			501	501			A	11	FLDXXX
FLUX LLOYDS SS JOHNSON MFG CO.	JOHNSON MFG CO.		71-2372-1	GOX	1500.0	50	00/04							A	10	FLDXXX
FLUX LLOYDS SS JOHNSON MFG CO.	JOHNSON MFG CO.		71-2372-2	GOX	1500.0	50	00/04			N999	N999			A	13	FLDXXX
FLUX-BRAZING EUTECTIC CORP	EUTECTIC CORP		70-1926	GOX	1500.0	50	00/04							Y	10	FLXXX
FLUX-BRAZING EUTECTIC CORP	EUTECTIC CORP		70-1926-1	GOX	1500.0	50	00/04							A	11	FLXXX
FLUX-BRAZING EUTECTIC CORP	EUTECTIC CORP		70-1926-2	GOX	1500.0	50	00/04			N999	N999			A	11	FLXXX
FLUX-BRAZING O-F-499C MANDY AND HARMON	MANDY AND HARMON		70-1925	GOX	1500.0	50	00/04							A	11	FLXXX
FLUX-BRAZING O-F-499C MANDY AND HARMON	MANDY AND HARMON		70-1925	GOX	1500.0	50	00/04							Y	13	FLXXX
FLUX-BRAZING O-F-499C MANDY AND HARMON	MANDY AND HARMON		70-1925-1	GOX	1500.0	50	00/04			N999	N999			A	10	FLXXX
FORM-VAP COATED CU WIRE ESSEX INTERNATIONAL CO.	ESSEX INTERNATIONAL CO.		70-2216	GOX	500.0	50	00/04							A	10	ELMCHS
FORM-VAP COATED CU WIRE ESSEX INTERNATIONAL CO.	ESSEX INTERNATIONAL CO.		70-2216-1	GOX	500.0	50	00/04							Y	13	ELMCHS
FORM-VAP COATED CU WIRE ESSEX INTERNATIONAL CO.	ESSEX INTERNATIONAL CO.		70-2216-2	GOX	160.0	1000	00/04			N999	N999			A	11	DBCKXX
FS-1281 COMPOUND DOM CORNING CORP	DOM CORNING CORP		71-3015	GOX	1500.0	50	00/04							A	11	DBCKXX
FS-1281 COMPOUND DOM CORNING CORP	DOM CORNING CORP		71-3015-1	GOX	1500.0	50	01/01							T	10	DBCKXX
FS-1281 COMPOUND DOM CORNING CORP	DOM CORNING CORP		71-3015-2	GOX	1500.0	50	00/01							A	10	DBCKXX
PYROQUEL 220 CELLULOSE STAUFFER CHEMICAL	STAUFFER CHEMICAL	.0050	10-73	GOX	5000.0	50	00/04							A	11	DCXXX
PYROQUEL 220 CELLULOSE STAUFFER CHEMICAL	STAUFFER CHEMICAL	.0050	10-73-1	GOX	2000.0	50	00/01							A	11	DCXXX
PYROQUEL 220 CELLULOSE STAUFFER CHEMICAL	STAUFFER CHEMICAL	.0050	10-73-10	GOX	4500.0	50	01/02							D	10	DCXXX
PYROQUEL 220 CELLULOSE STAUFFER CHEMICAL	STAUFFER CHEMICAL	.0050	10-73-11	GOX	5000.0	50	01/02							O	10	DCXXX
PYROQUEL 220 CELLULOSE STAUFFER CHEMICAL	STAUFFER CHEMICAL	.0050	10-73-12	GOX	2500.0	50	01/01							T	10	DCXXX
PYROQUEL 220 CELLULOSE STAUFFER CHEMICAL	STAUFFER CHEMICAL	.0050	10-73-13	GOX	2000.0	50	01/01							T	10	DCXXX
PYROQUEL 220 CELLULOSE STAUFFER CHEMICAL	STAUFFER CHEMICAL	.0050	10-73-14	GOX	1500.0	50	01/01							T	10	DCXXX
PYROQUEL 220 CELLULOSE STAUFFER CHEMICAL	STAUFFER CHEMICAL	.0050	10-73-15	GOX	1000.0	50	00/04							A	10	DCXXX

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MFGR S DESIGNATION	MANUFACTURER	SPEC. THICK.	TEST RPT NO.	TEST ENVR	TEST PRESS	TEST TEMP	TEST ENER	IMPT NO OF REACT	FLASH POINT	FIRE PT	PROG DIST	WT LOSS	R T T	MATL CODE
FYROQUEL 220 CELLULOSE	STAUFFER CHEMICAL	.0050	10-73-16	GDX	50.0				527	527			D 13	DCXXXX
FYROQUEL 220 CELLULOSE	STAUFFER CHEMICAL	.0050	10-73-2	GDX	3000.0		50	00/01					A 11	DCXXXX
FYROQUEL 220 CELLULOSE	STAUFFER CHEMICAL	.0050	10-73-3	GDX	4000.0		50	00/01					A 11	DCXXXX
FYROQUEL 220 CELLULOSE	STAUFFER CHEMICAL	.0050	10-73-4	GDX	1500.0			00/04					A 10	DCXXXX
FYROQUEL 220 CELLULOSE	STAUFFER CHEMICAL	.0050	10-73-5	GDX	2000.0			01/03					D 10	DCXXXX
FYROQUEL 220 CELLULOSE	STAUFFER CHEMICAL	.0050	10-73-6	GDX	2500.0			01/02					D 10	DCXXXX
FYROQUEL 220 CELLULOSE	STAUFFER CHEMICAL	.0050	10-73-7	GDX	3000.0			01/02					D 10	DCXXXX
FYROQUEL 220 CELLULOSE	STAUFFER CHEMICAL	.0050	10-73-8	GDX	3500.0			01/02					D 10	DCXXXX
FYROQUEL 220 CELLULOSE	STAUFFER CHEMICAL	.0050	10-73-9	GDX	4000.0			01/02					D 10	DCXXXX
GENOM 2010	G.E. CHEM MATL DEPT	.0750	10-94	GDX	3500.0			00/04					A 10	DLCDGF
GENOM 2010	G.E. CHEM MATL DEPT	.0750	10-94-1	GDX	4000.0			01/03					D 10	DLCDGF
GENOM 2010	G.E. CHEM MATL DEPT	.0750	10-94-2	GDX	4500.0			01/03					D 10	DLCDGF
GENOM 2010	G.E. CHEM MATL DEPT	.0750	10-94-3	GDX	5000.0			01/03					D 10	DLCDGF
GENOM 2010	G.E. CHEM MATL DEPT	.0750	10-94-4	GDX	4000.0		200	00/01					A 11	DLCDGF
GENOM 2010-0103	G.E. CHEM MATL DEPT	.0750	10-94-5	GDX	5000.0		200	00/04					A 11	DLCDGF
GENOM 2010-0103	G.E. CHEM MATL DEPT	.0750	10-95	GDX	3500.0			01/07					A 10	DLCDGF
GENOM 2010-0103	G.E. CHEM MATL DEPT	.0750	10-95-1	GDX	4000.0			00/04					A 10	DLCDGF
GENOM 2010-0103	G.E. CHEM MATL DEPT	.0750	10-95-10	GDX	5000.0		200	00/04					A 11	DLCDGF
GENOM 2010-0103	G.E. CHEM MATL DEPT	.0750	10-95-2	GDX	4500.0			01/03					D 10	DLCDGF
GENOM 2010-0103	G.E. CHEM MATL DEPT	.0750	10-95-3	GDX	5000.0			01/02					D 10	DLCDGF
GENOM 2010-0103	G.E. CHEM MATL DEPT	.0750	10-95-4	GDX	2000.0		200	00/01					A 11	DLCDGF
GENOM 2010-0103	G.E. CHEM MATL DEPT	.0750	10-95-5	GDX	2500.0		200	00/01					A 11	DLCDGF
GENOM 2010-0103	G.E. CHEM MATL DEPT	.0750	10-95-6	GDX	3000.0		200	00/01					A 11	DLCDGF
GENOM 2010-0103	G.E. CHEM MATL DEPT	.0750	10-95-7	GDX	3500.0		200	00/01					A 11	DLCDGF
GENOM 2010-0103	G.E. CHEM MATL DEPT	.0750	10-95-8	GDX	4000.0		200	00/01					A 11	DLCDGF
GENOM 2010-0103	G.E. CHEM MATL DEPT	.0750	10-95-9	GDX	4500.0		200	00/01					A 11	DLCDGF
GENOM 2012-L0125	G.E. CHEM MATL DEPT	.0750	10-96	GDX	1000.0				484	484			D 13	DLCDGP
GENOM 2012-L0125	G.E. CHEM MATL DEPT	.0750	10-96-1	GDX	1500.0				392	392			D 13	DLCDGP
GENOM 2012-L0125	G.E. CHEM MATL DEPT	.0750	10-96-2	GDX	2000.0				421	421			D 13	DLCDGP
GENOM 2012-L0125	G.E. CHEM MATL DEPT	.0750	10-96-3	GDX	4000.0			00/01					A 10	DLCDGP
GENOM 2012-L0125	G.E. CHEM MATL DEPT	.0750	10-96-4	GDX	4500.0			00/04					A 10	DLCDGP
GENOM 2012-L0125	G.E. CHEM MATL DEPT	.0750	10-96-5	GDX	5000.0			01/02					T 10	DLCDGP
GENOM 2012-L0125	G.E. CHEM MATL DEPT	.0750	10-96-6	GDX	4000.0		200	00/01					A 11	DLCDGP
GENOM 2012-L0125	G.E. CHEM MATL DEPT	.0750	10-96-7	GDX	5000.0		200	00/04					A 11	DLCDGP
GENOM 3010	G.E. CHEM MATL DEPT	.0750	10-87	GDX	2000.0			00/01					A 10	DLCDGF
GENOM 3010	G.E. CHEM MATL DEPT	.0750	10-87-1	GDX	3000.0			00/01					A 10	DLCDGF
GENOM 3010	G.E. CHEM MATL DEPT	.0750	10-87-2	GDX	4000.0			00/01					A 10	DLCDGF
GENOM 3010	G.E. CHEM MATL DEPT	.0750	10-87-3	GDX	4500.0			00/04					A 10	DLCDGF
GENOM 3010	G.E. CHEM MATL DEPT	.0750	10-87-4	GDX	5000.0			01/03					D 10	DLCDGF
GENOM 3010	G.E. CHEM MATL DEPT	.0750	10-87-5	GDX	4000.0		200	00/01					A 11	DLCDGF
GENOM 3010	G.E. CHEM MATL DEPT	.0750	10-87-6	GDX	4500.0		200	00/01					A 11	DLCDGF
GENOM 3010 (-65GLASS)	G.E. CHEM MATL DEPT	.0750	10-87-7	GDX	5000.0		200	00/04					D 11	DLCDGF
GENOM 3010 (-65GLASS)	G.E. CHEM MATL DEPT	.0750	70-1769	GDX	25.0			01/03					D 13	DLCDGF
GENOM 3010 (-65GLASS)	G.E. CHEM MATL DEPT	.0750	70-1769-1	GDX	50.0				768	791			D 13	DLCDGF

MATERIAL TEST DATA BY MANUFACTURER S DESIGNATION AS OF 31 JAN 72

MFR S DESIGNATION	MANUFACTURER	SPEC. THICK.	TEST RPT NO.	TEST TEST ENVR PRESS	TEST TEMP	TEST ENER	IMPT NO OF PEACT	FLASH POINT	FIRE PT	PROP DIST	WT LOSS	R T I T	MATL CODE
GERMON 3010 (-65GLASS)	G.E. CHEM MATL DEPT	.0750	70-1769-10	GDX 3500.0			00/04					A 10	DLCDIA
GERMON 3010 (-65GLASS)	G.E. CHEM MATL DEPT	.0750	70-1769-11	GDX 4000.0			01/03					T 10	DLCDIA
GERMON 3010 (-65GLASS)	G.E. CHEM MATL DEPT	.0750	70-1769-12	GDX 4500.0			01/03					T 10	DLCDIA
GERMON 3010 (-65GLASS)	G.E. CHEM MATL DEPT	.0750	70-1769-13	GDX 5000.0			04/04					T 10	DLCDIA
GERMON 3010 (-65GLASS)	G.E. CHEM MATL DEPT	.0750	70-1769-14	GDX 5000.0		200	00/04	868	868			A 11	DLCDIA
GERMON 3010 (-65GLASS)	G.E. CHEM MATL DEPT		70-1769-2	GDX 50.0				776	N999			D 13	DLCDIA
GERMON 3010 (-65GLASS)	G.E. CHEM MATL DEPT		70-1769-3	GDX 62.0	1000			608	608			D 13	DLCDIA
GERMON 3010 (-65GLASS)	G.E. CHEM MATL DEPT		70-1769-4	GDX 100.0				835	837			D 13	DLCDIA
GERMON 3010 (-65GLASS)	G.E. CHEM MATL DEPT		70-1769-5	GDX 165.0				503	503			D 13	DLCDIA
GERMON 3010 (-65GLASS)	G.E. CHEM MATL DEPT		70-1769-6	GDX 500.0				507	507			D 13	DLCDIA
GERMON 3010 (-65GLASS)	G.E. CHEM MATL DEPT		70-1769-7	GDX 1000.0				396	396			D 13	DLCDIA
GERMON 3010 (-65GLASS)	G.E. CHEM MATL DEPT		70-1769-8	GDX 1500.0				374	374			D 13	DLCDIA
GERMON 3010 (-65GLASS)	G.E. CHEM MATL DEPT		70-1769-9	GDX 2000.0				842	N999			J 13	DLCDIA
GERMON 3010-0096	G.E. CHEM MATL DEPT	.0750	10-101-1	GDX 25.0	1000							A 10	DLCDIA
GERMON 3010-0096	G.E. CHEM MATL DEPT	.0750	10-101-10	GDX 3500.0			00/01					A 10	DLCDIA
GERMON 3010-0096	G.E. CHEM MATL DEPT	.0750	10-101-11	GDX 4000.0			00/04					D 10	DLCDIA
GERMON 3010-0096	G.E. CHEM MATL DEPT	.0750	10-101-12	GDX 4500.0			01/02					D 10	DLCDIA
GERMON 3010-0096	G.E. CHEM MATL DEPT	.0750	10-101-13	GDX 5000.0			01/02					D 10	DLCDIA
GERMON 3010-0096	G.E. CHEM MATL DEPT	.0750	10-101-14	GDX 4000.0		200	00/01					A 11	DLCDIA
GERMON 3010-0096	G.E. CHEM MATL DEPT	.0750	10-101-15	GDX 5000.0		200	00/04					A 11	DLCDIA
GERMON 3010-0096	G.E. CHEM MATL DEPT		10-101-2	GDX 50.0				933	933			D 13	DLCDIA
GERMON 3010-0096	G.E. CHEM MATL DEPT		10-101-3	GDX 50.0				763	763			C 13	DLCDIA
GERMON 3010-0096	G.E. CHEM MATL DEPT		10-101-4	GDX 100.0				734	734			D 13	DLCDIA
GERMON 3010-0096	G.E. CHEM MATL DEPT		10-101-5	GDX 500.0				656	656			D 13	DLCDIA
GERMON 3010-0096	G.E. CHEM MATL DEPT		10-101-6	GDX 1000.0				657	657			D 13	DLCDIA
GERMON 3010-0096	G.E. CHEM MATL DEPT		10-101-7	GDX 1500.0				418	418			D 13	DLCDIA
GERMON 3010-0096	G.E. CHEM MATL DEPT		10-101-8	GDX 2000.0				369	369			A 10	DLCDIA
GERMON 3010-0096	G.E. CHEM MATL DEPT	.0750	10-101-9	GDX 2500.0			00/01					A 10	DLCDIA
GLASS FAB 3-DIM	MOVEN PRODUCTS	.0750	10-98	GDX 4000.0			00/01					A 10	DLCDIA
GLASS FAB 3-DIM	MOVEN PRODUCTS	.0750	10-98-1	GDX 4500.0			00/01					A 10	DLCDIA
GLASS FAB 3-DIM	MOVEN PRODUCTS	.0750	10-98-2	GDX 5000.0			00/04					A 10	DLCDIA
GLASS FAB 3-DIM	MOVEN PRODUCTS	.0750	10-98-3	GDX 4000.0		200	00/01					A 11	DLCDIA
GLASS FRIT	MOVEN PRODUCTS	.0750	10-98-4	GDX 5000.0		200	00/04					T 15	FJAXX
GLASS FRIT	CORNING GLASS		71-2701	A-50 800.0	493							T 15	FJAXX
GLASS FRIT	CORNING GLASS		71-2701-1	A-50 818.0	526							T 15	FJAXX
GLASS FRIT	CORNING GLASS		71-2701-2	MMH 797.0	539							T 15	FJAXX
GLASS TAPE 1180140	CORNING GLASS		71-2552	MMH 805.0	514							T 15	EBGDXX
GLASS TAPE 1180140	INSULECTRO CORP		71-2552-1	MMH 833.0	517							T 15	EBGDXX
GLYPHAL 1201	G.E. CHEM MATL DEPT		71-2671	A-50 751.0	515							T 15	ATAOXX
GLYPHAL 1201	G.E. CHEM MATL DEPT		71-2671-1	A-50 59.0	511							T 15	ATAOXX
GLYPHAL 1201	G.E. CHEM MATL DEPT		71-2671-2	MMH 748.0	518							T 15	ATAOXX
GLYPHAL 1201	G.E. CHEM MATL DEPT		71-2671-3	MMH 711.0	522							T 15	ATAOXX
GOLD ALLOY 581	MANDY AND HARMON		70-2139	GDX 4510.0			00/04					A 10	FKMUMR
GOLD ALLOY 581	MANDY AND HARMON		70-2139-1	A-50 801.0	513							T 15	FKMUMR

MATERIAL TEST DATA BY MANUFACTURER S DESIGNATION AS OF 31 JAN 72

MFGR S DESIGNATION	MANUFACTURER	SPEC. THICK.	TEST RPT NO.	TEST PRESS	TEST TEMP	TEST IMPRT NO OF REACT ENER	FLASH POINT	PROP WT	DIST LOSS	R T	MATL
GOLD ALLJY 501	HANDY AND HARMON		70-2139-2	A-50	693.0	487				T 15	FKMUMR
GOLD TEFLON WIRE INSUL			70-1750	GDX	5.0	1000	605			R 13	EPCNGJ
GOLD TEFLON WIRE INSUL			70-1750-1	GDX	25.0	1000	910			J 13	EPCNGJ
GOLD TEFLON WIRE INSUL			70-1750-1U	GDX	16.5	1000	N999			Y 13	EPCNGJ
GOLD TEFLON WIRE INSUL			70-1750-2	GDX	50.0		652			O 13	EPCNGJ
GOLD TEFLON WIRE INSUL			70-1750-3	GDX	100.0		654			D 13	EPCNGJ
GOLD TEFLON WIRE INSUL			70-1750-4	GDX	500.0		634			D 13	EPCNGJ
GOLD TEFLON WIRE INSUL			70-1750-5	GDX	1000.0		621			D 13	EPCNGJ
GOLD TEFLON WIRE INSUL			70-1750-6	GDX	1500.0		735			D 13	EPCNGJ
GOLD TEFLON WIRE INSUL			70-1750-7	GDX	2000.0		701			D 13	EPCNGJ
GOLD TEFLON WIRE INSUL			70-1750-8	GDX	50.0		904			D 13	EPCNGJ
GOLD TEFLON WIRE INSUL			70-1750-9	GDX	6.2	1000	4999			Y 13	EPCNGJ
GOLD.FINE			70-2125-1	A-50	767.0	515				T 15	DTMXX
GOLD.FINE			70-2125-2	A-50	764.0	515				T 15	DTMXX
GOLD.FINE			70-2125-3	MHH	767.0	521				T 15	DTMXX
GOLD.FINE			70-2125-4	MHH	807.0	527				T 15	DTMXX
GP-2 DAMPING SHEET			70-2125	GDX	2000.0				00/04	A 10	DTMXX
H-11 PYROMAT	SOUND COAT CO. INC		71-2346	GDX	6.2	600				J 13	DTMXX
H-11 PYROMAT	CARPENTER TECH CORP		71-2376	GDX	500.0			50	00/04	A 11	EXMIXX
H-11 PYROMAT	CARPENTER TECH CORP		71-2376-1	GDX	500.0				00/04	A 10	EXMIXX
H-11 PYROMAT	CARPENTER TECH CORP		71-2376-2	MHH	828.0	517				T 15	EXMIXX
H-11 PYROMAT	CARPENTER TECH CORP		71-2376-3	MHH	787.0	511				T 15	EXMIXX
MASTELLOY-W	HAYNES STELLITE CO		71-2500	GDX	1500.0			50	00/04	A 11	FMMNHC
MASTELLOY-W	HAYNES STELLITE CO		71-2500-1	GDX	1500.0			50	00/04	A 10	FMMNHC
MAYNES STELLITE NO. 3	GAC		70-2171	GDX	5000.0			50	00/04	A 11	DMOXX
MAYNES 25-HTLA	HAYNES ALLOY CORP		71-2340	A-50	785.0	503				T 15	DMOXX
MAYNES 25-HTLA	HAYNES ALLOY CORP		71-2340-1	A-50	741.0	490				T 15	DMOXX
MI-TEMP INSULATION	MIN-KFANSTEEL CORP		71-2363	GDX	500.0			50	00/04	A 11	CKGUXX
PI-TEMP INSULATION	MIN-KFANSTEEL CORP		71-2363-1	GDX	500.0				00/04	A 10	CKGUXX
MI-TEMP INSULATION	MIN-KFANSTEEL CORP		71-2363-2	GDX	1000.0	1000				A 13	CKGLXX
MI-TEMP INSULATION	MIN-KFANSTEEL CORP		71-2363-3	GDX	100.0	1000				A 11	DBCKXX
HIGH VACUUM GREASE	DOM CORNING CORP		71-2766	GDX	500.0			50	00/04	A 10	DBCKXX
HIGH VACUUM GREASE	DOM CORNING CORP		71-2766-1	GDX	500.0			50	00/04	A 10	DBCKXX
MS-248-2 AMS-5508	GAC		70-2148	GDX	2000.0					A 10	DTMDHS
MS-248-2 AMS-5508	GAC		70-2148-1	GDX	2000.0			50	00/04	A 11	DTMDHS
MS-248-41 AMS-5508	GAC		70-2146	GDX	2000.0			50	00/04	A 10	DTMDHS
HYGRADE POLYTUBE 463	MARKEL.L. FRANK + SONS		70-2146-1	GDX	2000.0			50	00/04	A 11	DTMDHS
HYGRADE POLYTUBE 463	MARKEL.L. FRANK + SONS		71-2250	GDX	1000.0			50	00/04	D 13	EEEXXX
HYGRADE POLYTUBE 463	MARKEL.L. FRANK + SONS		71-2250-1	GDX	1500.0			50	00/04	A 11	AMBGXX
HYGRADE POLYTUBE 463	MARKEL.L. FRANK + SONS		71-2250-2	GDX	1500.0			50	00/04	T 10	AMBGXX
HYSOL C-4	HYSOL CORP		71-2499	GDX	1000.0	1000				Z 13	AKBGXX
HYSOL DK-4	HYSOL CORP		71-2499-1	GDX	1500.0			50	00/04	A 11	AKBGXX
HYSOL DK-4	HYSOL CORP		71-2499-2	GDX	1500.0			50	00/04	T 10	AKBGXX
HYSOL EPOXY	HYSOL CORP		70-1964	A-50	350.0	531				T 15	FJBAXX

MATERIAL TEST DATA BY MANUFACTURER S DESIGNATION AS OF 31 JAN 72

MFGR S DESIGNATION	MANUFACTURER	SPEC. THICK.	TEST RPT NO.	TEST ENVR	TEST PRESS	TEST TEMP	TEST IMPT ENER	NO OF REACT	FLASH POINT	FIRF PT	WT LOSS	R T	MATL
HYSQL EPOXY	HYSQL CORP		70-1964-1	A-50	480.0	465						T 15	FJBAXX
HYSQL EPOXY	HYSQL CORP		70-1964-2	A-50	640.0	533						T 15	FJBAXX
HYSQL EPOXY	HYSQL CORP		70-1964-3	A-50	806.0	629						T 15	FJBAXX
HYSQL EPOXY	HYSQL CORP		70-1964-4	A-50	265.0	407						R 13	A'RGXX
HYSQL K7-5223	HYSQL CORP		70-2127	GDX	8.7	1000			N999	N999		A 11	DM'NMC
INCOMEL ALLOY 706	INTERNATIONAL NICKEL CO.		71-2498	GDX	1500.0		50	00/04				A 10	DMM'HC
INCOMEL ALLOY 706	INTERNATIONAL NICKEL CO.		71-2498-1	GDX	1500.0		50	00/04				T 15	DMMD'X
INCOMEL FILLER 92T	INTERNATIONAL NICKEL CO.		71-2390	A-50	570.0	463						T 15	DMMD'X
INCOMEL FILLER 92T	INTERNATIONAL NICKEL CO.		71-2390-1	A-50	775.0	494						T 15	DMMD'X
INCOMEL FILLER 92T	INTERNATIONAL NICKEL CO.		71-2390-2	A-50	768.0	512						T 15	DMMD'X
INCOMEL FILLER 92T	INTERNATIONAL NICKEL CO.		71-2390-3	MMH	774.0	523						T 15	DMMD'X
INCOMEL FILLER 92T	INTERNATIONAL NICKEL CO.		71-2390-4	MMH	816.0	532						T 15	DMMD'X
INCOMEL X	INTERNATIONAL NICKEL CO.		70-2032	A-50	744.0	508						T 15	DMMD'X
INCOMEL X	INTERNATIONAL NICKEL CO.		70-2032-1	A-50	803.0	528						T 15	DMMD'X
INCOMEL X-750	INTERNATIONAL NICKEL CO.		70-2144	GDX	5000.0			00/04				A 10	DMMD'X
INCOMEL X-750	INTERNATIONAL NICKEL CO.		70-2144-1	GDX	6800.0			00/04				A 10	DMMD'X
INCOMEL X-750	INTERNATIONAL NICKEL CO.		70-2144-2	A-50	754.0	500						T 15	DMMD'X
INCOMEL X-750	INTERNATIONAL NICKEL CO.		70-2144-3	A-50	689.0	491						T 15	DMMD'X
INCOMEL 718	GAC	.0750	70-2142	GDX	2000.0		50	00/04				A 11	DMMD'X
INCOMEL 718	GAC		70-2142-1	GDX	5000.0			00/04				A 10	DMMD'X
INCOMEL 718	GAC		70-2142-2	GDX	6800.0			00/04				A 10	DMMD'X
INCOMEL 718	GAC		70-2142-3	GDX	5050.0		50	00/04				A 11	DMMD'X
INDIUM BISMUTH AND CU BEMSEFC			70-2043	GDX	6.2	1000			N999	N999		Y 13	AWFZMC
INDIUM BISMUTH AND CU BEMSEFC			70-2043-1	GDX	16.5	1000			N999	N999		Y 13	AWFZMC
INVAR 36	ALLEN FRY STEEL CO.	.0750	70-2206	GDX	1500.0			00/04				A 10	DMMD'X
INVAR 36	ALLEN FRY STEEL CO.		70-2206-1	GDX	1500.0		50	00/04				A 11	DMMD'X
INVAR 36	ALLEN FRY STEEL CO.		70-2109	GDX	2500.0		50	00/04				A 11	F'IMTN
FOR RED FIBER SHEET			SP-6931-15	GDX	100.0				364	364		D 13	CRBGXX
FOR RED FIBER SHEET			SP-6931-16	GDX	500.0				265	265		D 13	CRBGXX
FOR RED FIBER SHEET			SP-6931-17	GDX	50.0				427	427		D 13	CRBGXX
K-602 STEEL	KENAMETAL	.0750	70-2217	GDX	1500.0			00/04				A 10	DMMD'X
K-602 STEEL	KENAMETAL		70-2217-1	GDX	1500.0		50	00/04				A 11	DMMD'X
X-602 STEEL	KENAMETAL		71-2266	GDX	1500.0			00/04				A 10	DMMD'X
X-602 STEEL	KENAMETAL		71-2266-1	GDX	500.0		50	00/01				A 11	DMMD'X
K-602 STEEL	KENAMETAL		71-2266-10	GDX	1000.0		200	01/01				A 11	DMMD'X
K-602 STEEL	KENAMETAL		71-2266-2	GDX	1000.0		50	00/01				A 11	DMMD'X
K-602 STEEL	KENAMETAL		71-2266-3	GDX	1500.0		50	00/10				A 11	DMMD'X
K-602 STEEL	KENAMETAL		71-2266-4	GDX	3000.0		50	00/03				A 11	DMMD'X
K-602 STEEL	KENAMETAL		71-2266-5	GDX	500.0		200	02/05				T 11	DMMD'X
K-602 STEEL	KENAMETAL		71-2266-6	GDX	1000.0		200	01/05				T 11	DMMD'X
K-602 STEEL	KENAMETAL		71-2266-7	LOX	14.7		50	00/04				A 16	DMMD'X
K-602 STEEL	KENAMETAL		71-2266-8	LOX	14.7		200	00/04				A 16	DMMD'X
K-602 STEEL	KENAMETAL		71-2266-9	GDX	1000.0		50	01/01				T 11	DMMD'X
KAPTON H-FILM	E-I. DUPONT CO., INC.		70-1752	GDX	5.0	1000			682	N999		R 13	EJCDXX

MATERIAL TEST DATA BY MANUFACTURER S DESIGNATION AS OF 31 JAN 72

MEGA S DESIGNATION	MANUFACTURER	SPEC. THICK.	TEST RPT NO.	TEST ENVR	TEST PRESS	TEST TEMP	TEST IMPT ENER	NO OF REACT	FLASH POINT	FIRE PROP	WT LOSS	R T CODE	MATL
KAPTON H-FILM	E-I DUPONT CO., INC.		70-1752-1	GOX	25.0	1000			R00	N999		J 13	EJCDXX
KAPTON H-FILM	E-I DUPONT CO., INC.		70-1752-2	GOX	50.0				710	710		D 13	EJCDXX
KAPTON H-FILM	E-I DUPONT CO., INC.		70-1752-3	GOX	50.0				57R	85R		D 13	EJCDXX
KAPTON H-FILM	E-I DUPONT CO., INC.		70-1752-4	GOX	100.0				644	644		D 13	EJCDXX
KAPTON H-FILM	E-I DUPONT CO., INC.		70-1752-5	GOX	500.0				579	579		D 13	EJCDXX
KAPTON H-FILM	E-I DUPONT CO., INC.		70-1752-6	GOX	1000.0				492	492		D 13	EJCDXX
KAPTON H-FILM	E-I DUPONT CO., INC.		70-1752-7	GOX	1500.0				535	535		D 13	EJCDXX
KAPTON H-FILM	E-I DUPONT CO., INC.		70-1752-8	GOX	2000.0				541	541		D 13	EJCDXX
KAPTON H-FILM	E-I DUPONT CO., INC.		70-1752-9	GOX	16.5	1000			N999	N999		R 13	EJCDXX
KAPTON H-FILM	E-I DUPONT CO., INC.		70-1991	GOX	1000.0		50	00/04				A 11	CKCDXX
KAPTON H-FILM	E-I DUPONT CO., INC.		70-1991-1	GOX	1500.0				01/01			T 10	CKCDXX
KAPTON H-FILM	E-I DUPONT CO., INC.		70-1991-2	GOX	500.0		50	00/04				A 11	CKCDXX
KAPTON H-FILM	E-I DUPONT CO., INC.	.0750	70-1991-3	GOX	500.0				00/04			A 10	CKCDXX
KAPTON H-FILM	E-I DUPONT CO., INC.		70-1991-4	GOX	100.0				466	466		D 13	CKCDXX
KAPTON H-FILM	E-I DUPONT CO., INC.		70-1991-5	GOX	1500.0				374	374		D 13	CKCDXX
KAPTON H-FILM	E-I DUPONT CO., INC.		71-2431	A-50	723.0	493						A 11	CKCDXX
KAPTON H-FILM	E-I DUPONT CO., INC.		71-2431-1	A-50	831.0	509						T 15	FJCDXX
KAPTON H-FILM	E-I DUPONT CO., INC.		71-2431-2	A-50	751.0	516						T 15	FJCDXX
KEL-F-81	3M CO. ST. PAUL		M9-0296	GOX	5.0	1000						A 11	DKBDXX
KEL-F-81	3M CO. ST. PAUL		M9-0296-1	GOX	4500.0		50	00/04				T 10	DKBDXX
KEL-F-81	3M CO. ST. PAUL		M9-0296-2	GOX	4000.0				02/02			T 10	DKBDXX
KEL-F-81	3M CO. ST. PAUL		M9-0296-3	GOX	1110.0				890	N999		D 13	DKBDXX
KEL-F-81	3M CO. ST. PAUL		M9-0296-4	GOX	1500.0				655	655		D 13	DKBDXX
KEL-F-81	3M CO. ST. PAUL		M9-0296-5	GOX	2000.0				698	698		D 13	DKBDXX
KEL-F-81	3M CO. ST. PAUL	.0750	M9-0296-6	GOX	4000.0				706	706		D 13	DKBDXX
KEL-F-81	3M CO. ST. PAUL	.0750	M9-0296-7	GOX	4500.0							A 11	DKBDXX
KEL-F-81	3M CO. ST. PAUL		M9-0296-8	GOX	1500.0				02/02			A 10	DKBDXX
KEL-F-81	3M CO. ST. PAUL		M9-0296-9	GOX	6.2	1000						F 13	DKBDXX
KEL-F-81	3M CO. ST. PAUL		M9-0296-10	GOX	3000.0				N999	N999		A 10	DKBDXX
KEL-F-81	3M CO. ST. PAUL		M9-0296-11	GOX	5000.0				629	629		F 13	DKBDXX
KEL-F-81	3M CO. ST. PAUL		M9-0296-12	GOX	4500.0				01/01			D 13	DKBDXX
KEL-F-81	3M CO. ST. PAUL		M9-0296-13	GOX	20.0	1000			01/01			T 10	DKBDXX
KEL-F-81	3M CO. ST. PAUL		M9-0296-14	GOX	4000.0				01/01			T 10	DKBDXX
KEL-F-81	3M CO. ST. PAUL		M9-0296-15	GOX	3000.0				01/01			T 10	DKBDXX
KEL-F-81	3M CO. ST. PAUL		M9-0296-16	GOX	2500.0				01/01			T 10	DKBDXX
KEL-F-81	3M CO. ST. PAUL		M9-0296-17	GOX	2000.0				01/03			T 10	DKBDXX
KEL-F-81	3M CO. ST. PAUL		M9-0296-18	GOX	1500.0				01/01			T 10	DKBDXX
KEL-F-81	3M CO. ST. PAUL		M9-0296-19	GOX	1000.0				00/04			A 10	DKBDXX
KEL-F-81	3M CO. ST. PAUL		M9-0296-20	GOX	25.0	1000						J 13	DKBDXX
KEL-F-81	3M CO. ST. PAUL		M9-0296-21	GOX	30.0	1000			791	N999		T 10	DKBDXX
KEL-F-81	3M CO. ST. PAUL		M9-0296-22	GOX	40.0	1000			790	N999		T 10	DKBDXX
KEL-F-81	3M CO. ST. PAUL		M9-0296-23	GOX	50.0	1000			790	N999		T 10	DKBDXX
KEL-F-81	3M CO. ST. PAUL		M9-0296-24	GOX	40.0	1000			790	N999		T 10	DKBDXX
KEL-F-81	3M CO. ST. PAUL		M9-0296-25	GOX	50.0	1000			790	N999		T 10	DKBDXX
KEL-F-81	3M CO. ST. PAUL		M9-0296-26	GOX	40.0	1000						D 13	DKBDXX
KEL-F-81	3M CO. ST. PAUL		M9-0296-27	GOX	50.0	1000						D 13	DKBDXX



MATERIAL TEST DATA BY MANUFACTURER S DESIGNATION AS OF 31 JAN 72

MFG S DESIGNATION	MANUFACTURER	SPEC. THICK.	TEST RPT NO.	TEST ENVR PRESS	TEST TEMP	TEST EMER	TEST IMPT NO OF REACT	FLASH FIRE POINT	PROP DIST LOSS	R T MATL I T CODE
KEL-F-01	3M CO. ST. PAUL		M9-0296-7	GOX 100.0	681			681		D 13 DK8DXX
KEL-F-01	3M CO. ST. PAUL		M9-0296-8	GOX 110.0	676			676		D 13 DK8DXX
KEL-F-01	3M CO. ST. PAUL		M9-0296-9	GOX 300.0	702			702		A 11 DK8DXX
KEL-F-01	3M CO. ST. PAUL		71-2700-1	GOX 300.0		50	00/04			T 10 DK8DXX
KEL-F-01	3M CO. ST. PAUL		71-2700-2	GOX 3000.0			01/02			T 10 DK8DXX
KEL-F-01	3M CO. ST. PAUL		71-2700-3	GOX 3000.0			01/01			T 10 DK8DXX
KEL-F-01	3M CO. ST. PAUL		71-2700-4	GOX 1500.0			01/01			T 10 DK8DXX
KEL-F-01	3M CO. ST. PAUL		71-2700-5	GOX 1000.0			01/03			T 10 DK8DXX
KEL-F-01	3M CO. ST. PAUL		71-2700-6	GOX 500.0			00/04			T 10 DK8DXX
KEL-F-01	3M CO. ST. PAUL		71-2292	GOX 5000.0			00/04			A 10 FKXXXX
KEL-F-01	3M CO. ST. PAUL		71-2292-1	GOX 6800.0			00/04			A 10 FKXXXX
KEL-F-01	3M CO. ST. PAUL		71-2292-2	GOX 3000.0			00/04			D 13 FKXXXX
KEL-F-01	3M CO. ST. PAUL		71-2292-3	GOX 3000.0			00/04			A 13 FKXXXX
KEL-F-01	3M CO. ST. PAUL		70-1957	A-50 764.0	1000			700	700	T 15 DTMDXX
KEL-F-01	3M CO. ST. PAUL		70-1957-1	A-50 605.0	502					T 15 DTMDXX
KEL-F-01	3M CO. ST. PAUL		70-1957-2	A-50 747.0	495					T 15 DTMDXX
KEL-F-01	3M CO. ST. PAUL		70-1957-3	MMH 798.0	523					T 15 DTMDXX
KEL-F-01	3M CO. ST. PAUL		70-1957-4	MMH 803.0	509					T 15 DTMDXX
KEL-F-01	3M CO. ST. PAUL		70-2220	GOX 500.0			00/04			A 10 DTMDXX
KEL-F-01	3M CO. ST. PAUL		70-2220-1	GOX 500.0		50	00/04			A 10 DTMDXX
KEL-F-01	3M CO. ST. PAUL		71-2580	GOX 6.2						D 13 ASAKXX
KEL-F-01	3M CO. ST. PAUL		70-1882	GOX 5000.0		50	00/04	475	497	A 11 DC8PXX
KEL-F-01	3M CO. ST. PAUL		70-1882-1	GOX 5000.0			01/01			A 10 DC8PXX
KEL-F-01	3M CO. ST. PAUL		70-1882-2	GOX 4500.0			00/04			A 11 DC8PXX
KEL-F-01	3M CO. ST. PAUL		70-1928	GOX 5000.0		50	00/04			A 10 DC8PXX
KEL-F-01	3M CO. ST. PAUL		70-1928-1	GOX 5000.0			00/04			A 10 DC8PXX
KEL-F-01	3M CO. ST. PAUL		70-1883	GOX 5000.0			01/04			A 10 DC8PXX
KEL-F-01	3M CO. ST. PAUL		70-1883-1	GOX 4500.0			00/04			A 10 DC8PXX
KEL-F-01	3M CO. ST. PAUL		70-1883-2	GOX 5000.0		50	00/04			A 11 DC8PXX
KEL-F-01	3M CO. ST. PAUL		70-1884	GOX 5000.0		50	00/04			A 10 DC8PXX
KEL-F-01	3M CO. ST. PAUL		70-1884-1	GOX 5000.0			01/04			A 10 DC8PXX
KEL-F-01	3M CO. ST. PAUL		70-1885	GOX 5000.0			00/04			A 11 DC8PXX
KEL-F-01	3M CO. ST. PAUL		70-1885-1	GOX 5000.0		50	00/04			T 10 DC8PXX
KEL-F-01	3M CO. ST. PAUL		70-1885-2	GOX 2500.0			01/03			T 10 DC8PXX
KEL-F-01	3M CO. ST. PAUL		70-1885-3	GOX 3000.0			01/01			T 10 DC8PXX
KEL-F-01	3M CO. ST. PAUL		70-1885-4	GOX 3500.0			01/01			T 10 DC8PXX
KEL-F-01	3M CO. ST. PAUL		70-1885-5	GOX 4000.0			01/01			T 10 DC8PXX
KEL-F-01	3M CO. ST. PAUL		70-1885-6	GOX 4500.0			01/03			T 10 DC8PXX
KEL-F-01	3M CO. ST. PAUL		69-1346-24	GOX 1000.0				768	768	D 13 DC8PXX
KEL-F-01	3M CO. ST. PAUL		69-1346	GOX 5.0	1000			570	N999	Y 13 DC8PXX
KEL-F-01	3M CO. ST. PAUL		69-1346	GOX 4500.0		50	00/04			A 11 DC8PXX
KEL-F-01	3M CO. ST. PAUL		69-1346	GOX 4000.0			01/03			T 10 DC8PXX
KEL-F-01	3M CO. ST. PAUL		69-1346-1	GOX 10.0	1000			590	N999	Y 13 DC8PXX

MATERIAL TEST DATA BY MANUFACTURER 5 DESIGNATION AS OF 31 JAN 72

MFGR 5 DESIGNATION	MANUFACTURER	SPEC. THICK.	TEST RPT NO.	TEST EMJR PRESS	TEST IMPR NO OF FLASH FIRE PROP	WT DIST LOSS	R T MATL
KRYTOX 240AC	E.I. DUPONT CO.,INC.	.0050	69-1346-10	GOX 900.0	802	802	D 13 088PXX
KRYTOX 240AC	E.I. DUPONT CO.,INC.	.0050	69-1346-11	GOX 1000.0	750	750	D 13 088PXX
KRYTOX 240AC	E.I. DUPONT CO.,INC.		69-1346-12	GOX 1000.0	784	784	D 13 088PXX
KRYTOX 240AC	E.I. DUPONT CO.,INC.		69-1346-13	GOX 1087.0	813	813	D 13 088PXX
KRYTOX 240AC	E.I. DUPONT CO.,INC.		69-1346-14	GOX 1110.0	795	795	D 13 088PXX
KRYTOX 240AC	E.I. DUPONT CO.,INC.		69-1346-15	GOX 1500.0	808	808	D 13 088PXX
KRYTOX 240AC	E.I. DUPONT CO.,INC.		69-1346-16	GOX 1565.0	830	830	D 13 088PXX
KRYTOX 240AC	E.I. DUPONT CO.,INC.		69-1346-17	GOX 2000.0	775	775	D 13 088PXX
KRYTOX 240AC	E.I. DUPONT CO.,INC.		69-1346-18	GOX 5000.0	00/04		A 10 088PXX
KRYTOX 240AC	E.I. DUPONT CO.,INC.		69-1346-19	GOX 5000.0	50	00/04	A 11 088PXX
KRYTOX 240AC	E.I. DUPONT CO.,INC.		69-1346-20	GOX 20.0	1000	546	Y 13 088PXX
KRYTOX 240AC	E.I. DUPONT CO.,INC.		69-1346-21	GOX 16.5	1000	N999	A 13 088PXX
KRYTOX 240AC	E.I. DUPONT CO.,INC.		69-1346-22	GOX 200.0		849	D 13 088PXX
KRYTOX 240AC	E.I. DUPONT CO.,INC.		69-1346-23	GOX 1000.0	790	790	D 13 088PXX
KRYTOX 240AC	E.I. DUPONT CO.,INC.		69-1346-3	GOX 3000.0	734	734	D 13 088PXX
KRYTOX 240AC	E.I. DUPONT CO.,INC.		69-1346-4	GOX 25.0	1000	N999	Y 13 088PXX
KRYTOX 240AC	E.I. DUPONT CO.,INC.		69-1346-5	GOX 30.0	1000	NS99	A 13 088PXX
KRYTOX 240AC	E.I. DUPONT CO.,INC.		69-1346-6	GOX 40.0		974	D 13 088PXX
KRYTOX 240AC	E.I. DUPONT CO.,INC.		69-1346-7	GOX 50.0		N999	J 13 088PXX
KRYTOX 240AC	E.I. DUPONT CO.,INC.		69-1346-8	GOX 50.0		864	D 13 088PXX
KRYTOX 240AC	E.I. DUPONT CO.,INC.		69-1346-9	GOX 100.0		854	D 13 088PXX
KRYTOX 240AC	E.I. DUPONT CO.,INC.		71-2274	A-50 779.0	496	831	D 13 088PXX
KRYTOX 240AC	E.I. DUPONT CO.,INC.		71-2274-1	A-50 744.0	497		T 15 088PXX
KRYTOX 240AC	E.I. DUPONT CO.,INC.		69-1346/1041	GOX 1000.0	703		T 15 088PXX
KRYTOX 240AC	E.I. DUPONT CO.,INC.		69-1346/70-X	GOX 1000.0	620		T 15 088PXX
KRYTOX 240AC	E.I. DUPONT CO.,INC.		10-65	GOX 50.0		830	D 13 088PXX
KRYTOX 240AC	E.I. DUPONT CO.,INC.		70-1956	A-50 407.0	449		T 15 088PXX
KRYTOX 240AC	E.I. DUPONT CO.,INC.		70-1956-1	A-50 471.0	415		T 15 088PXX
KRYTOX 240AC	E.I. DUPONT CO.,INC.		70-1956-2	A-50 424.0	410		T 15 088PXX
KRYTOX 240AC	E.I. DUPONT CO.,INC.		70-1956-3	GOX 1000.0			A 11 088PXX
KRYTOX 240AC	E.I. DUPONT CO.,INC.		70-1956-4	GOX 1000.0	200	00/04	A 11 088PXX
KRYTOX 240AC	E.I. DUPONT CO.,INC.		70-1956-5	LOX 14.7		50	A 16 088PXX
KRYTOX 240AC	E.I. DUPONT CO.,INC.		70-1956-6	LOX 14.7		200	A 16 088PXX
KRYTOX 240AC	E.I. DUPONT CO.,INC.		70-1956-7	A-50 502.0	423		A 16 088PXX
KRYTOX 240AC	E.I. DUPONT CO.,INC.		70-1973	A-50 479.0	419		T 15 088PXX
KRYTOX 240AC	E.I. DUPONT CO.,INC.		70-1973-1	MMH 370.0	420		T 15 088PXX
KRYTOX 240AC	E.I. DUPONT CO.,INC.		70-1973-2	MMH 481.0	437		T 15 088PXX
KRYTOX 240AC	E.I. DUPONT CO.,INC.		70-1973-3	A-50 515.0	437		T 15 088PXX
KRYTOX 240AC	E.I. DUPONT CO.,INC.		71-2259	A-50 484.0	417		T 15 088PXX
KRYTOX 240AC	E.I. DUPONT CO.,INC.		71-2259-1	A-50 494.0	419		T 15 088PXX
KRYTOX 240AC	E.I. DUPONT CO.,INC.		71-2413	GOX 250.0		634	A 16 088PXX
KRYTOX 240AC	E.I. DUPONT CO.,INC.		71-2413-1	GOX 75.0		634	O 13 088PXX

L-13098 SILICONE RUBBER

MFGR S DESIGNATION	MANUFACTURER	SPEC. THICK.	TEST RPT NO.	TEST PRESS	TEST PRESS	TEST EMER	TEST EMER	TEST IMPR	TEST IMPR	NO OF REACT	NO OF REACT	FLASH POINT	FIRE POINT	PROP DIST	WT LOSS	R T	MAT.
L-449-6 FLUOROSILICONE	PARKER SEAL/LOS ANGLS	.0750	10-40	GDX 3000.0	3000.0	00/04	00/04	298	298	00/04	00/04	298	298	.00	.00	A 10	CHD
L-449-6 FLUOROSILICONE	PARKER SEAL/LOS ANGLS	.0750	10-40-1	GDX 3500.0	3500.0	01/02	01/02	735	735	01/01	01/01	735	735	.00	.00	D 10	CHDGXX
L-449-6 FLUOROSILICONE	PARKER SEAL/LOS ANGLS	.0750	10-40-10	GDX 2500.0	2500.0	01/02	01/02	748	748	01/02	01/02	748	748	.00	.00	T 10	CHDGXX
L-449-6 FLUOROSILICONE	PARKER SEAL/LOS ANGLS	.0750	10-40-11	GDX 2000.0	2000.0	00/04	00/04			00/04	00/04			.00	.00	T 10	CHDGXX
L-449-6 FLUOROSILICONE	PARKER SEAL/LOS ANGLS	.0750	10-40-12	GDX 500.0	500.0	50	50			02/02	02/02			.00	.00	A 10	CHDGXX
L-449-6 FLUOROSILICONE	PARKER SEAL/LOS ANGLS	.0750	10-40-13	GDX 4000.0	4000.0	04/04	04/04			04/04	04/04			.00	.00	D 10	CHDGXX
L-449-6 FLUOROSILICONE	PARKER SEAL/LOS ANGLS	.0750	10-40-2	GDX 2000.0	2000.0	200	200			00/04	00/04			.00	.00	A 11	CHDGXX
L-449-6 FLUOROSILICONE	PARKER SEAL/LOS ANGLS	.0750	10-40-3	GDX 3000.0	3000.0	50	50			00/04	00/04			.00	.00	A 11	CHDGXX
L-449-6 FLUOROSILICONE	PARKER SEAL/LOS ANGLS	.0750	10-40-4	GDX 3500.0	3500.0	50	50			01/01	01/01			.00	.00	D 11	CHDGXX
L-449-6 FLUOROSILICONE	PARKER SEAL/LOS ANGLS	.0750	10-40-5	GDX 4000.0	4000.0	50	50			01/01	01/01			.00	.00	D 11	CHDGXX
L-449-6 FLUOROSILICONE	PARKER SEAL/LOS ANGLS	.0750	10-40-6	GDX 2000.0	2000.0	50	50			04/04	04/04			.00	.00	D 11	CHDGXX
L-449-6 FLUOROSILICONE	PARKER SEAL/LOS ANGLS	.0750	10-40-7	GDX 16.5	16.5									.00	.00	D 13	CHDGXX
L-449-6 FLUOROSILICONE	PARKER SEAL/LOS ANGLS	.0750	10-40-8	GDX 2000.0	2000.0	00/04	00/04			00/04	00/04			.00	.00	D 13	CHDGXX
L-449-6 FLUOROSILICONE	PARKER SEAL/LOS ANGLS	.0750	10-40-9	GDX 4500.0	4500.0	00/04	00/04			00/04	00/04			.00	.00	A 10	DTMOXX
L-605 MS-25	GAC	.0750	70-2115-1	A-50 801.0	801.0	512	512							.00	.00	T 15	DMCKGD
1-605 MS-25	GAC	.0750	71-2533	A-50 762.0	762.0	512	512							.00	.00	T 15	DMCKGD
LANTHANOID G-7	SYNTHANE CORP	.0000	71-2533-1	A-50 300.0	300.0									.00	.00	T 15	DMCKGD
LANTHANOID G-7	SYNTHANE CORP	.0000	70-2090-1	GDX 450.0	450.0									.00	.00	D 13	88DFCC
LANTHANOID G-7	SYNTHANE CORP	.0000	71-2744	A-50 746.0	746.0	506	506							.00	.00	D 13	88DFCC
LANTHANOID G-7	SYNTHANE CORP	.0000	71-2744-1	GDX 6000.0	6000.0	0	0			00/04	00/04			.00	.00	T 15	ELMCMZ
LANTHANOID G-7	SYNTHANE CORP	.0000	71-2889-1	GDX 3000.0	3000.0	500	500			01/01	01/01			.00	.00	A 10	AMXXX
LANTHANOID G-7	SYNTHANE CORP	.0000	71-2889-2	GDX 2000.0	2000.0					01/01	01/01			.00	.00	A 10	AMXXX
LANTHANOID G-7	SYNTHANE CORP	.0000	71-2889-3	GDX 1000.0	1000.0					00/04	00/04			.00	.00	A 10	AMXXX
LANTHANOID G-7	SYNTHANE CORP	.0000	71-2889-4	GDX 1500.0	1500.0					01/01	01/01			.00	.00	A 10	AMXXX
LANTHANOID G-7	SYNTHANE CORP	.0000	71-2437	GDX 807.0	807.0									.00	.00	T 15	FLMRMC
LANTHANOID G-7	SYNTHANE CORP	.0000	71-2437-1	MMH 779.0	779.0	530	530							.00	.00	T 15	FLMRMC
LANTHANOID G-7	SYNTHANE CORP	.0000	71-2560	GDX 1500.0	1500.0	514	514							.00	.00	A 10	FLMRMC
LANTHANOID G-7	SYNTHANE CORP	.0000	71-2560-1	GDX 5000.0	5000.0	50	50			00/04	00/04			.00	.00	A 11	CCFLXX
LANTHANOID G-7	SYNTHANE CORP	.0000	71-2560-2	GDX 2500.0	2500.0					01/02	01/02			.00	.00	T 10	CCFLXX
LANTHANOID G-7	SYNTHANE CORP	.0000	71-2432	GDX 2000.0	2000.0					01/01	01/01			.00	.00	T 10	CCFLXX
LANTHANOID G-7	SYNTHANE CORP	.0000	71-2432-1	GDX 1500.0	1500.0					01/02	01/02			.00	.00	T 10	CCFLXX
LANTHANOID G-7	SYNTHANE CORP	.0000	71-2432-2	GDX 1000.0	1000.0					01/01	01/01			.00	.00	T 10	CCFLXX
LANTHANOID G-7	SYNTHANE CORP	.0000	71-2432-3	GDX 500.0	500.0					01/01	01/01			.00	.00	T 10	CCFLXX
LANTHANOID G-7	SYNTHANE CORP	.0000	71-2432-4	GDX 1565.0	1565.0					00/04	00/04			.00	.00	A 10	CCFLXX
LANTHANOID G-7	SYNTHANE CORP	.0000	71-2432-5	GDX 1500.0	1500.0	50	50			00/04	00/04			.00	.00	D 13	OSBMFW
LANTHANOID G-7	SYNTHANE CORP	.0000	71-2432-6	GDX 1500.0	1500.0					00/04	00/04			.00	.00	A 11	OSBMFW
LANTHANOID G-7	SYNTHANE CORP	.0000	69-1516	GDX 1000.0	1000.0									.00	.00	A 10	OSBMFW
LANTHANOID G-7	SYNTHANE CORP	.0000	70-2063	GDX 1500.0	1500.0					00/04	00/04			.00	.00	A 10	OSBMFW
LANTHANOID G-7	SYNTHANE CORP	.0000	70-2063-1	GDX 1000.0	1000.0					00/04	00/04			.00	.00	D 15	OSBMFW
LANTHANOID G-7	SYNTHANE CORP	.0000	70-2063-10	GDX 25.0	25.0					00/04	00/04			.00	.00	D 13	OSBMFW
LANTHANOID G-7	SYNTHANE CORP	.0000	70-2063-11	GDX 25.0	25.0					00/04	00/04			.00	.00	D 13	OSBMFW

MATERIAL TEST DATA BY MANUFACTURER S DESIGNATION AS OF 31 JAN 72

MFR S DESIGNATION	MANUFACTURER	SPEC. THICK.	TEST RPT NO.	TEST ENVR	TEST PRESS	TEST TEMP	EMER ENER	NO OF REACT	FLASH POINT	PROP DIST LOSS	WT LOSS	R T I T	FMTL CODE
LOC TITE GRADE A	LOC TITE CORP		70-2063-12	G0X	50.0				218	398		D 13	8SBMFW
LOC TITE GRADE A	LOC TITE CORP		70-2063-13	G0X	50.0				269	269		D 13	8SBMFW
LOC TITE GRADE A	LOC TITE CORP		70-2063-14	G0X	1000.0				282	282		D 13	8SBMFW
LOC TITE GRADE A	LOC TITE CORP		70-2063-15	G0X	2500.0		50	00/01				A 11	8SBMFW
LOC TITE GRADE A	LOC TITE CORP		70-2063-16	G0X	3000.0		50	00/01				A 11	8SBMFW
LOC TITE GRADE A	LOC TITE CORP		70-2063-17	G0X	5000.0		50	00/04				A 11	8SBMFW
LOC TITE GRADE A	LOC TITE CORP		70-2063-18	G0X	500.0			01/01				B 10	8SBMFW
LOC TITE GRADE A	LOC TITE CORP		70-2063-19	G0X	1000.0			01/01	282	282		B 10	8SBMFW
LOC TITE GRADE A	LOC TITE CORP		70-2063-20	G0X	1000.0			01/01				D 10	8SBMFW
LOC TITE GRADE A	LOC TITE CORP		70-2063-21	G0X	2000.0			01/01				D 10	8SBMFW
LOC TITE GRADE A	LOC TITE CORP		70-2063-3	G0X	50.0				269	269		D 10	8SBMFW
LOC TITE GRADE A	LOC TITE CORP		70-2063-4	G0X	100.0				241	241		D 13	8SBMFW
LOC TITE GRADE A	LOC TITE CORP		70-2063-5	G0X	500.0				151	151		D 13	8SBMFW
LOC TITE GRADE A	LOC TITE CORP		70-2063-6	G0X	1500.0				204	204		D 13	8SBMFW
LOC TITE GRADE A	LOC TITE CORP		70-2063-7	G0X	2000.0				208	208		D 13	8SBMFW
LOC TITE GRADE A	LOC TITE CORP		70-2063-8	MMH	776.0	520						T 15	8SBMFW
LOC TITE GRADE A	LOC TITE CORP		70-2063-9	MMH	815.0	554						T 15	8SBMFW
LOC TITE GRADE E	LOC TITE CORP		71-2558	A-50	768.0	512						T 15	DSCBXX
LOC TITE GRADE E	LOC TITE CORP		71-2558-1	A-50	772.0	514						T 15	DSCBXX
LOC TITE GRADE-E	LOC TITE CORP	.0050	70-2122	G0X	1500.0		50	02/02				T 10	DSCBXX
LOC TITE GRADE-E	LOC TITE CORP	.0050	70-2122-1	G0X	1500.0			00/04				A 11	DSCBXX
LOC TITE GRADE-E	LOC TITE CORP		70-2122-10	G0X	50.0				210	210		D 13	DSCBXX
LOC TITE GRADE-E	LOC TITE CORP		70-2122-11	G0X	100.0				274	274		D 13	DSCBXX
LOC TITE GRADE-E	LOC TITE CORP		70-2122-12	G0X	500.0				217	217		D 13	DSCBXX
LOC TITE GRADE-E	LOC TITE CORP		70-2122-13	G0X	1000.0	168						D 15	DSCBXX
LOC TITE GRADE-E	LOC TITE CORP		70-2122-13	G0X	1000.0				168	168		D 13	DSCBXX
LOC TITE GRADE-E	LOC TITE CORP		70-2122-14	G0X	1500.0				182	192		D 13	DSCBXX
LOC TITE GRADE-E	LOC TITE CORP		70-2122-15	G0X	2000.0				194	194		D 13	DSCBXX
LOC TITE GRADE-E	LOC TITE CORP		70-2122-16	G0X	3000.0	226						D 15	DSCBXX
LOC TITE GRADE-E	LOC TITE CORP		70-2122-17	G0X	25.0				452	452		D 13	DSCBXX
LOC TITE GRADE-E	LOC TITE CORP		70-2122-18	G0X	50.0				424	424		D 13	DSCBXX
LOC TITE GRADE-E	LOC TITE CORP		70-2122-2	G0X	4500.0		50	00/04				A 11	DSCBXX
LOC TITE GRADE-E	LOC TITE CORP		70-2122-3	G0X	1000.0				300	300		D 13	DSCBXX
LOC TITE GRADE-E	LOC TITE CORP		70-2122-4	G0X	3000.0				241	241		D 13	DSCBXX
LOC TITE GRADE-E	LOC TITE CORP		70-2122-5	G0X	5000.0		50	00/04				A 11	DSCBXX
LOC TITE GRADE-E	LOC TITE CORP		70-2122-6	G0X	2500.0			01/01				T 10	DSCBXX
LOC TITE GRADE-E	LOC TITE CORP		70-2122-7	G0X	1500.0			01/01				T 10	DSCBXX
LOC TITE GRADE-E	LOC TITE CORP		70-2122-8	G0X	1000.0			01/01				T 10	DSCBXX
LOC TITE GRADE-E	LOC TITE CORP		70-2122-9	G0X	500.0			01/02				T 10	DSCBXX
LOC TITE GRADE-E	LOC TITE CORP		71-2477	A-50	772.0	504						T 15	DSCBXX
LOC TITE GRADE-E	LOC TITE CORP		71-2477-1	A-50	801.0	512						T 15	DSCBXX
LOC TITE GRADE-E	LOC TITE CORP		70-1778	G0X	1500.0		50	00/04				A 11	DODGCP
LOC TITE GRADE-E	LOC TITE CORP		70-1778	G0X	1500.0			01/04				T 10	DODGCP

NICHOLS ENGINEERING  
LS-93  
LS-93

MFGR S DESIGNATION	MANUFACTURER	SPEC. THICK.	TEST RPT NO.	TEST ENVIR PRESS	TEST TEMP	TEST EMER	NO OF REACT	FLASH POINT PT	FIRE DIST	PROP WT LOSS	R T MATL
LS-53	NICHOLS ENGINEERING		70-1778-1	GOX 3000.0				42R	42R		D 13 D00GCP
LS-53	NICHOLS ENGINEERING		70-1778-10	GOX 16.5				73R	76R		D 13 D00GCP
LS-53	NICHOLS ENGINEERING		70-1778-11	GOX 25.0				716	716		D 13 D00GCP
LS-53	NICHOLS ENGINEERING		70-1778-12	GOX 50.0				483	483		D 13 D00GCP
LS-53	NICHOLS ENGINEERING		70-1778-13	GOX 50.0				674	674		D 13 D00GCP
LS-53	NICHOLS ENGINEERING		70-1778-14	GOX 100.0				221	221		D 13 D00GCP
LS-53	NICHOLS ENGINEERING		70-1778-15	GOX 500.0				421	421		D 13 D00GCP
LS-53	NICHOLS ENGINEERING		70-1778-16	GOX 1000.0				394	394		D 13 0"D0GCP
LS-53	NICHOLS ENGINEERING		70-1778-17	GOX 1500.0				377	377		D 13 D00GCP
LS-53	NICHOLS ENGINEERING		70-1778-18	GOX 2000.0				329	329		D 13 D00GCP
LS-53	NICHOLS ENGINEERING		70-1778-19	GOX 3000.0	374						D 15 D00GCP
LS-53	NICHOLS ENGINEERING		70-1778-2	GOX 5000.0		50	00/04				A 11 D00GCP
LS-53	NICHOLS ENGINEERING		70-1778-3	GOX 1500.0							T 10 D00GCP
LS-53	NICHOLS ENGINEERING		70-1778-4	GOX 1000.0		50	00/04				A 10 D00GCP
LS-53	NICHOLS ENGINEERING		70-1778-5	GOX 1000.0		200	00/04				A 11 D00GCP
LS-53	NICHOLS ENGINEERING		70-1778-6	GOX 1000.0		50	00/04				A 11 D00GCP
LS-53	NICHOLS ENGINEERING		70-1778-7	L0X 14.7		200	00/04				A 16 D00GCP
LS-53	NICHOLS ENGINEERING		70-1778-8	L0X 14.7		200	00/04				A 16 D00GCP
LS-53	NICHOLS ENGINEERING		70-1778-9	GOX 6.2	1000			80R	N999		J 13 D00GCP
LS-63	NICHOLS ENGINEERING	.0750	10-38-1	GOX 1000.0			00/01				A 10 CH0GXX
LS-63	NICHOLS ENGINEERING	.0750	10-38-10	GOX 5000.0		200	01/01				A 10 CH0GXX
LS-63	NICHOLS ENGINEERING	.0750	10-38-11	GOX 1000.0		200	01/01				D 11 CH0GXX
LS-63	NICHOLS ENGINEERING	.0750	10-38-12	GOX 2000.0		200	01/01				D 11 CH0GXX
LS-63	NICHOLS ENGINEERING	.0750	10-38-13	GOX 3000.0		200	00/01				A 11 CH0GXX
LS-63	NICHOLS ENGINEERING	.0750	10-38-14	GOX 4000.0		200	00/01				A 11 CH0GXX
LS-63	NICHOLS ENGINEERING	.0750	10-38-15	GOX 5000.0		200	00/04				A 11 CH0GXX
LS-63	NICHOLS ENGINEERING	.0750	10-38-16	GOX 25.0				725	725		F 13 CH0GXX
LS-63	NICHOLS ENGINEERING	.0750	10-38-17	GOX 50.0				685	685		D 13 CH0GXX
LS-63	NICHOLS ENGINEERING	.0750	10-38-18	GOX 100.0				452	452		D 13 CH0GXX
LS-63	NICHOLS ENGINEERING	.0750	10-38-2	GOX 2000.0			04/04				D 10 CH0GXX
LS-63	NICHOLS ENGINEERING	.0750	10-38-3	GOX 3000.0			01/01				D 10 CH0GXX
LS-63	NICHOLS ENGINEERING	.0750	10-38-4	GOX 2500.0			00/04				A 10 CH0GXX
LS-63	NICHOLS ENGINEERING	.0750	10-38-5	GOX 3000.0			01/04				D 10 CH0GXX
LS-63	NICHOLS ENGINEERING	.0750	10-38-6	GOX 3500.0			01/02				D 10 CH0GXX
LS-63	NICHOLS ENGINEERING	.0750	10-38-7	GOX 4000.0			01/02				D 10 CH0GXX
LS-63	NICHOLS ENGINEERING	.0750	10-38-8	GOX 4500.0			04/04				D 10 CH0GXX
LS-63	NICHOLS ENGINEERING	.0750	10-38-9	GOX 200.0		200	04/04				D 11 CH0GXX
LUBECO M350 A/ALUMINUM	LUBECO INC.	.0050	70-1765	GOX 500.0		10	00/05				A 11 DAEJFM
LUBECO M350 A/ALUMINUM	LUBECO INC.	.0050	70-1765-3	GOX 500.0		10	00/05				A 11 DAEJFM
LUBECO M350 A/STAINLESS	LUBECO INC.	.0050	70-1765-1	GOX 500.0		10	00/05				A 11 DAEJFM
LUBECO M350 A/STAINLESS	LUBECO INC.	.0050	70-1765-2	GOX 500.0		10	00/05				A 11 DAEJFM
LUBECO M350A	LUBECO INC.		71-2272	GOX 1500.0		50	00/04				A 11 DAEJFM
LUBECO M350A	LUBECO INC.		71-2272-1	GOX 1500.0		50	00/04				A 10 DAEJFM

MFGR S DESIGNATION	MANUFACTURER	SPEC. THICK.	TEST RPT NO.	TEST EMVR PRESS	TEST TEST TEMP	TEST IMPRT NO OF REACT	FLASH POINT	FIRE PT	PROP DIST LOSS	WT	R T MAIL
LUBECO M350A	LUBECO INC.		71-2272-2	GOX	1000.0	1000	N999	N999			A 13 DAEJEH
L9/3T GREASE	AIRESEARCH INDST DIV	.0050	SP-6928	GOX	5.0	1000	704	N999			Y 13 DEXXXX
L9/3T GREASE	AIRESEARCH INDST DIV	.0050	SP-6928-1	GOX	25.0		738	71R			D 13 DBXXXX
L9/3T GREASE	AIRESEARCH INDST DIV	.0050	SP-6928-10	GOX	2000.0		466	466			D 13 DBXXXX
L9/3T GREASE	AIRESEARCH INDST DIV	.0050	SP-6928-11	GOX	3000.0						A 10 DBXXXX
L9/3T GREASE	AIRESEARCH INDST DIV	.0050	SP-6928-12	GOX	4000.0		00/01				A 10 DBXXXX
L9/3T GREASE	AIRESEARCH INDST DIV	.0050	SP-6928-13	GOX	5000.0		00/04				A 10 DBXXXX
L9/3T GREASE	AIRESEARCH INDST DIV	.0050	SP-6928-14	GOX	3500.0	200	00/01				A 11 DBXXXX
L9/3T GREASE	AIRESEARCH INDST DIV	.0050	SP-6928-15	GOX	4000.0	200	00/01				A 11 DBXXXX
L9/3T GREASE	AIRESEARCH INDST DIV	.0050	SP-6928-16	GOX	5000.0	200	00/04				A 11 DBXXXX
L9/3T GREASE	AIRESEARCH INDST DIV	.0050	SP-6928-17	GOX	5000.0	50	00/04				A 11 DBXXXX
L9/3T GREASE	AIRESEARCH INDST DIV	.0050	SP-6928-18	GOX	5000.0	50	00/04				A 10 DBXXXX
L9/3T GREASE	AIRESEARCH INDST DIV	.0050	SP-6928-19	GOX	1500.0		00/04				A 11 DBXXXX
L9/3T GREASE	AIRESEARCH INDST DIV	.0050	SP-6928-2	GOX	50.0		760	760			D 13 DBXXXX
L9/3T GREASE	AIRESEARCH INDST DIV	.0050	SP-6928-20	GOX	1500.0		01/01				T 10 DBXXXX
L9/3T GREASE	AIRESEARCH INDST DIV	.0050	SP-6928-3	GOX	50.0		600	600			D 13 DBXXXX
L9/3T GREASE	AIRESEARCH INDST DIV	.0050	SP-6928-4	GOX	100.0		530	530			D 13 DBXXXX
L9/3T GREASE	AIRESEARCH INDST DIV	.0050	SP-6928-5	GOX	500.0		467	467			D 13 DBXXXX
L9/3T GREASE	AIRESEARCH INDST DIV	.0050	SP-6928-6	CJX	1000.0		460	460			D 13 DBXXXX
L9/3T GREASE	AIRESEARCH INDST DIV	.0050	SP-6928-7	GOX	1087.0		464	464			D 13 DBXXXX
L9/3T GREASE	AIRESEARCH INDST DIV	.0050	SP-6928-8	GOX	1500.0		436	436			D 13 DBXXXX
L9/3T GREASE	AIRESEARCH INDST DIV	.0050	SP-6928-9	GOX	1565.0		547	547			D 13 DBXXXX
MAGNESIUM OX P/N 803666	MORTON CO.		70-2192	GOX	1500.0		00/04				A 10 FJHXXX
MAGNET WIRE-TYPE H	GAC		70-2158	GOX	2000.0		00/04				A 10 EPCDMS
MAGNET WIRE-TYPE H	GAC		70-2158-1	GOX	2500.0	50	00/04				A 11 FPCDMS
MAGNET WIRE-TYPE H	GAC		70-2158-2	GOX	1400.0		51R	51R			D 13 EPCDMS
MELAMINE	ROTARY PLASTICS		71-2488	A-50	783.0	499					T 15 DLASXX
MICAMATTE	ROTARY PLASTICS		71-2488-1	A-50	727.0	486					T 15 DLASXX
MICAPLY TYPE GF	G.F. INSULATING MATLS		71-2597-1	A-50	818.0	524					T 15 FJHFX
MICAPLY TYPE GF	G.E. INSULATING MATLS		71-2630	A-50	774.0	515					T 15 CRBGXX
MICAPLY EPOXY GLASS LAM	MICA CORP		70-2236	GOX	1000.0		493	493			T 15 CRBGXX
MICAPLY EPOXY GLASS LAM	MICA CORP		70-2236-1	GOX	1500.0	50	00/04				D 13 CRBGXX
MICAPLY EPOXY GLASS LAM	MICA CORP		70-2236-2	GOX	1500.0		01/03				A 11 CRBGXX
MICRO QUARTZ THERM INSULROSEMONT ENG. CORP	MICA CORP		70-1990	GOX	1500.0	50	00/04				A 11 CKHXX
MICRO QUARTZ THERM INSULROSEMONT ENG. CORP	MICA CORP		70-1990-1	GOX	1500.0	1000	00/04				A 10 CKHXX
MICRO QUARTZ THERM INSULROSEMONT ENG. CORP	MICA CORP		70-1751	GOX	5.0	1000	N999	N999			A 13 CKHXX
MICRO QUARTZ THERM INSULROSEMONT ENG. CORP	MICA CORP		70-1751-1	GOX	25.0	1000	93R	N999			Y 13 EPCNGI
MICRO QUARTZ THERM INSULROSEMONT ENG. CORP	MICA CORP		70-1751-2	GOX	50.0		91R	N999			Y 13 EPCNGI
MICRO QUARTZ THERM INSULROSEMONT ENG. CORP	MICA CORP		70-1751-3	GOX	50.0		835	835			D 13 EPCNGI
MICRO QUARTZ THERM INSULROSEMONT ENG. CORP	MICA CORP		70-1751-4	GOX	100.0		798	939			D 13 EPCNGI
MICRO QUARTZ THERM INSULROSEMONT ENG. CORP	MICA CORP		70-1751-5	GOX	500.0		679	679			D 13 EPCNGI

MATERIAL TEST DATA BY MANUFACTURER S DESIGNATION AS OF 31 JAN 72

REFR S DESIGNATION	MANUFACTURER	SPEC. THICK.	TEST RPT NO.	TEST ENVR PRESS	TEST TEMP	TEST ENER	IMPT NO OF REACT	FLASH POINT	FIRE PT	PROP DIST LOSS	WT	R T	MATL I T CODE
ML POLY CLD TEFLON WIRE			70-1751-6	GOX 1000.0				789	789			D 13	PCNGI
ML POLY CLD TEFLON WIRE			70-1751-7	GOX 1500.0				714	714			D 13	PCNGI
ML POLY CLD TEFLON WIRE			70-1751-8	GOX 2000.0				720	720			D 13	PCNGI
MM METAL	ALLEGHENY LUDLUM		71-2483	A-50 746.0	511							T 15	DMGXX
MM METAL	ALLEGHENY LUDLUM		71-2483-1	A-50 732.0	510		00/04					T 15	DMGXX
MOLYCOTE X-15	ALPHA MOLYCOTE CORP		70-1877	GOX 1500.0					N999			A 10	DAEJGP
MOLYCOTE X-15	ALPHA MOLYCOTE CORP		70-1877-1	GOX 16.5	1000				N999			J 13	DAEJGP
MOLYCOTE X-15	ALPHA MOLYCOTE CORP		70-1877-10	GOX 25.0	1000				N999			J 13	DAEJGP
MOLYCOTE X-15	ALPHA MOLYCOTE CORP		70-1877-11	GOX 1500.0	1000				N999			J 13	DAEJGP
MOLYCOTE X-15	ALPHA MOLYCOTE CORP		70-1877-12	GOX 2000.0	1000				N999			J 13	DAEJGP
MOLYCOTE X-15	ALPHA MOLYCOTE CORP		70-1877-2	GOX 950.0	1000				N999			A 13	DAEJGP
MOLYCOTE X-15	ALPHA MOLYCOTE CORP		70-1877-3	GOX 50.0	1000			928	N999			J 13	DAEJGP
MOLYCOTE X-15	ALPHA MOLYCOTE CORP		70-1877-4	GOX 62.0	1000				N999			A 13	DAEJGP
MOLYCOTE X-15	ALPHA MOLYCOTE CORP		70-1877-5	GOX 900.0	1000				N999			A 13	DAEJGP
MOLYCOTE X-15	ALPHA MOLYCOTE CORP		70-1877-6	GOX 50.0	1000				N999			J 13	DAEJGP
MOLYCOTE X-15	ALPHA MOLYCOTE CORP		70-1877-7	GOX 100.0	1000				N999			J 13	DAEJGP
MOLYCOTE X-15	ALPHA MOLYCOTE CORP		70-1877-8	GOX 500.0	1000				N999			J 13	DAEJGP
MOLYCOTE X-15	ALPHA MOLYCOTE CORP		70-1877-9	GOX 1000.0	1000				N999			J 13	DAEJGP
MOLYCOTE X-15	ALPHA MOLYCOTE CORP		70-1877-5	GOX 1500.0		50	00/04		N999			A 11	DAEJGP
MOLYCOTE X-15	GAC	.0050	70-2147	GOX 2000.0		50	00/04					A 10	DTMHS
MOLYCOTE X-15	GAC		70-2147-1	GOX 2000.0		50	00/04					A 11	DTMHS
MOLYCOTE X-15	TOMSEN CO.		70-2094-1	GOX 1500.0		500	00/04					A 10	ELMNC
MOLYCOTE X-15	TOMSEN CO.		70-2094-2	GOX 1000.0			00/04					A 10	ELMNC
MOLYCOTE X-15	TOMSEN CO.		70-2094-3	GOX 1500.0			00/04					A 10	ELMNC
MOLYCOTE X-15	TOMSEN CO.		71-2712	GOX 250.0			00/04					A 10	FJMOXX
MOLYCOTE X-15	TOMSEN CO.		70-2028	GOX 50.0				695	695			D 13	DUCBXX
MOLYCOTE X-15	TOMSEN CO.		70-2028-1	GOX 1500.0			00/04					A 10	DUCBXX
MOLYCOTE X-15	TOMSEN CO.		70-2028-2	GOX 100.0				649	649			D 13	DUCBXX
MOLYCOTE X-15	TOMSEN CO.		70-2028-3	GOX 1000.0				440	440			D 13	DUCBXX
MOLYCOTE X-15	TOMSEN CO.		70-2028-4	GOX 1500.0			00/04					A 11	DUCBXX
MOLYCOTE X-15	TOMSEN CO.		70-2028-5	GOX 500.0		50	00/04					D 13	DUCBXX
MOLYCOTE X-15	TOMSEN CO.		70-2028-6	GOX 1500.0				466	466			D 13	DUCBXX
MOLYCOTE X-15	TOMSEN CO.		70-2028-7	GOX 25.0				386	386			D 13	DUCBXX
MOLYCOTE X-15	TOMSEN CO.		70-2028-8	GOX 1000.0	419			733	733			D 13	DUCBXX
MOLYCOTE X-15	TOMSEN CO.		70-2028-9	GOX 50.0				743	743			D 15	DUCBXX
MOLYCOTE X-15	TOMSEN CO.	.0750	70-2120	GOX 1500.0			01/07					T 10	DUCBXX
MOLYCOTE X-15	TOMSEN CO.	.0750	70-2120-1	GOX 4500.0			01/06					T 10	DUCBXX
MOLYCOTE X-15	TOMSEN CO.		70-2120-10	GOX 1500.0				419	419			D 13	DUCBXX
MOLYCOTE X-15	TOMSEN CO.		70-2120-11	GOX 2000.0				294	294			D 13	DUCBXX
MOLYCOTE X-15	TOMSEN CO.		70-2120-15	GOX 25.0				763	763			D 13	DUCBXX
MOLYCOTE X-15	TOMSEN CO.		70-2120-14	GOX 50.0				732	732			D 13	DUCBXX
MOLYCOTE X-15	TOMSEN CO.		70-2120-2	GOX 1000.0				450	450			D 13	DUCBXX
MOLYCOTE X-15	TOMSEN CO.		70-2120-3	GOX 3000.0				335	335			D 13	DUCBXX
MOLYCOTE X-15	TOMSEN CO.		70-2120-4	A-50 779.0	505							T 15	DUCBXX





MATERIAL TEST DATA BY MANUFACTURER S DESIGNATION AS OF 31 JAN 72

MFG S DESIGNATION	MANUFACTURER	SPEC. THICK.	TEST RPT NO.	TEST ENVR PRESS	TEST TEMP	TEST .MPT NO OF ENER REACT	FLASH FIRE POINT	PROP WT DIST LOSS	R T MATL I T CODE
MEDPREME SEATS	VICTOR EQUIPMENT CO.		71-2774-3	GOX 1500.0	499	01/01			D 10 CHDBXX
MEDPREME SEATS	VICTOR EQUIPMENT CO.		71-2774-4	GOX 1000.0	512	01/03			D 10 CHDBXX
MEDPREME SEATS	VICTOR EQUIPMENT CO.		71-2774-5	GOX 500.0	491	00/04			A 10 CHDBXX
MEDPREME SEATS	VICTOR EQUIPMENT CO.		71-2783-1	GOX 2500.0	505	02/02			D 10 CHDBXX
MEDPREME SEATS	VICTOR EQUIPMENT CO.		71-2783-2	GOX 1500.0	538	01/01			D 10 CHDBXX
MEDPREME SEATS	VICTOR EQUIPMENT CO.		71-2783-3	GOX 1000.0	511	00/04			A 10 CHDBXX
NI SPAN C	NR		70-1966	A-50 745.0	499				T 15 DMNIMN
NI SPAN C	NR		70-1966-1	A-50 812.0	512				T 15 DMNIMN
NI SPAN C	NR		70-1966-2	A-50 701.0	491				T 15 DMNIMN
NI SPAN C	NR		70-1966-3	A-50 773.0	505				T 15 DMNIMN
NI SPAN C	NR		70-1966-4	MMH 812.0	538				T 15 DMNIMN
NI SPAN C	NR		70-1966-5	MMH 765.0	511				T 15 DMNIMN
NI SPAN C ALLOY 902	GAC	.0750	70-2145	GOX 2000.0		00/04			A 10 DMNIMN
NI SPAN C ALLOY 902	GAC	.0750	70-2145-1	GOX 2000.0	504	00/04			A 11 DMNIMN
NI SPAN C ALLOY 902	INTERNATIONAL NICKEL CO.		71-2338	A-50 781.0	494				T 15 DMNIMN
NI SPAN C ALLOY 902	INTERNATIONAL NICKEL CO.		71-2338-1	A-50 746.0	494				T 15 DMNIMN
NI-Fe NO 51			71-2706	A-50 813.0	523				T 15 DMNIMN
NI-Fe NO 52			71-2706-1	A-50 780.0	519				T 15 DMNIMN
NI-Fe NO 52			71-2650	A-50 750.0	512				T 15 DMNIMN
NI-TFE WIRE			71-2650-1	A-50 746.0	514				T 15 DMNIMN
NICKEL FILTER-MOVEN			71-2656	A-50 784.0	509				T 15 DMNIMN
NICKEL ALLOY 200			70-2195	GOX 2000.0		00/04			A 10 DMNIMN
NICKEL ALLOY 200			70-2121	GOX 2000.0		00/04			A 10 DMNIMN
NICKEL ALLOY 200			71-2395	A-50 799.0	490				T 15 DMNIMN
NICKEL ALLOY 205			71-2395-1	A-50 781.0	475				T 15 DMNIMN
NICKEL ALLOY 205			70-2123-5	N204 252.6	86				A 14 DMNIMN
NICKEL ALLOY 205			70-2123	GOX 4500.0		00/04			T 15 DMNIMN
NICKEL ALLOY 205			70-2123-1	A-50 578.0	455				T 15 DMNIMN
NICKEL ALLOY 205			70-2123-2	A-50 451.0	431				T 15 DMNIMN
NICKEL ALLOY 205			70-2123-3	A-50 841.0	541				T 15 DMNIMN
NICKEL ALLOY 205			70-2123-4	N204 252.1	72				A 14 DMNIMN
NICKEL ALLOY 205			71-2674-2	MMH 768.0	540				T 15 ELMMMU
NICKEL ALLOY 205			71-2674-3	MMH 811.0	515				T 15 ELMMMU
NICKEL ALLOY 205			71-2674	A-50 773.0	518				T 15 ELMMMU
NICKEL ALLOY 205			71-2522	MMH 816.0	514				T 15 ELMMMU
NICKEL ALLOY 205			71-2522-1	MMH 779.0	513				T 15 AHMMUC
NICKEL ALLOY 205			70-1943	GOX 1500.0		00/04			A 11 FLXXXX
NICKEL ALLOY 205			70-1943	GOX 1500.0	1000	00/04	N999	N999	A 10 FLXXXX
NICKEL ALLOY 205			70-1943-1	GOX 1500.0		00/04			Y 13 FLXXXX
NICKEL ALLOY 205			70-2196	GOX 1500.0		00/04			A 10 FLXXXX
NICKEL ALLOY 205			70-2196-1	GOX 1500.0		00/04			A 11 FLXXXX
NICKEL ALLOY 205			71-2430	GOX 2000.0		00/04			A 10 FLXXXX
NICKEL ALLOY 205			71-2430-1	GOX 4500.0		00/04			A 10 FLXXXX

MATERIAL TEST DATA BY MANUFACTURER S DESIGNATION AS OF 31 JAN 72

MFGR S DESIGNATION	MANUFACTURER	SPEC. THICK.	TEST RPT NO.	TEST PRESS ENVR	TEST PRESS	TEST TEMP	TEST IMPT NO OF ENER	FLASH POINT	FIRE PT	PROP DIST LOSS	WT	R T I	MATL CODE
MICROBRAZE DN 321 SS	WALL COLMONOY CORP		71-2430-2	A-50	791.0	487						T	15 FLXXX
MICROBRAZE DP 321 SS	WALL COLMONOY CORP		71-2430-3	A-50	795.0	495						T	15 FLXXX
MICROBRAZE-50 PELLETS	WALL COLMONOY CORP		70-2196-2	GDX	1000.0	1000		N999	N999			J	13 FLXXX
NYLON 8218	WESTERN GOLD & PLATH CO.		71-2743	A-50	819.0	525						T	15 ELUMIN
NYLON 8218	WESTERN GOLD & PLATH CO.		71-2743-1	A-50	774.0	515						T	15 ELUMIN
NYLON 8218	WESTERN GOLD & PLATH CO.		71-2743-2	MMH	808.0	536						T	15 ELUMIN
NYLON 8218	WESTERN GOLD & PLATH CO.		71-2743-3	MMH	839.0	541						T	15 ELUMIN
MORAN TP 61-6013/3013KRLNK-E/BOROEN ING.	VICTOR EQUIPMENT CO.		71-2375	GDX	6.2	600		499	N600			A	13 AKAKGU
NYLON GASKET	VICTOR EQUIPMENT CO.		71-2778-1	GDX	2500.0		02/02					D	10 CHBSXX
NYLON GASKET	VICTOR EQUIPMENT CO.		71-2778-2	GDX	1000.0		01/01					D	10 CHBSXX
NYLON GASKET	VICTOR EQUIPMENT CO.		71-2778-3	GDX	500.0		00/04					D	10 CHBSXX
NYLON GASKET	VICTOR EQUIPMENT CO.		71-2780-1	GDX	2500.0		02/02					D	10 CHBSXX
NYLON GASKET	VICTOR EQUIPMENT CO.		71-2780-2	GDX	1500.0		01/01					D	10 CHBSXX
NYLON GASKET	VICTOR EQUIPMENT CO.		71-2780-3	GDX	1000.0		01/01					D	10 CHBSXX
NYLON GASKET	VICTOR EQUIPMENT CO.		71-2780-4	GDX	500.0		00/04					D	10 CHBSXX
NYLON GASKET-NOZZLE	VICTOR EQUIPMENT CO.		71-2781-1	GDX	2500.0		02/02					D	10 CHBSXX
NYLON GASKET-NOZZLE	VICTOR EQUIPMENT CO.		71-2781-2	GDX	1000.0		01/01					D	10 CHBSXX
NYLON GASKET-NOZZLE	VICTOR EQUIPMENT CO.		71-2781-3	GDX	500.0		04/05					D	10 CHBSXX
NYLON ROD			71-2685	A-50	773.0	501						T	15 BEH2XX
NYLON 600			71-2685-1	A-50	748.0	509						T	15 BEH2XX
NYLON SWEET			10-44	GDX	500.0		50	00/04				A	11 DUBSXX
NYLON SWEET			10-44-1	GDX	500.0		00/04					A	10 DUBSXX
NYLON SWEET			10-44-2	GDX	4500.0		50	00/04				A	11 DUBSXX
NYLON SWEET			10-44-3	GDX	4500.0		01/01					T	10 DUBSXX
NYLON SWEET			10-44-4	GDX	1500.0		01/01					T	10 DUBSXX
NYLON SWEET			10-44-5	GDX	100.0			376	376			D	13 DUBSXX
NYLON SLIP RING	VICTOR EQUIPMENT CO.		71-2781-1	GDX	200.0		02/02					D	10 CHBSXX
NYLON SLIP RING	VICTOR EQUIPMENT CO.		71-2782-2	GDX	2000.0		01/01					D	10 CHBSXX
NYLON SLIP RING	VICTOR EQUIPMENT CO.		71-2782-3	GDX	1500.0		01/02					D	10 CHBSXX
NYLON SLIP RING	VICTOR EQUIPMENT CO.		71-2782-4	GDX	1000.0		01/01					D	10 CHBSXX
NYLON SLIP RING	VICTOR EQUIPMENT CO.		71-2782-5	GDX	590.0		00/01					A	10 CHBSXX
NYLON TIE CORD	TRINTEX CORP		71-2438	GDX	1500.0		01/01					T	10 EDBSXX
NYLON TIE CORD	TRINTEX CORP		71-2438-1	GDX	1000.0		01/01					T	10 EDBSXX
NYLON TWINE 70M023M	WESTERN FILAMENT CO		71-2678	A-50	777.0	511						T	15 EUBSXX
NYLON TWINE 70M023K	WESTERN FILAMENT CO		71-2678-1	A-50	760.0	517						T	15 EUBSXX
NYLON TYING STRING	E-I. DUPONT CO., INC.		71-2436	GDX	500.0		50	00/04				A	11 EDBSXX
NYLON TYING STRING	E-I. DUPONT CO., INC.		71-2436-1	GDX	500.0		01/01					T	10 EDBSXX
NYLON/STAINLESS			71-2595	A-50	809.0	525						T	15 BNMDBS
NYLON/STAINLESS			71-2595-1	A-50	815.0	521						T	15 BNMDBS
OS-124/AL202	MONSANTO CORP		71-2604	A-50	777.0	516						T	15 AYXXXX
P-665-7 POLYURETHANE	PARKER SEAL/LOS ANGLS	.0750	71-2604-1	A-50	723.0	504						T	15 AYXXXX
P-665-7 POLYURETHANE	PARKER SEAL/LOS ANGLS	.0750	10-84	GDX	2000.0		00/04					A	10 CHCOXX
P-665-7 POLYURETHANE	PARKER SEAL/LOS ANGLS	.0750	10-84-1	GDX	2500.0		01/02					D	10 CHCOXX
P-665-7 POLYURETHANE	PARKER SEAL/LOS ANGLS	.0750	10-84-2	GDX	3000.0		01/03					D	10 CHCOXX

MATERIAL TEST DATA BY MANUFACTURER S DESIGNATION AS OF 31 JAN 72

MFGR S DESIGNATION	MANUFACTURER	SPEC. THICK.	TEST RPT NO.	TEST ENVR PRESS	TEST IMPR NO OF TEMP ENER REACT	FLASH POINT	FIRE PT	WT LOSS	R T I	MATL CODE
P-665-7 POLYURETHANE	PARKER SEAL/LOS ANGLS	.0750	10-84-3	GOX 3500.0	01/03				D 10	CHCOXX
P-665-7 POLYURETHANE	PARKER SEAL/LOS ANGLS	.0750	10-84-4	GOX 4000.0	01/02				D 10	CHCOXX
P-665-7 POLYURETHANE	PARKER SEAL/LOS ANGLS	.0750	10-84-5	GOX 4500.0	04/04				D 10	CHCOXX
PALIMEY NO 7	PARKER SEAL/LOS ANGLS	.0750	10-84-6	GOX 5000.0	200				A 10	CHCOXX
PALIMEY NO 7	THE J.M. MEY CO		71-2742-1	GOX 250.0	00/04				A 10	ELMKMF
PALIMEY NO 7	THE J.M. MEY CO		71-2742-2	GOX 250.0	00/04				A 11	FLMKMF
PALIMEY NO 7	GAC		71-2742-3	A-50 771.0	50				T 15	DTMUMN
PALIMEY NO 7	GAC		71-2742-4	A-50 830.0	494				T 15	DTMUMN
PARAFFIN-2-BROM	MSFC		70-2037-1	GOX 6.2			489		D 13	AMGNGI
PARAFFIN-2-BROM	MSFC		70-2037-2	GOX 16.5			492		D 13	AMGNGI
PARAFFIN-SILICONE CARBIDMSFC	PLASTICS + RUBBER PRODS		69-1567-1	GOX 25.0			741		D 13	DUEGXX
PARAFFIN-SILICONE CARBIDMSFC	PLASTICS + RUBBER PRODS		69-1567-2	GOX 50.0			711		D 13	DUEGXX
PARAFFIN-SODIUM ACETATE MSFC	PLASTICS + RUBBER PRODS		69-1567-3	GOX 50.0			657		D 13	DUEGXX
PARAFFIN-SODIUM ACETATE MSFC	PLASTICS + RUBBER PRODS		69-1567-4	GOX 100.0			428		D 13	DUEGXX
PARAFFIN-SODIUM ACETATE MSFC	PLASTICS + RUBBER PRODS		69-1567-5	GOX 500.0			448		D 13	DUEGXX
PARAFFIN-SODIUM ACETATE MSFC	PLASTICS + RUBBER PRODS		69-1567-6	GOX 1000.0			398		D 13	DUEGXX
PARAFFIN-SODIUM ACETATE MSFC	PLASTICS + RUBBER PRODS		69-1567-7	GOX 1500.0			392		D 13	DUEGXX
PARAFFIN-SODIUM ACETATE MSFC	PLASTICS + RUBBER PRODS		69-1567-8	GOX 2000.0			386		D 13	DUEGXX
PARAFFIN-SODIUM ACETATE MSFC	PLASTICS + RUBBER PRODS		69-1568-1	GOX 25.0			391		D 13	DUEGXX
PARAFFIN-SODIUM ACETATE MSFC	PLASTICS + RUBBER PRODS		69-1568-2	GOX 50.0			756		D 13	DVDPXX
PARAFFIN-SODIUM ACETATE MSFC	PLASTICS + RUBBER PRODS		69-1568-3	GOX 100.0			720		D 13	DVDPXX
PARAFFIN-SODIUM ACETATE MSFC	PLASTICS + RUBBER PRODS		69-1568-4	GOX 200.0	200	01/01			T 11	DVDPXX
PARAFFIN-SODIUM ACETATE MSFC	PLASTICS + RUBBER PRODS	.0750	69-1568-10	GOX 500.0	200	01/01			T 11	DVDPXX
PARAFFIN-SODIUM ACETATE MSFC	PLASTICS + RUBBER PRODS	.0750	69-1568-11	GOX 1000.0	200	01/01			T 11	DVDPXX
PARAFFIN-SODIUM ACETATE MSFC	PLASTICS + RUBBER PRODS	.0750	69-1568-12	GOX 1500.0	200	01/01			T 11	DVDPXX
PARAFFIN-SODIUM ACETATE MSFC	PLASTICS + RUBBER PRODS	.0750	69-1568-13	GOX 2000.0	200	01/01			T 11	DVDPXX
PARAFFIN-SODIUM ACETATE MSFC	PLASTICS + RUBBER PRODS	.0750	69-1568-14	GOX 50.0					T 11	DVDPXX
PARAFFIN-SODIUM ACETATE MSFC	PLASTICS + RUBBER PRODS	.0750	69-1568-15	GOX 100.0			595		D 13	DVDPXX
PARAFFIN-SODIUM ACETATE MSFC	PLASTICS + RUBBER PRODS	.0750	69-1568-16	GOX 150.0			551		D 13	DVDPXX
PARAFFIN-SODIUM ACETATE MSFC	PLASTICS + RUBBER PRODS	.0750	69-1568-17	GOX 1000.0			444		D 13	DVDPXX
PARAFFIN-SODIUM ACETATE MSFC	PLASTICS + RUBBER PRODS	.0750	69-1568-18	GOX 1500.0			397		D 13	DVDPXX
PARAFFIN-SODIUM ACETATE MSFC	PLASTICS + RUBBER PRODS	.0750	69-1568-19	GOX 2000.0			781		D 13	DVDPXX
PARAFFIN-SODIUM ACETATE MSFC	PLASTICS + RUBBER PRODS	.0750	69-1568-20	GOX 2500.0			760		D 13	DVDPXX
PARAFFIN-SODIUM ACETATE MSFC	PLASTICS + RUBBER PRODS	.0750	69-1568-21	GOX 3000.0					A 10	DVDPXX
PARAFFIN-SODIUM ACETATE MSFC	PLASTICS + RUBBER PRODS	.0750	69-1568-22	GOX 3500.0	00/01				A 10	DVDPXX
PARAFFIN-SODIUM ACETATE MSFC	PLASTICS + RUBBER PRODS	.0750	69-1568-23	GOX 4000.0	00/01				A 10	DVDPXX
PARAFFIN-SODIUM ACETATE MSFC	PLASTICS + RUBBER PRODS	.0750	69-1568-24	GOX 4500.0	00/04				A 10	DVDPXX
PARAFFIN-SODIUM ACETATE MSFC	PLASTICS + RUBBER PRODS	.0750	69-1568-25	GOX 5000.0	01/02				T 10	DVDPXX
PARAFFIN-SODIUM ACETATE MSFC	PLASTICS + RUBBER PRODS	.0750	69-1568-26	GOX 5000.0	01/02				T 10	DVDPXX

MATERIAL TEST DATA BY MANUFACTURER S DESIGNATION AS OF 31 JAN 77

MFGR S DESIGNATION	MANUFACTURER	SPEC. THICK.	TEST RPT NO.	TEST ENVR	TEST PRESS	TEST TEMP	TEST IMPT ENER	NO OF REACT	FLASH POINT	FIRE PT	PROP DIST	WT LOSS	R T	MATL I T CODE
PARC COMPOUND 920-70	PLASTICS + RUBBER PRODS		70-1710	GOX	5.0	1000			744	N999			J 13	DVDFXX
PARC COMPOUND 920-70	PLASTICS + RUBBER PRODS		70-1710-1	GOX	25.0		00/01		789	813			0 13	DVDFXX
PARC COMPOUND 920-70	PLASTICS + RUBBER PRODS		70-1710-11	GOX	2000.0		00/04						A 10	DVDFXX
PARC COMPOUND 920-70	PLASTICS + RUBBER PRODS		70-1710-12	GOX	2500.0		01/02						A 10	DVDFXX
PARC COMPOUND 920-70	PLASTICS + RUBBER PRODS		70-1710-13	GOX	3000.0		01/02						T 10	DVDFXX
PARC COMPOUND 920-70	PLASTICS + RUBBER PRODS		70-1710-14	GOX	3500.0		01/02						T 10	DVDFXX
PARC COMPOUND 920-70	PLASTICS + RUBBER PRODS		70-1710-15	GOX	4000.0		00/01						A 10	DVDFXX
PARC COMPOUND 920-70	PLASTICS + RUBBER PRODS		70-1710-16	GOX	4500.0		04/04						T 10	DVDFXX
PARC COMPOUND 920-70	PLASTICS + RUBBER PRODS		70-1710-17	GOX	2000.0	200	00/04						A 11	DVDFXX
PARC COMPOUND 920-70	PLASTICS + RUBBER PRODS		70-1710-18	GOX	2500.0		00/01						A 10	DVDFXX
PARC COMPOUND 920-70	PLASTICS + RUBBER PRODS		70-1710-19	GOX	3000.0		00/01						A 10	DVDFXX
PARC COMPOUND 920-70	PLASTICS + RUBBER PRODS		70-1710-2	GOX	50.0		00/01		71A	7A5			0 13	DVDFXX
PARC COMPOUND 920-70	PLASTICS + RUBBER PRODS		70-1710-20	GOX	3500.0		00/01						A 10	DVDFXX
PARC COMPOUND 920-70	PLASTICS + RUBBER PRODS		70-1710-21	GOX	4000.0		00/01						A 10	DVDFXX
PARC COMPOUND 920-70	PLASTICS + RUBBER PRODS		70-1710-22	GOX	4500.0		00/04						A 10	DVDFXX
PARC COMPOUND 920-70	PLASTICS + RUBBER PRODS		70-1710-23	GOX	5000.0		01/01						T 10	DVDFXX
PARC COMPOUND 920-70	PLASTICS + RUBBER PRODS		70-1710-24	GOX	5000.0	200	00/04						A 11	DVDFXX
PARC COMPOUND 920-70	PLASTICS + RUBBER PRODS		70-1710-3	GOX	50.0				574	574			0 13	DVDFXX
PARC COMPOUND 920-70	PLASTICS + RUBBER PRODS		70-1710-4	GOX	100.0				562	562			0 13	DVDFXX
PARC COMPOUND 920-70	PLASTICS + RUBBER PRODS		70-1710-5	GOX	500.0				480	480			0 13	DVDFXX
PARC COMPOUND 920-70	PLASTICS + RUBBER PRODS		70-1710-6	GOX	1000.0				445	445			0 13	DVDFXX
PARC COMPOUND 920-70	PLASTICS + RUBBER PRODS		70-1710-7	GOX	1500.0				414	414			0 13	DVDFXX
PARC COMPOUND 920-70	PLASTICS + RUBBER PRODS		70-1710-8	GOX	2000.0				419	419			0 13	DVDFXX
PARC COMPOUND 920-70	PLASTICS + RUBBER PRODS		70-1710-9	GOX	16.5				419	419			0 13	DVDFXX
PARC COMPOUND 975-75	PLASTICS + RUBBER PRODS	.0750	70-1951	GOX	5000.0	50	00/04		844	861			M 13	DVDFXX
PARC COMPOUND 975-75	PLASTICS + RUBBER PRODS	.0750	70-1951-1	GOX	5000.0		00/04						A 11	CHDFXX
PBX BONDING CEMENT	WILLIAM T. BEAM INC		70-1987	GOX	1500.0	50	00/04						A 10	CHDFXX
PBX BONDING CEMENT	WILLIAM T. BEAM INC		70-1987	GOX	1500.0	50	00/04						A 11	ABXXXX
PBX CERAMIC CMT P-1	WILLIAM T. BEAM INC		70-1987-1	GOX	1500.0	50	00/04						A 10	ABXXXX
PBX CERAMIC CMT P-1	WILLIAM T. BEAM INC		70-1988	GOX	1500.0	50	00/04		N999	N999			A 13	ABXXXX
PBX CERAMIC CMT P-1	WILLIAM T. BEAM INC		70-1988	GOX	1500.0	50	00/04						A 11	ABXXXX
PBX CERAMIC CMT P-1	WILLIAM T. BEAM INC		70-1988-1	GOX	1000.0	1000	00/04						A 10	ABXXXX
PC-12-007	HYSOL CORP		70-1963	GOX	1500.0	50	01/01		N999	N999			R 13	ABXXXX
PC-12-007	HYSOL CORP		70-1963-1	GOX	1500.0	50	00/04						T 10	ALBJXX
PC-12-007	HYSOL CORP		70-1963-2	A-50	413.0	515							A 11	ALBJXX
PC-12-007	HYSOL CORP		70-1963-3	A-50	818.0	522							T 15	ALBJXX
PC-12-007	HYSOL CORP		70-1963-4	A-50	791.0	497							T 15	ALBJXX
PC-12-007	HYSOL CORP		70-1963-5	A-50	827.0	505							T 15	ALBJXX
PE-100 ADHESIVE TAPE	PERMACEL TAPE CORP		70-2047	GOX	1000.0	600			300	300			D 13	ALBJXX
PENNTUBE 2 SMT	INSULECTRO CORP		71-268A	GOX	1500.0	50	00/04		N600	N600			F 13	DZGDFX
PENNTUBE 2 SMT	INSULECTRO CORP		71-268A-1	GOX	1500.0	50	01/07						A 11	EPDEXX
PENNTUBE 2 SMT	INSULECTRO CORP		71-268A-2	GOX	1000.0	50	01/07		584	584			T 10	EPDEXX

MPGR S DESIGNATION	MANUFACTURER	SPEC. THICK.	TEST RPT NO.	TEST ENVR	TEST PRESS	TEST TEMP	TEST ENER	IMPT NO OF REACT	FLASH POINT	FIRE PT	PROP DIST LOSS	WT	R T	MATL
													I	T CODE
PENTON	MERCULES IRC		71-2922	GDX	1000.0				270	270			D	13 DL8BXX
PENTON	MERCULES INC		71-2922-1	GDX	1500.0		50	00/04					A	11 DL8BXX
PH 15-7	MERCULES INC		71-2922-2	GDX	1500.0			01/01					W	10 DL8BXX
PH 17-7	GAC		71-2315	A-50	623.0	473							T	15 DTMIML
PH 17-7	GAC		71-2315-1	A-50	770.0	504							T	15 DTMIMH
PH 17-7	GAC		71-2316	A-50	779.0	499							T	15 DTMIMH
PLASKON ALKYD 422	ALLIED CHEM CORP		71-2675	A-50	826.0	514							T	15 FJADXX
PLASKON ALKYD 422	ALLIED CHEM CORP		71-2675-1	A-50	762.0	495							T	15 FJADXX
PLATINUM COBALT MAGNETS	HAMILTON PRECIOUS METALS		71-2369	GDX	1500.0		50	00/04					A	10 EXMKMO
PLATINUM COBALT MAGNETS	HAMILTON PRECIOUS METALS		71-2369-1	GDX	1500.0			00/04					A	10 EXMKMO
PLY-2000	PELMORE LABS		70-1814-16	GDX	950.0				529	529			D	13 ABDFXX
PLY-2000 VITON	PELMORE LABS		70-1814	GDX	50.0		50	00/04	652	652			D	13 ABDFXX
PLY-2000 VITON	PELMORE LABS		70-1814	GDX	1500.0								A	11 ABDFXX
PLY-2000 VITON	PELMORE LABS		70-1814	GDX	1500.0			01/02					T	10 ABDFXX
PLY-2000 VITON	PELMORE LABS		70-1814-1	GDX	50.0				797	797			D	13 ABDFXX
PLY-2000 VITON	PELMORE LABS		70-1814-10	GDX	62.0	1000			304	304			D	13 ABDFXX
PLY-2000 VITON	PELMORE LABS		70-1814-11	GDX	3000.0			00/04					D	13 ABDFXX
PLY-2000 VITON	PELMORE LABS		70-1814-12	GDX	3500.0			01/02					A	10 ACOFXX
PLY-2000 VITON	PELMORE LABS		70-1814-13	GDX	4000.0			04/04					T	10 ABDFXX
PLY-2000 VITON	PELMORE LABS		70-1814-14	GDX	3000.0		200	00/04					T	10 ABDFXX
PLY-2000 VITON	PELMORE LABS		70-1814-15	GDX	4000.0		200	01/04					T	11 ABDFXX
PLY-2000 VITON	PELMORE LABS		70-1814-2	GDX	100.0				669	669			D	13 ABDFXX
PLY-2000 VITON	PELMORE LABS		70-1814-3	GDX	165.0				797	812			D	13 ABDFXX
PLY-2000 VITON	PELMORE LABS		70-1814-4	GDX	500.0				570	570			D	13 AHDFXX
PLY-2000 VITON	PELMORE LABS		70-1814-5	GDX	900.0				517	517			D	13 AHDFXX
PLY-2000 VITON	PELMORE LABS		70-1814-6	GDX	1000.0				536	536			D	13 AHDFXX
PLY-2000 VITON	PELMORE LABS		70-1814-7	GDX	1500.0				408	408			D	13 AHDFXX
PLY-2000 VITON	PELMORE LABS		70-1814-8	GDX	2000.0				426	426			D	13 ABDFXX
PLY-2000 VITON	PELMORE LABS		70-1814-9	GDX	25.0	1000			N999	N999			D	13 ABDFXX
POLY-THERMALEX/200	ESSEX WIRE CORP	.0750	70-2092	GDX	1500.0		50	00/04					A	11 ERXXXX
POLY-THERMALEX/200	ESSEX WIRE CORP	.0750	70-2092-1	GDX	1000.0				N999	N999			J	13 ERXXXX
POLY-THERMALEX/200	ESSEX WIRE CORP	.0750	70-2092-2	GDX	1500.0			00/04					A	10 ERXXXX
POLYETHYLENE	AIRESEARCH INDST DIV		69-1296	GDX	25.0				562	562			D	13 DUCFXX
POLYETHYLENE	AIRESEARCH INDST DIV		69-1296-1	GDX	50.0				435	435			D	13 DUCFXX
POLYETHYLENE	AIRESEARCH INDST DIV		69-1296-2	GDX	62.0	1000			883	N999			J	13 DUCFXX
POLYETHYLENE	AIRESEARCH INDST DIV		69-1296-3	GDX	165.0				581	581			D	13 DUCFXX
POLYETHYLENE	AIRESEARCH INDST DIV		69-1296-4	GDX	50.0				324	324			D	13 DUCFXX
POLYETHYLENE	AIRESEARCH INDST DIV		69-1296-5	GDX	100.0				273	273			D	13 DUCFXX
POLYETHYLENE	AIRESEARCH INDST DIV		69-1296-6	GDX	500.0				251	251			D	13 DUCFXX
POLYETHYLENE	AIRESEARCH INDST DIV		69-1296-7	GDX	1000.0				286	286			D	13 DUCFXX
POLYETHYLENE	AIRESEARCH INDST DIV		69-1296-8	GDX	1500.0				261	261			D	13 DUCFXX
POLYETHYLENE	AIRESEARCH INDST DIV		69-1296-9	GDX	2000.0				307	307			D	13 DUCFXX
POLYISOPRENE	MR DOWNEY		SP-6926	GDX	1000.0		50	00/04					A	11 DDD1XX

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MATERIAL TEST DATA BY MANUFACTURER S DESIGNATION AS OF 31 JAN 72

MGFR S DESIGNATION	MANUFACTURER	SPEC. THICK.	TEST RPT NO.	TEST ENVR	TEST PRESS	TEST TEMP	TEST ENER	IMPT NO OF REACT	NO OF FLASH POINT	FIRE POINT	PROP DIST LOSS	WT LOSS	R T MAT. I T CODE
POLYISOPRENE	MR DOWNEY		SP-6926-1	GOX	1000.0		200	00/04					A 11 DDDIXX
PR-11208-ZZ-R-765	MR DOWNEY		SP-6926-2	LGX	14.7		50	00/04					A 16 DDDIXX
PR-11208-ZZ-R-765	PRECISION RUBBER PROD		70-1776	GOX	25.0				735	735			D 13 DDDPXX
PR-11208-ZZ-R-765	PRECISION RUBBER PROD		70-1776-1	GOX	50.0				724	724			D 13 DDDPXX
PR-11208-ZZ-R-765	PRECISION RUBBER PROD		70-1776-10	GOX	1500.0				471	471			D 13 DDDPXX
PR-11208-ZZ-R-765	PRECISION RUBBER PROD		70-1776-11	GOX	2000.0				494	494			D 13 DDDPXX
PR-11208-ZZ-R-765	PRECISION RUBBER PROD		70-1776-12	GOX	950.0				412	412			D 13 DDDPXX
PR-11208-ZZ-R-765	PRECISION RUBBER PROD		70-1776-2	GOX	62.0	1000			751	N999			D 13 DDDPXX
PR-11208-ZZ-R-765	PRECISION RUBBER PROD		70-1776-3	GOX	165.0				745	817			D 13 DDDPXX
PR-11208-ZZ-R-765	PRECISION RUBBER PROD	.0750	70-1776-4	GOX	1500.0			01/01					T 10 DDDPXX
PR-11208-ZZ-R-765	PRECISION RUBBER PROD	.0750	70-1776-5	GOX	1500.0		50	00/04					A 11 DDDPXX
PR-11208-ZZ-R-765	PRECISION RUBBER PROD		70-1776-6	GOX	50.0				66A	66A			D 13 DDDPXX
PR-11208-ZZ-R-765	PRECISION RUBBER PROD		70-1776-7	GOX	100.0				582	582			D 13 DDDPXX
PR-11208-ZZ-R-765	PRECISION RUBBER PROD		70-1776-8	GOX	500.0				50A	50A			D 13 DDDPXX
PR-11208-ZZ-R-765	PRECISION RUBBER PROD		70-1776-9	GOX	1000.0				49A	49A			D 13 DDDPXX
PR-11208-ZZ-R-775	PRECISION RUBBER PROD		71-2303	GOX	2000.0			01/01					T 10 DDDPXX
PR-11208-ZZ-R-775	PRECISION RUBBER PROD		71-2303-1	GOX	1500.0				505	505			D 13 DDDPXX
PR-1538	PRODUCTS RESEARCH		71-5002	GOX	5000.0		50	00/04					A 11 BACQXX
PR-1538	PRODUCTS RESEARCH		71-5002-1	GOX	1000.0			01/01					T 10 BACQXX
PR-1538	PRODUCTS RESEARCH		71-5002-2	GOX	500.0			01/02					T 10 RACQXX
PR-1538	PRODUCTS RESEARCH		71-5002-3	GOX	500.0			01/01					T 10 BACQXX
PR-1538	PRODUCTS RESEARCH		71-5002-4	GOX	1500.0			01/01					T 10 BACQXX
PR-1538	PRODUCTS RESEARCH		71-5002-5	GOX	500.0			00/04					T 10 BACQXX
PR-1538	PRODUCTS RESEARCH		71-5002-6	GOX	500.0			01/03					T 10 BACQXX
PR-1538	PRODUCTS RESEARCH		71-5002-7	GOX	500.0			01/04					T 10 BACQXX
PRO-SEAL 333C	COAST PRO SEAL		71-2591	A-50	769.0	519							T 15 AKGUXX
PVC 3025-140	3M CO. ST. PAUL		71-2591-1	A-50	765.0	511							T 15 AKGUXX
PVC 3025-140	3M CO. ST. PAUL		71-2554	A-50	439.0	425							T 15 EZCUXX
PVRE NL COAT WIRE	AIRESEARCH INDST DIV		71-2554-1	A-50	574.0	465							T 15 EZCUXX
PVRE NL COAT WIRE	AIRESEARCH INDST DIV		71-2521	MMH	767.0	502							T 15 EPCDMA
PVRE NL COAT WIRE	OWENS CORNING FIBGLS		71-2521-1	MMH	779.0	540							T 15 EPCDMA
PVRE NL COAT WIRE	OWENS CORNING FIBGLS		71-2710	GOX	250.0	0	50	00/04					A 11 FJHOXX
PVRE NL COAT WIRE	OWENS CORNING FIBGLS		71-2710-1	GOX	250.0	0		00/04					A 10 FJHOXX
PVRE NL COAT WIRE	OWENS CORNING FIBGLS		70-1767	GOX	25.0	1000			N999	N999			A 13 DDHXXX
QUARTZ 7940	OWENS CORNING FIBGLS		70-1767-1	GOX	50.0	1000			N999	N999			A 13 DDHXXX
QUARTZ 7940	OWENS CORNING FIBGLS		70-1767-10	GOX	5000.0			00/04					A 10 DDHXXX
QUARTZ 7940	OWENS CORNING FIBGLS	.0750	70-1767-11	GOX	4000.0			00/01					A 11 DDHXXX
QUARTZ 7940	OWENS CORNING FIBGLS	.0750	70-1767-12	GOX	5000.0			00/04					A 11 DDHXXX
QUARTZ 7940	OWENS CORNING FIBGLS		70-1767-2	GOX	62.0	1000			N999	N999			A 13 DDHXXX
QUARTZ 7940	OWENS CORNING FIBGLS		70-1767-3	GOX	100.0	1000			N999	N999			A 13 DDHXXX
QUARTZ 7940	OWENS CORNING FIBGLS		70-1767-4	GOX	165.0	1000			N999	N999			A 13 DDHXXX
QUARTZ 7940	OWENS CORNING FIBGLS		70-1767-5	GOX	500.0	1000			N999	N999			A 13 DDHXXX
QUARTZ 7940	OWENS CORNING FIBGLS		70-1767-6	GOX	1000.0	1000			N999	N999			A 13 DDHXXX
QUARTZ 7940	OWENS CORNING FIBGLS		70-1767-7	GOX	1500.0	1000			N999	N999			A 13 DDHXXX

MFGR S DESIGNATION	MANUFACTURER	SPEC. THICK.	TEST RPT NO.	TEST ENVR	TEST PRESS	TEST TEMP	TEST EMER	NO OF REACT	FLASH POINT	FIRE PT	PROP LOSS	WT LOSS	R T	MATL
QUARTZ 7940	OMENS CORNING FIBGLS	.0750	70-1767-8	G0X	2000.0	1000			N999	N999			A 13	DDHXXX
QUARTZ 7940	OMENS CORNING FIBGLS	.0750	70-1767-9	G0X	4000.0		00/01						A 10	DDHXXX
QUARTZ 7940	OMENS CORNING FIBGLS	.0750	70-1520	G0X	1500.0		00/04						A 10	DDHXXX
QUARTZ 7940	OMENS CORNING FIBGLS	.0750	70-1920-1	G0X	1500.0		00/04						A 11	DDHXXX
QUARTZ 7940	OMENS CORNING FIBGLS	.0750	70-1920-2	G0X	1500.0	1000			N999	N999			D 13	DVDPXX
REDAR SI-500-03	DARLING R.E. CO. INC	.0750	70-1648	G0X	5.0	1000			737	N999			D 13	DVDPXX
REDAR SI-500-03	DARLING R.E. CO. INC	.0750	70-1648-1	G0X	25.0				728	728			D 13	DVDPXX
REDAR SI-500-03	DARLING R.E. CO. INC	.0750	70-1648-10	G0X	3000.0		01/02						T 10	DVDPXX
REDAR SI-500-03	DARLING R.E. CO. INC	.0750	70-1648-11	G0X	3500.0		00/01						A 10	DVDPXX
REDAR SI-500-03	DARLING R.E. CO. INC	.0750	70-1648-12	G0X	4000.0		00/01						A 10	DVDPXX
REDAR SI-500-03	DARLING R.E. CO. INC	.0750	70-1648-13	G0X	4500.0		02/03						T 10	DVDPXX
REDAR SI-500-03	DARLING R.E. CO. INC	.0750	70-1648-14	G0X	5000.0		03/04						T 10	DVDPXX
REDAR SI-500-03	DARLING R.E. CO. INC	.0750	70-1648-15	G0X	5000.0		00/04						A 11	DVDPXX
REDAR SI-500-03	DARLING R.E. CO. INC	.0750	70-1648-16	G0X	2000.0		00/04						A 10	DVDPXX
REDAR SI-500-03	DARLING R.E. CO. INC	.0750	70-1648-17	G0X	2500.0		01/01						T 10	DVDPXX
REDAR SI-500-03	DARLING R.E. CO. INC	.0750	70-1648-18	G0X	3500.0		01/01						T 10	DVDPXX
REDAR SI-500-03	DARLING R.E. CO. INC	.0750	70-1648-19	G0X	4000.0		01/03			720			T 10	DVDPXX
REDAR SI-500-03	DARLING R.E. CO. INC	.0750	70-1648-2	G0X	50.0								D 13	DVDPXX
REDAR SI-500-03	DARLING R.E. CO. INC	.0750	70-1648-20	G0X	4500.0		01/02						T 10	DVDPXX
REDAR SI-500-03	DARLING R.E. CO. INC	.0750	70-1648-21	G0X	5000.0		04/04						T 10	DVDPXX
REDAR SI-500-03	DARLING R.E. CO. INC	.0750	70-1648-22	G0X	200.0		01/01						T 11	DVDPXX
REDAR SI-500-03	DARLING R.E. CO. INC	.0750	70-1648-23	G0X	500.0		01/01						T 11	DVDPXX
REDAR SI-500-03	DARLING R.E. CO. INC	.0750	70-1648-24	G0X	1000.0		01/01						T 11	DVDPXX
REDAR SI-500-03	DARLING R.E. CO. INC	.0750	70-1648-25	G0X	1500.0		01/01						T 11	DVDPXX
REDAR SI-500-03	DARLING R.E. CO. INC	.0750	70-1648-3	G0X	50.0				474	474			D 13	DVDPXX
REDAR SI-500-03	DARLING R.E. CO. INC	.0750	70-1648-4	G0X	100.0				472	472			D 13	DVDPXX
REDAR SI-500-03	DARLING R.E. CO. INC	.0750	70-1648-5	G0X	500.0				441	441			D 13	DVDPXX
REDAR SI-500-03	DARLING R.E. CO. INC	.0750	70-1648-6	G0X	1000.0				391	391			D 13	DVDPXX
REDAR SI-500-03	DARLING R.E. CO. INC	.0750	70-1648-7	G0X	1500.0				359	359			D 13	DVDPXX
REDAR SI-500-03	DARLING R.E. CO. INC	.0750	70-1648-8	G0X	2000.0				417	417			D 13	DVDPXX
REDAR SI-500-03	DARLING R.E. CO. INC	.0750	70-1648-9	G0X	2500.0		00/04						A 10	DVDPXX
REDAR SI-503-00	DARLING R.E. CO. INC	.0750	70-1647-1	G0X	5.0				711	772			D 13	DVDPXX
REDAR SI-503-00	DARLING R.E. CO. INC	.0750	70-1647-10	G0X	25.0				749	749			D 13	DVDPXX
REDAR SI-503-00	DARLING R.E. CO. INC	.0750	70-1647-11	G0X	3500.0		01/01						T 10	DVDPXX
REDAR SI-503-00	DARLING R.E. CO. INC	.0750	70-1647-12	G0X	4000.0		04/04						T 10	DVDPXX
REDAR SI-503-00	DARLING R.E. CO. INC	.0750	70-1647-2	G0X	2000.0		00/04						A 11	DVDPXX
REDAR SI-503-00	DARLING R.E. CO. INC	.0750	70-1647-26	G0X	50.0				657	657			D 13	DVDPXX
REDAR SI-503-00	DARLING R.E. CO. INC	.0750	70-1647-27	G0X	6.2				721	759			D 13	DVDPXX
REDAR SI-503-00	DARLING R.E. CO. INC	.0750	70-1647-3	G0X	16.5				735	744			D 13	DVDPXX
REDAR SI-503-00	DARLING R.E. CO. INC	.0750	70-1647-4	G0X	50.0				481	481			D 13	DVDPXX
REDAR SI-503-00	DARLING R.E. CO. INC	.0750	70-1647-5	G0X	100.0				447	447			D 13	DVDPXX
REDAR SI-503-00	DARLING R.E. CO. INC	.0750	70-1647-6	G0X	500.0				393	393			D 13	DVDPXX
REDAR SI-503-00	DARLING R.E. CO. INC	.0750	70-1647-7	G0X	1000.0				381	381			D 13	DVDPXX
REDAR SI-503-00	DARLING R.E. CO. INC	.0750	70-1647-7	G0X	1500.0				362	362			D 13	DVDPXX

MATERIAL TEST DATA BY MANUFACTURER S DESIGNATION AS OF 31 JAN 72

MFG S DESIGNATION	MANUFACTURER	SPEC. THICK.	TEST RPT NO.	TEST ENVR	TEST PRESS	TEST TEMP	TEST IMPT ENER	NO OF REACT	FLASH POINT	FIKE DIST	WT LOSS	R T Y	MATL CODE
REDAR SI-503-00	DARLING R.E. CO., INC	.0750	70-1647-8	GDX	2000.0				353	353		D	13 DVDPXX
REDAR SI-503-00	DARLING R.E. CO., INC		70-1647-9	GDX	3000.0		00/04					A	10 DVDPXX
REDAR SI-528-00	DARLING R.E. CO., INC		70-1938	GDX	1500.0		01/01					T	10 EKDPXX
REDAR SI-528-00	DARLING R.E. CO., INC		70-1938-1	GDX	100.0		50	00/04				A	11 EKDPXX
REDAR SI-528-00	DARLING R.E. CO., INC		70-1938-10	GDX	1000.0	284			555	555		D	13 EKDPXX
REDAR SI-528-00	DARLING R.E. CO., INC		70-1938-11	GDX	1500.0	232						D	15 EKDPXX
REDAR SI-528-00	DARLING R.E. CO., INC		70-1938-12	GDX	1500.0							D	15 EKDPXX
REDAR SI-528-00	DARLING R.E. CO., INC		70-1938-2	GDX	500.0				287	287		D	13 EKDPXX
REDAR SI-528-00	DARLING R.E. CO., INC		70-1938-3	GDX	1000.0				302	302		D	13 EKDPXX
REDAR SI-528-00	DARLING R.E. CO., INC		70-1938-4	GDX	50.0				250	250		D	13 EKDPXX
REDAR SI-528-00	DARLING R.E. CO., INC		70-1938-5	GDX	25.0				728	728		D	13 EKDPXX
REDAR SI-528-00	DARLING R.E. CO., INC		70-1938-6	GDX	6.2	1700			768	768		J	13 EKDPXX
REDAR SI-528-00	DARLING R.E. CO., INC		70-1938-7	GDX	16.5				787	787		D	13 EKDPXX
REDAR SI-528-00	DARLING R.E. CO., INC		70-1938-8	GDX	1500.0				232	232		D	13 EKDPXX
RS-025 SHIM			SP-6919	GDX	5.0	1000			N999	N999		R	13 CHMAXX
RS-025 SHIM			SP-6919-1	GDX	25.0	1000			N999	N999		R	13 CHMAXX
RS-025 SHIM			SP-6919-20	GDX	500.0	200	00/01					A	11 CHMAXX
RS-025 SHIM			SP-6919-11	GDX	1000.0	200	00/01					A	11 CHMAXX
RS-025 SHIM			SP-6919-12	GDX	1500.0	200	00/01					A	11 CHMAXX
RS-025 SHIM			SP-6919-13	GDX	2000.0	200	00/04					A	11 CHMAXX
RS-025 SHIM			SP-6919-14	GDX	50.0	1000			N999	N999		R	13 CHMAXX
RS-025 SHIM			SP-6919-15	GDX	100.0	1000			N999	N999		R	13 CHMAXX
RS-025 SHIM			SP-6919-2	GDX	50.0	1000			R68	N999		R	13 CHMAXX
RS-025 SHIM			SP-6919-3	GDX	62.0	1000			N999	N999		R	13 CHMAXX
RS-025 SHIM			SP-6919-4	GDX	165.0	1000			N999	N999		R	13 CHMAXX
RS-025 SHIM			SP-6919-5	GDX	900.0	1000			N999	N999		R	13 CHMAXX
RS-025 SHIM			SP-6919-6	GDX	2500.0							A	10 CHMAXX
RS-025 SHIM			SP-6919-7	GDX	3000.0				00/01			A	10 CHMAXX
RS-025 SHIM			SP-6919-8	GDX	3500.0				00/01			A	10 CHMAXX
RS-025 SHIM			SP-6919-9	GDX	4000.0				00/01			A	10 CHMAXX
RTV-106 RED			71-2368	GDX	500.0		50	00/04				A	11 AEDXXX
RTV-106 RED			71-2368-1	GDX	500.0							A	10 AEDXXX
RTV-21	G.E. SILICONE PRODUCTS		71-2446	A-50	820.0	524			560	560		T	15 DDDPGS
RTV-21	G.E. SILICONE PRODUCTS		71-2446-1	A-50	764.0	501						T	15 DDDPGS
RTV-30	G.E. SILICONE PRODUCTS		71-2442	A-50	423.0	419						T	15 DDDPGS
RTV-30	G.E. SILICONE PRODUCTS		71-2442-1	A-50	457.0	431						T	15 DDDPGS
RTV-60	G.E. SILICONE PRODUCTS		71-2443	A-50	397.0	415						T	15 DDDPGS
RTV-60	G.E. SILICONE PRODUCTS		71-2443-1	A-50	417.0	416						T	15 DDDPGS
RTV-90	G.E. SILICONE PRODUCTS		71-5000	GDX	5000.0		50	00/04				A	11 DDDPGX
RTV-90	G.E. SILICONE PRODUCTS		71-5000-10	GDX	500.0				00/04			A	10 DDDPGX
RTV-90	G.E. SILICONE PRODUCTS		71-5000-11	GDX	1500.0				00/04			A	10 DDDPGX
RTV-90	G.E. SILICONE PRODUCTS		71-5000-11	GDX	2000.0				01/01			T	10 DDDPGX



MATERIAL TEST DATA BY MANUFACTURER S DESIGNATION AS OF 31 JAN 72

REFR S DESIGNATION	MANUFACTURER	SPEC. THICK.	TEST RPT NO.	TEST ENVR PRESS	TEST IMPR NO OF	FLASH FIRE PROP	WT LOSS	P T	MATL
					TEST ENR	POINT PT		I T	I T
									CODE
RTV-90	G-E. SILICONE PRODUCTS		71-5000-12	GOX 2000.0	01/02			T 10	DDPPX
RTV-90	G-E. SILICONE PRODUCTS		71-5000-13	GOX 2500.0	01/01			T 10	DDPPX
RTV-90	G-E. SILICONE PRODUCTS		71-5000-14	GGX 2500.0	01/02			T 10	DDPPX
RTV-90	G-E. SILICONE PRODUCTS		71-5000-15	GOX 2500.0	01/03			T 10	DDPPX
RTV-90	G-E. SILICONE PRODUCTS		71-5000-16	GOX 3000.0	01/01			T 10	DDPPX
RTV-90	G-E. SILICONE PRODUCTS		71-5000-17	GOX 3500.0	01/01			T 10	DDPPX
RTV-90	G-E. SILICONE PRODUCTS		71-5000-2	GOX 1000.0	01/01			T 10	DDPPX
RTV-90	G-E. SILICONE PRODUCTS		71-5000-3	GOX 1000.0	01/03			T 10	DDPPX
RTV-90	G-E. SILICONE PRODUCTS		71-5000-4	GOX 1000.0	01/04			T 10	DDPPX
RTV-90	G-E. SILICONE PRODUCTS		71-5000-5	GOX 1000.0	00/04			T 10	DDPPX
RTV-90	G-E. SILICONE PRODUCTS		71-5000-6	GOX 1500.0	01/04			T 10	DDPPX
RTV-90	G-E. SILICONE PRODUCTS		71-5000-7	GOX 1500.0	01/01			T 10	DDPPX
RTV-90	G-E. SILICONE PRODUCTS		71-5000-8	GOX 1500.0	01/03			T 10	DDPPX
RTV-90	G-E. SILICONE PRODUCTS		71-5000-9	GOX 1500.0	01/02	989 989		T 10	DDPPX
RULON A	DIXON CORP	.0300	70-1716	GOX 25.0		735 965		D 13	DKCNAD
RULON A	DIXON CORP	.0300	70-1716-1	GOX 50.0				D 13	DKCNAD
RULON A	DIXON CORP	.0750	70-1716-10	GOX 1000.0	200 00/01			A 11	DKCNAD
RULON A	DIXON CORP	.0750	70-1716-11	GOX 1500.0	200 00/01			A 11	DKCNAD
RULON A	DIXON CORP	.0750	70-1716-12	GOX 2000.0	200 00/04			A 11	DKCNAD
RULON A	DIXON CORP	.0750	70-1716-13	GOX 1500.0	50 00/04			A 11	DKCNAD
RULON A	DIXON CORP	.0750	70-1716-14	GOX 1500.0	00/04			A 10	DKCNAD
RULON A	DIXON CORP	.0750	70-1716-15	GOX 50.0		802 802		D 13	DKCNAD
RULON A	DIXON CORP	.0750	70-1716-17	GOX 500.0		788 788		D 13	DKCNAD
RULON A	DIXON CORP	.0750	70-1716-18	GOX 1000.0		761 761		D 13	DKCNAD
RULON A	DIXON CORP	.0300	70-1716-2	GOX 62.0	1000	N999 N999		Y 13	DKCNAD
RULON A	DIXON CORP	.0300	70-1716-3	GOX 165.0	1000	N999 N999		Y 13	DKCNAD
RULON A	DIXON CORP	.0750	70-1716-4	GOX 2500.0				A 10	DKCNAD
RULON A	DIXON CORP	.0750	70-1716-5	GOX 3000.0				T 10	DKCNAD
RULON A	DIXON CORP	.0750	70-1716-6	GOX 3500.0				A 10	DKCNAD
RULON A	DIXON CORP	.0750	70-1716-7	GOX 4000.0				T 10	DKCNAD
RULON A	DIXON CORP	.0750	70-1716-8	GOX 4500.0				T 10	DKCNAD
RULON A	DIXON CORP	.0750	70-1716-9	GOX 500.0	200 00/01			A 11	DKCNAD
RULON A	DIXON CORP	.0720	70-1717-1	GOX 5.0	1000	752 N999		Y 13	DKCNAD
RULON A	DIXON CORP	.0750	70-1717-10	GOX 25.0		627 986		D 13	DKCNAD
RULON A	DIXON CORP	.0750	70-1717-11	GOX 1000.0	200 00/01			A 11	DKCNAD
RULON A	DIXON CORP	.0750	70-1717-12	GOX 1500.0	200 00/01			A 11	DKCNAD
RULON A	DIXON CORP	.0750	70-1717-13	GOX 2000.0	200 00/04			A 11	DKCNAD
RULON A	DIXON CORP	.0750	70-1717-14	GOX 3000.0	50 00/01			A 11	DKCNAD
RULON A	DIXON CORP	.0750	70-1717-15	GOX 4000.0	50 00/01			A 11	DKCNAD
RULON A	DIXON CORP	.0750	70-1717-2	GOX 5000.0	50 00/04			A 11	DKCNAD
RULON A	DIXON CORP	.0720	70-1717-3	GOX 50.0		650 971		D 13	DKCNAD
RULON A	DIXON CORP	.0720	70-1717-4	GOX 62.0	1000	N999 N999		Y 13	DKCNAD
RULON A	DIXON CORP	.0750	70-1717-5	GOX 165.0	1000	739 N999		Y 13	DKCNAD
RULON A	DIXON CORP	.0750	70-1717-5	GOX 3000.0				A 10	DKCNAD

MPFR S DESIGNATION	MANUFACTURER	SPEC. THICK.	TEST RPT NO.	TEST TEST ENVR PRESS	TEST TEMPT	TEMP ENER	NO OF REACT	FLASH POINT	FIRF PT	WT LOSS	R T I T	MATL CODE
RULON A	DIXON CORP	.0750	70-1717-6	GOX 3500.0			00/01				A 10	DKCNAD
RULON A	DIXON CORP	.0750	70-1717-7	GOX 4000.0			00/01				A 10	DKCNAD
RULON A	DIXON CORP	.0750	70-1717-A	GOX 4500.0			00/01				A 10	DKCNAD
RULON A	DIXON CORP	.0750	70-1717-9	GOX 5000.0			00/04				A 10	DKCNAD
RULON A	DIXON CORP		70-1775	A-50 750.0	491						T 15	DKCNAD
RULON A	DIXON CORP		70-1975-1	A-50 686.0	478						T 15	DKCNAD
RULON A	DIXON CORP		70-1975-2	A-50 750.0	497						T 15	DKCNAD
RULON A	DIXON CORP		71-2242	GOX 1500.0			00/04				A 11	DKCNAD
RULON A	DIXON CORP		71-2242-1	GOX 1500.0			01/02	738	738		A 10	DKCNAD
RULON A	DIXON CORP		71-2242-2	GOX 1000.0							A 10	DKCNAD
RULON A	DIXON CORP		71-2276	A-50 807.0	513						D 13	DKCNAD
RULON A	DIXON CORP		71-2276-1	A-50 781.0	510						T 15	CHCNFM
RULON A	DIXON CORP		71-2526	GOX 1500.0			00/04				T 15	CHCNFM
RULON A	DIXON CORP		71-2526-1	GOX 1500.0			01/02	635	635		A 11	DKCNAD
RULON A	DIXON CORP		71-2526-2	GOX 1000.0							D 13	DKCNAD
RULON A	DIXON CORP		71-2383	GOX 500.0			00/04				D 13	DKCNAD
RULON A	DIXON CORP		71-2383-1	GOX 500.0			00/04				A 11	BFCNGD
RULON A	DIXON CORP		71-2383-2	GOX 100.0	1000						J 13	BFCNGD
RULON A	DIXON CORP		10-46	GN2 200.0			10	00/04			R 11	CHDPXX
RULON A	DIXON CORP		10-46-1	GN2 200.0			4	00/04			R 11	CHDPXX
RULON A	DIXON CORP		70-1570	GOX 4000.0			50	00/04			T 10	CHDPXX
RULON A	DIXON CORP		70-1570-1	GOX 4000.0							A 11	CHDPXX
RULON A	DIXON CORP		70-1570-10	GOX 1000.0					42R 42R		D 13	CHDPXX
RULON A	DIXON CORP		70-1570-11	GOX 1500.0					400 400		D 13	CHDPXX
RULON A	DIXON CORP		70-1570-12	GOX 2000.0					394 394		D 13	CHDPXX
RULON A	DIXON CORP		70-1570-13	GOX 3000.0					419 419		D 13	CHDPXX
RULON A	DIXON CORP		70-1570-14	GOX 3000.0					419 419		J 15	CHDPXX
RULON A	DIXON CORP		70-1570-15	GOX 25.0					901 R27		D 13	CHDPXX
RULON A	DIXON CORP		70-1570-16	GOX 3000.0			50	00/04	419 419		J 13	CHDPXX
RULON A	DIXON CORP		70-1570-2	GOX 5000.0							A 11	CHDPXX
RULON A	DIXON CORP		70-1570-3	GOX 1500.0			01/01				T 10	CHDPXX
RULON A	DIXON CORP		70-1570-4	GOX 1000.0			00/04				A 10	CHDPXX
RULON A	DIXON CORP		70-1570-5	GOX 50.0							D 13	CHDPXX
RULON A	DIXON CORP		70-1570-6	GOX 50.0					766 766		D 13	CHDPXX
RULON A	DIXON CORP		70-1570-7	GOX 100.0					642 642		D 13	CHDPXX
RULON A	DIXON CORP		70-1570-8	GOX 500.0					471 471		D 13	CHDPXX
RULON A	DIXON CORP		70-1570-9	GOX 1000.0					389 389		D 13	CHDPXX
RULON A	DIXON CORP	.0750	71-2409	GOX 750.0			00/04		404 404		D 13	CHDPXX
RULON A	DIXON CORP	.0750	71-2408-1	GOX 75.0					564 564		A 10	CHDPXX
RULON A	DIXON CORP	.0750	10-83	GOX 2000.0			00/04				D 15	CHDPXX
RULON A	DIXON CORP	.0750	10-83-1	GOX 2500.0			01/04				A 10	CHCKXX
RULON A	DIXON CORP	.0750	10-83-2	GOX 3500.0			03/04				A 10	CHCKXX
RULON A	DIXON CORP	.0750	10-83-3	GOX 1500.0			200	00/04			A 11	CHCKXX

MATERIAL TEST DATA BY MANUFACTURER S DESIGNATION AS OF 31 JAN 72

MFR S DESIGNATION	MANUFACTURER	SPEC. THICK.	TEST RPT NO.	TEST ENVR	TEST PRESS	TFMP	EMER	NO OF REACT	FLASH POINT	FIRE PT	WT LOSS	M T CODE
S-614-80	PARKER SEAL/LOS ANGLS	.0750	10-83-4	GDX	2000.0	200	03/04		782	R51		D 11 CHCKXX
S-614-80	PARKER SEAL/LOS ANGLS		10-83-5	GDX	6.2				824	R66		D 13 CHCKXX
S-614-80	PARKER SEAL/LOS ANGLS		10-83-6	GDX	16.5							A 10 FJCKXX
SAVEREISEN NO. 8	CONTROL PRODUCTS, INC.		71-2411	GDX	250.0		00/04					A 13 FJCKXX
SCOTCH 393 TAPE	CONTROL PRODUCTS, INC.		71-2411-1	GDX	75.0	1000			N999	N999		S 13 DZFSGT
SCOTCHCAL 3930	3M CO. ST. PAUL		71-2398	GDX	75.0	600			N600	N600		R 13 AKAKXX
SCOTCHCAST 248	3M CO. ST. PAUL		71-2593	A-50	732.0	492			N999	N999		T 15 AKBGXX
SCOTCHCAST 248	3M CO. ST. PAUL		71-2593-1	A-50	750.0	511			N600	N600		T 15 AKBGXX
SCOTCHCAST 282	3M CO. ST. PAUL		71-2562	MMH	578.0	465			N999	N999		T 15 BABGXX
SCOTCHCAST 282	3M CO. ST. PAUL		71-2562-1	MMH	783.0	503						T 15 BABGXX
SE-550	G.E. SILICONE PRODUCTS		67-0243	GDX	1555.0				461	461		D 13 DDDQXX
SE-565/VAROX CAT	G.E. SILICONE PRODUCTS		70-1775	GDX	25.0				854	854		D 13 DDDPXX
SE-565/VAROX CAT	G.E. SILICONE PRODUCTS		70-1775	GDX	1500.0	50	00/04					A 11 DDDPXX
SE-565/VAROX CAT	G.E. SILICONE PRODUCTS		70-1775	GDX	1500.0		01/02					T 10 DDDPXX
SE-565/VAROX CAT	G.E. SILICONE PRODUCTS		70-1775-1	GDX	50.0				533	533		D 13 DDDPXX
SE-565/VAROX CAT	G.E. SILICONE PRODUCTS		70-1775-10	GDX	2000.0				410	410		D 13 DDDPXX
SE-565/VAROX CAT	G.E. SILICONE PRODUCTS	.0750	70-1775-11	GDX	1500.0	200	00/04					A 11 DDDPXX
SE-565/VAROX CAT	G.E. SILICONE PRODUCTS	.0750	70-1775-12	GDX	2000.0	200	01/03					T 11 DDDPXX
SE-565/VAROX CAT	G.E. SILICONE PRODUCTS	.0750	70-1775-13	GDX	2500.0	00	01/03					T 11 DDDPXX
SE-565/VAROX CAT	G.E. SILICONE PRODUCTS	.0750	70-1775-14	GDX	3000.0	200	01/01					T 11 DDDPXX
SE-565/VAROX CAT	G.E. SILICONE PRODUCTS	.0750	70-1775-15	GDX	3500.0	200	01/01					T 11 DDDPXX
SE-565/VAROX CAT	G.E. SILICONE PRODUCTS	.0750	70-1775-16	GDX	4000.0	200	04/04					T 11 DDDPXX
SE-565/VAROX CAT	G.E. SILICONE PRODUCTS		70-1775-17	GDX	1500.0		00/04					A 10 DDDPXX
SE-565/VAROX CAT	G.E. SILICONE PRODUCTS		70-1775-18	GDX	2000.0		01/03					T 10 DDDPXX
SE-565/VAROX CAT	G.E. SILICONE PRODUCTS		70-1775-19	GDX	2500.0		03/04		770	770		D 13 DDDPXX
SE-565/VAROX CAT	G.E. SILICONE PRODUCTS		70-1775-2	GDX	50.0							D 13 DDDPXX
SE-565/VAROX CAT	G.E. SILICONE PRODUCTS		70-1775-20	GDX	3000.0		04/04					T 10 DDDPXX
SE-565/VAROX CAT	G.E. SILICONE PRODUCTS		70-1775-21	GDX	5000.0	50	00/04					A 11 DDDPXX
SE-565/VAROX CAT	G.E. SILICONE PRODUCTS		70-1775-22	GDX	3000.0		01/01					T 10 DDDPXX
SE-565/VAROX CAT	G.E. SILICONE PRODUCTS		70-1775-23	GDX	2000.0		01/01					T 10 DDDPXX
SE-565/VAROX CAT	G.E. SILICONE PRODUCTS		70-1775-24	GDX	1000.0		01/01					T 10 DDDPXX
SE-565/VAROX CAT	G.E. SILICONE PRODUCTS		70-1775-25	GDX	500.0		00/04					A 10 DDDPXX
SE-565/VAROX CAT	G.E. SILICONE PRODUCTS		70-1775-26	GDX	2000.0		00/04		314	314		D 13 DDDPXX
SE-565/VAROX CAT	G.E. SILICONE PRODUCTS		70-1775-3	GDX	62.0	1000			769	N999		D 13 DDDPXX
SE-565/VAROX CAT	G.E. SILICONE PRODUCTS		70-1775-4	GDX	100.0				549	549		D 13 DDDPXX
SE-565/VAROX CAT	G.E. SILICONE PRODUCTS		70-1775-5	GDX	165.0				819	819		D 13 DDDPXX
SE-565/VAROX CAT	G.E. SILICONE PRODUCTS		70-1775-6	GDX	500.0				366	366		D 13 DDDPXX
SE-565/VAROX CAT	G.E. SILICONE PRODUCTS		70-1775-7	GDX	900.0				428	428		D 13 DDDPXX
SE-565/VAROX CAT	G.E. SILICONE PRODUCTS		70-1775-8	GDX	1000.0				413	413		D 13 DDDPXX
SE-565/VAROX CAT	G.E. SILICONE PRODUCTS		70-1775-9	GDX	1500.0				379	379		D 13 DDDPXX
SE-565/VAROX CAT	G.E. SILICONE PRODUCTS		70-1775-27	GDX	950.0				376	376		J 13 DDDPXX
SHRINK SLEEVE 221-1/16	ROYAL INDUSTRIES INC		71-2655	A-50	797.0	514						T 15 EMCEXX
SIL CRYSTAL STRAIN GAGE	DYNASCIFICES		70-2134	GDX	2000.0		00/04					A 10 FIG1XX

MATERIAL TEST DATA BY MANUFACTURER S DESIGNATION AS OF 31 JAN 72

MFGR S DESIGNATION	MANUFACTURER	SPEC. THICK.	TEST RPT NO.	TEST ENVR	TEST PRESS	TEST TEMP	TEST ENER	IMPT NO OF ENER	NO OF REACT	FLASH POINT	FIRE PT	PROP DIST	WT LOSS	R T	MATL
SIL CRYSTAL STRAIN GAGE	DYNASCIENCE		70-2134-1	GOX	2500.0		50	00/04						A 11	FIGIXX
SIL DIOX INSUL SP 950-46ROSEMONT ENG. CORP			70-2134-2	GOX	1400.0	1000			N999	N999				A 13	FIGIXX
SIL DIOX INSUL SP 950-46ROSEMONT ENG. CORP			70-1986	GOX	1500.0		50	00/04						A 10	FJCKXX
SIL DIOX INSUL SP 950-46ROSEMONT ENG. CORP			70-1986-1	GOX	500.0		50	01/01						T 11	FJCKXX
SIL DIOX INSUL SP 950-46ROSEMONT ENG. CORP			70-1986-2	GOX	1500.0	1000			N999	N999				A 13	FJCKXX
SIL DIOX INSUL SP 950-46ROSEMONT ENG. CORP			70-1986-3	GOX	1500.0		50	01/01						T 11	FJCKXX
SIL DIOX INSUL SP 950-46ROSEMONT ENG. CORP			70-1986-4	GOX	5000.0		50	00/04						A 11	FJCKXX
SIL DIOX INSUL SP 950-46ROSEMONT ENG. CORP			70-1986-5	GOX	5000.0		50	00/04						A 10	FJCKXX
SIL GLASS LAM MIL-P-997 CADILLAC PROCESS CO.		.0750	70-2210	GOX	1500.0			01/01		614	614			T 10	CRCKXX
SIL GLASS LAM MIL-P-997 CADILLAC PROCESS CO.			70-2210-1	GOX	1000.0		50	00/04						D 15	CRCKXX
SIL LUMPS SX-150 LOT 670MATHESON COLEMAN + BELL			70-2240	GOX	1500.0									A 11	DDCKXX
SIL LUMPS SX-150 LOT 670MATHESON COLEMAN + BELL			70-2240-1	GOX	1500.0									A 10	DDCKXX
SIL LUMPS SX-150 LOT 670MATHESON COLEMAN + BELL			70-2240-2	A-50	771.0	500								A 10	DDCKXX
SIL LUMPS SX-150 LOT 670MATHESON COLEMAN + BELL			70-2240-3	A-50	835.0	528								T 15	DDCKXX
SIL LUMPS SX-150 LOT 670MATHESON COLEMAN + BELL			70-2240-4	MNH	752.0	502								T 15	DDCKXX
SIL LUMPS SX-150 LOT 670MATHESON COLEMAN + BELL			70-2240-5	MNH	756.0	503								T 15	DDCKXX
SIL RUB RC/DC 916 RUBBERCRAFT CORP			71-2563	A-50	286.0	370								T 15	DDCKXX
SIL RUB RC/DC 916 RUBBERCRAFT CORP			71-2563-1	A-50	293.0	370								T 15	DDCKXX
SIL RUB SVSK-81370-3 HAMILTON STANDARD			71-2264	GOX	2000.0			00/04		564	564			A 10	DDCKXX
SIL RUB SVSK-81370-3 HAMILTON STANDARD			71-2264-1	GOX	1500.0									D 13	DDCKXX
SILASTIC S-5370 RTV GAC			71-2512	A-50	783.0	509								T 15	DDCKXX
SILASTIC S-5370 RTV GAC			71-2512-1	A-50	807.0	508								T 15	DDCKXX
SILASTIC S-5370 RTV DOM CORNING CORP			71-2489	A-50	765.0	501								T 15	DDCKXX
SILASTIC S-5370 RTV DOM CORNING CORP			71-2489-1	A-50	771.0	498								T 15	DDCKXX
SILASTIC 140-RTV DOM CORNING CORP			71-2496	GOX	1500.0		50	00/04						A 11	AECKGL
SILASTIC 140-RTV DOM CORNING CORP			71-2496-1	GOX	1500.0			01/03		342	342			T 10	AECKGL
SILASTIC 3118-RTV DOM CORNING CORP			71-2205	GOX	1000.0									D 13	AECKGL
SILASTIC 3118-RTV DOM CORNING CORP			70-2205-1	GOX	1000.0									D 13	AECKGL
SILASTIC 3118-RTV DOM CORNING CORP			70-2205-2	GOX	100.0					441	441			O 13	8ADPXX
SILASTIC 3118-RTV DOM CORNING CORP			70-2205-3	GOX	100.0					442	442			O 13	8ADPXX
SILASTIC 3118-RTV DOM CORNING CORP			70-2205-4	GOX	500.0					450	450			O 13	8ADPXX
SILASTIC 3118-RTV DOM CORNING CORP			70-2205-5	GOX	1500.0					403	403			O 13	8ADPXX
SILASTIC 3120 RTV DOM CORNING CORP			70-2205-6	GOX	2000.0					353	353			D 13	8ADPXX
SILASTIC 3120 RTV DOM CORNING CORP			71-2407	GOX	250.0					382	382			D 13	8ADPXX
SILASTIC 601 RTV DOM CORNING CORP			71-2407-1	GOX	75.0									A 10	8ADPXX
SILASTIC 601 RTV DOM CORNING CORP			71-2364	GOX	1500.0		50	00/04		645	645			D 13	8ADPXX
SILASTIC 601 RTV DOM CORNING CORP			71-2364-1	GOX	1500.0									A 11	DRDSXX
SILASTIC 601 RTV DOM CORNING CORP			71-2364-2	GOX	1000.0					420	420			T 10	DRDSXX
SILASTIC 601 RTV DOM CORNING CORP			71-2364-3	LOX	14.7		50	00/04						D 13	DRDSXX
SILASTIC 601 RTV DOM CORNING CORP			71-2364-4	LOX	14.7		200	00/04						A 16	DRDSXX
SILASTIC 601 RTV DOM CORNING CORP			71-2364-5	GOX	1000.0		50	00/04						A 11	DRDSXX
SILASTIC 731-RTV DOM CORNING CORP		.0050	71-2364-6	GOX	1000.0		200	00/04						A 11	DRDSXX
SILASTIC 731-RTV DOM CORNING CORP			SP-6932	GOX	5.0	1000			N999	N999				F 13	ABCKXX

MATERIAL TEST DATA BY MANUFACTURER S DESIGNATION AS OF 31 JAN 72

MFGR S DESIGNATION	MANUFACTURER	SPEC. THICK.	TEST RPT NO.	TEST TEST ENVR PRESS	TEST IMPT NO OF ENCR REACT	FLASH POINT	FIRF PT	PROP DIST	WT LOSS	R T T CODE	MATL CODE
SILASTIC 731-RTV	DOW CORNING CORP	.0050	SP-6932-1	GOX 10.0		730	870			U 13	ABCXXX
SILASTIC 731-RTV	DOW CORNING CORP	.0050	SP-6932-10	GOX 1000.0	00/01					A 10	ABCXXX
SILASTIC 731-RTV	DOW CORNING CORP	.0050	SP-6932-11	GOX 1500.0	00/01					A 10	ABCXXX
SILASTIC 731-RTV	DOW CORNING CORP	.0050	SP-6932-12	GOX 2000.0	00/01					A 10	ABCXXX
SILASTIC 731-RTV	DOW CORNING CORP	.0050	SP-6932-13	GOX 2500.0	00/01					A 10	ABCXXX
SILASTIC 731-RTV	DOW CORNING CORP	.0050	SP-6932-14	GOX 3000.0	00/01					A 10	ABCXXX
SILASTIC 731-RTV	DOW CORNING CORP	.0050	SP-6932-15	GOX 3500.0	05/01					A 10	ABCXXX
SILASTIC 731-RTV	DOW CORNING CORP	.0050	SP-6932-16	GOX 4000.0	00/01					A 10	ABCXXX
SILASTIC 731-RTV	DOW CORNING CORP	.0050	SP-6932-17	GOX 4500.0	00/01					A 10	ABCXXX
SILASTIC 731-RTV	DOW CORNING CORP	.0050	SP-6932-18	GOX 5000.0	00/04					A 10	ABCXXX
SILASTIC 731-RTV	DOW CORNING CORP	.0050	SP-6932-19	GOX 500.0	200 00/01	N999	N999			A 11	ABCXXX
SILASTIC 731-RTV	DOW CORNING CORP	.0050	SP-6932-20	GOX 20.0 1000	200 00/01					J 13	ABCXXX
SILASTIC 731-RTV	DOW CORNING CORP	.0050	SP-6932-21	GOX 1000.0	200 00/01					A 11	ABCXXX
SILASTIC 731-RTV	DOW CORNING CORP	.0050	SP-6932-22	GOX 1500.0	200 00/04					A 11	ABCXXX
SILASTIC 731-RTV	DOW CORNING CORP	.0050	SP-6932-23	GOX 2000.0	200 00/04					A 11	ABCXXX
SILASTIC 731-RTV	DOW CORNING CORP	.0050	SP-6932-24	GOX 500.0	50 00/04					A 10	ABCXXX
SILASTIC 731-RTV	DOW CORNING CORP	.0050	SP-6932-25	GOX 500.0	00/04					A 11	ABCXXX
SILASTIC 731-RTV	DOW CORNING CORP	.0050	SP-6932-26	GOX 1500.0	50 00/04					A 10	ABCXXX
SILASTIC 731-RTV	DOW CORNING CORP	.0050	SP-6932-3	GOX 25.0	00/04					D 13	ABCXXX
SILASTIC 731-RTV	DOW CORNING CORP	.0050	SP-6932-4	GOX 30.0	00/04	70R	70R			D 13	ABCXXX
SILASTIC 731-RTV	DOW CORNING CORP	.0050	SP-6932-5	GOX 40.0	00/04	620	620			D 13	ABCXXX
SILASTIC 731-RTV	DOW CORNING CORP	.0050	SP-6932-6	GOX 50.0	00/04	660	660			D 13	ABCXXX
SILASTIC 731-RTV	DOW CORNING CORP	.0050	SP-6932-7	GOX 62.0 1000	00/04	700	700			D 13	ABCXXX
SILASTIC 731-RTV	DOW CORNING CORP	.0050	SP-6932-8	GOX 165.0	00/04	693	N999			Y 13	ABCXXX
SILASTIC 731-RTV	DOW CORNING CORP	.0050	SP-6932-9	GOX 1565.0	00/04	66R	66R			D 13	ABCXXX
SILASTIC 881-RTV	DOW CORNING CORP	.0750	70-2193	GOX 1500.0	50 01/02	409	409			T 10	BADSXX
SILASTIC 881-RTV	DOW CORNING CORP	.0750	70-2193-1	GOX 1500.0	50 00/04					A 11	BADSXX
SILASTIC 881-RTV	DOW CORNING CORP	.0750	70-2193-11	GOX 25.0	00/04	686	686			D 13	BADSXX
SILASTIC 881-RTV	DOW CORNING CORP	.0750	70-2193-12	GOX 50.0	00/04	663	663			D 13	BADSXX
SILASTIC 881-RTV	DOW CORNING CORP	.0750	70-2193-2	GOX 1000.0	00/04	377	377			D 13	BADSXX
SILASTIC 881-RTV	DOW CORNING CORP	.0750	70-2193-3	GOX 1500.0	01/01					T 10	BADSXX
SILASTIC 881-RTV	DOW CORNING CORP	.0750	70-2193-4	GOX 50.0	01/01	475	475			D 13	BADSXX
SILASTIC 881-RTV	DOW CORNING CORP	.0750	70-2193-5	GOX 100.0	01/01	43R	43R			D 13	BADSXX
SILASTIC 881-RTV	DOW CORNING CORP	.0750	70-2193-6	GOX 500.0	01/01	363	363			D 13	BADSXX
SILASTIC 881-RTV	DOW CORNING CORP	.0750	70-2193-7	GOX 2000.0	01/01	326	326			D 13	BADSXX
SILASTIC 881-RTV	DOW CORNING CORP	.0750	70-2193-8	GOX 1000.0 432	01/01	300	300			D 15	BADSXX
SILASTIC 881-RTV	DOW CORNING CORP	.0750	70-2193-9	GOX 761.0 500	01/01					T 15	DODPXX
SILASTIC 881-RTV	DOW CORNING CORP	.0750	71-2490-1	A-50 764.0 505	00/04					T 15	DODPXX
SILCON/R ALUMINUM PAINT DEXTER CORP	PAINT DEXTER CORP		71-2377	GOX 500.0	50 00/04					A 11	ATFKXX
SILCON/R ALUMINUM PAINT DEXTER CORP	PAINT DEXTER CORP		71-2377-1	GOX 500.0	00/04					J 13	ATFKXX
SILCON/R ALUMINUM PAINT DEXTER CORP	PAINT DEXTER CORP		71-2377-2	GOX 100.0 1000	00/04	N999	N999			J 13	ATFKXX
SILICONE CTD GLASS CLOTHSM.DIELECTRIC MATLS DIV			71-2561	MMH 787.0 50R	00/04					T 15	FJCKGN

MATERIAL TEST DATA BY MANUFACTURER S DESIGNATION AS OF 31 JAN 77

MFGR S DESIGNATION	MANUFACTURER	SPEC. THICK.	TEST RPT NO.	TEST ENVR	TEST PRESS	TEST TEMP	TEST ENER	IMPT ND OF REACT	FLASH POINT	FIRF PT	PROP DIST LOSS	WT	R T	MATL
SILICONE CTD GLASS CLOTH	NICHOLS ENGINEERING		71-2561-1	MMH	727.0	510	50	00/04					T 15	FJCKGD
SILICONE GLASS CLOTH	ELECTRO PRODUCTS		70-2096	GOX	1500.0			01/03					A 11	BGCKGD
SILICONE GLASS CLOTH	ELECTRO PRODUCTS		70-2096-1	GOX	1500.0								T 10	BGCKGD
SILICONE GLASS CLOTH	ELECTRO PRODUCTS		70-2096-2	GOX	1000.0				509	509			D 13	BGCKGD
SILICONE O-RING 1063-70	PLASTICS + RUBBER PRODS		70-1593-2	GOX	62.0	1000			N999	N999			J 13	CHDPXX
SILICONE O-RING 1063-70	PLASTICS + RUBBER PRODS		70-1593-3	GOX	165.0	1000			755	N999			J 13	CHDPXX
SILICONE RUB SM 3500-41			71-2694	GOX	1500.0			01/01					T 10	DPDAXX
SILICONE RUB SM 3500-41			71-2694-1	GOX	1000.0				364	364			D 13	DPDAXX
SILICONE RUB 6070	NICHOLS ENGINEERING		71-2386	GOX	500.0		50	00/04					A 11	CHDPXX
SILICONE RUB 6070	NICHOLS ENGINEERING		71-2386-1	GOX	500.0			00/04					A 10	CHDPXX
SILICONE RUB 6C70	NICHOLS ENGINEERING		71-2386-2	GOX	100.0		50	00/04	535	535			D 13	CHDPXX
SILICONE RUBBER AMS 3357AGC	INC.		71-2380	GOX	500.0		50	00/04					A 11	OVCKXX
SILICONE RUBBER AMS 3357AGC	INC.		71-2380-1	GOX	500.0			00/04					A 10	OVCKXX
SILICONE RUBBER AMS 3357AGC	INC.		71-2380-2	GOX	100.0		50	00/04	550	550			D 13	OVCKXX
SILICONE S-355-7	PARKER SEAL/LOS ANGLS		71-2373	GOX	500.0		50	00/04					A 11	CHDPXX
SILICONE S-355-7	PARKER SEAL/LOS ANGLS		71-2373-1	GOX	500.0			00/04					A 10	CHDPXX
SILICONE S-355-7	PARKER SEAL/LOS ANGLS		71-2373-2	GOX	1500.0		50	01/01					T 10	CHDPXX
SILICONE S-355-7	PARKER SEAL/LOS ANGLS		71-2373-3	GOX	1500.0		50	00/04					A 11	CHDPXX
SILICONE S-355-7	PARKER SEAL/LOS ANGLS		71-2373-4	GOX	100.0		50	00/04	57A	57A			D 13	CHDPXX
SILICONE S-355-7	PARKER SEAL/LOS ANGLS		71-2373-5	LOX	14.7		50	00/04					A 16	CHDPXX
SILICONE S-355-7	PARKER SEAL/LOS ANGLS		71-2373-6	LOX	14.7		200	00/04					A 16	CHDPXX
SILICONE S-355-7	PARKER SEAL/LOS ANGLS		71-2373-7	GOX	1000.0		50	00/04					A 11	CHDPXX
SILICONE S-355-7	PARKER SEAL/LOS ANGLS		71-2373-8	GOX	1000.0		200	01/02					T 11	CHDPXX
SILICONE S-355-7	PARKER SEAL/LOS ANGLS		71-2373-9	GOX	1000.0				47A	47A			D 13	CHDPXX
SILICONE 555U	G.E. SILICONE PRODUCTS		69-1281	GOX	1265.0				470	470			D 13	ANDPXX
SILICONE 555U	G.E. SILICONE PRODUCTS		69-1281-1	GOX	1565.0				432	432			D 13	ANDPXX
SILICONE 555U	G.E. SILICONE PRODUCTS		69-1281-2	GOX	1500.0		50	01/01					D 13	ANDPXX
SILICONE 555U	G.E. SILICONE PRODUCTS		69-1281-3	GOX	1500.0		50	00/04					A 11	ANDPXX
SILVER SOLDER NO. 1618	ROSEMONT ENG. CORP		70-1584	GOX	1500.0		50	00/04					A 11	FKMRXX
SILVER SOLDER NO. 1618	ROSEMONT ENG. CORP		70-1984	GOX	1500.0	1000		00/04	N999	N999			A 10	FKMRXX
SILVER SOLDER NO. 1618	ROSEMONT ENG. CORP		70-1924	GOX	1500.0		50	00/04					A 11	FKMRXX
SILVER SOLDER OO-S-561D	HANDY AND HARMON		70-1924	GOX	1500.0		50	00/04					A 10	FKMRXX
SILVER SOLDER OO-S-561D	HANDY AND HARMON		70-1922	GOX	1500.0		50	00/04					A 11	DMRXX
SILVER SOLDER-BRAZING	EUTECTIC CORP		70-1922	GOX	1500.0								A 10	DMRXX
SILVER-AA FINE	GAC		70-2061	A-50	77A.0	506		00/04					A 10	DMRXX
SILVER-AA FINE	GAC		70-2061-1	A-50	77A.0	507							T 15	DMRXX
SILVER 567 LEAK DETECTOR	SIMCO		70-1827	GOX	5000.0		5	00/04					A 11	EYGUXX
SIMCO 567 LEAK DETECTOR	SIMCO		70-1827-1	GOX	5000.0			00/04					A 10	EYGUXX
SN 63 00-S-571	KESTER SOLDER CO.		71-2657	A-50	772.0	517							T 15	FKMSMP
SN 63 00-S-571	KESTER SOLDER CO.		71-2657-1	A-50	766.0	505							T 15	FKMSMP
SN 96	GAC		70-2143	GOX	4500.0			00/04					A 10	DMMSMR
SN 96	GAC		70-2143-1	A-50	771.0	500							T 15	DMMSMR
SN 96	GAC		70-2143-2	A-50	771.0	514							T 15	DMMSMR

MATERIAL TEST DATA BY MANUFACTURER S DESIGNATION AS OF 31 JAN 72

MFGR S DESIGNATION	MANUFACTURER	SPEC. THICK.	TEST RPT NO.	TEST ENVY PRESS	TEST TEMP	TEST .MPT NO OF FLASH FIRE PROP	WT LOSS	R T MATL	I T CUDE
SM 96.5 SM/AG 3.5	GAC		70-2143-3	N204 361.5	195			T 14 DMMSMR	
SM 96.5 SM/AG 3.5	GAC		70-2143-4	N204 360.0	190			T 14 DMMSMR	
SM-60	KESTER SOLDER CO.		70-1960	A-50 763.0	507			T 15 FKMSMP	
SM-60	KESTER SOLDER CO.		70-1960-1	A-50 814.0	518			T 15 FKMSMP	
SM-60	KESTER SOLDER CO.		70-1960-2	MMH 750.0	509			T 15 FKMSMP	
SM-60	KESTER SOLDER CO.		70-1960-3	MMH 756.0	507			T 15 FKMSMP	
SM-60 00-S-571	KESTER SOLDER CO.		70-2137	GOX 4500.0		00/04		A 10 FKMSMP	
SM-60 00-S-571	KESTER SOLDER CO.		70-2137-1	GOX 1000.0	50	00/04		A 11 FKMSMP	
SM-60 00-S-571	KESTER SOLDER CO.		70-2137-2	GOX 1000.0	200	01/01		T 11 FKMSMP	
SM-60 00-S-571	KESTER SOLDER CO.		70-2137-3	L0X 14.7	50	00/04		A 16 FKMSMP	
SM-60 00-S-571	KESTER SOLDER CO.		70-2137-4	L0X 14.7	200	00/04		A 16 FKMSMP	
SM-60 00-S-571	KESTER SOLDER CO.		70-2137-5	A-50 781.0	503			T 15 FKMSMP	
SM-60 N-RA-P2	KESTER SOLDER CO.		71-2329	GOX 1500.0		00/04		A 10 FKMSMP	
SM-60 N-RA-P2	KESTER SOLDER CO.		71-2329-1	GOX 1500.0		00/04		A 10 FKMSMP	
SM-60 00-S-571	GAC		70-2137-6	N204 289.4	130			A 14 FKMSMP	
SM-60 00-S-571	GAC		70-2137-7	N204 297.7	144			A 14 FKMSMP	
SM30/P870-P870 00-S-571			71-2653	A-50 766.0	506			T 15 FKMPMS	
SM30/P870-P870 00-S-571			71-2653-1	A-50 765.0	520			T 15 FKMPMS	
SOLDER 95SP/5 SB			71-2660	A-50 743.0	502			T 15 FKMSMP	
SOLDER 95SP/5 SB			71-2660-1	A-50 698.0	504			T 15 FKMSMP	
SOLDER SILVER			70-1952	A-50 821.0	494			T 15 FKMRXX	
SOLDER SILVER			70-1952-1	A-50 760.0	505			T 15 FKMRXX	
SOLDER SILVER			70-1952-2	MMH 745.0	696			T 15 FKMRXX	
SOLDER SILVER			70-1952-3	MMH 808.0	512			T 15 FKMRXX	
SR 634-70	STILLMAN RUBBER DIV		70-1968	A-50 319.0	541			T 15 DVCZXX	
SR 634-70	STILLMAN RUBBER DIV		70-1968-1	A-50 521.0	478			T 15 DVCZXX	
SR 634-70	STILLMAN RUBBER DIV		70-1968-2	A-50 767.0	504			T 15 DVCZXX	
SR 634-70	STILLMAN RUBBER DIV		70-1968-3	MMH 732.0	493			T 15 DVCZXX	
SR 634-70	STILLMAN RUBBER DIV		70-1968-4	MMH 769.0	507			T 15 DVCZXX	
SR 634-70	STILLMAN RUBBER DIV		71-2277	A-50 472.0	442			T 15 DVCZXX	
SR 634-70	STILLMAN RUBBER DIV		71-2277-1	A-50 315.0	393			T 15 DVCZXX	
SR 2702-75 FLUOROCARBON	SARGENT INDUSTRIES		71-2253	GOX 100.0		622	622	D 13 DPGXX	
SR 2702-75 FLUOROCARBON	SARGENT INDUSTRIES		71-2253-1	GOX 500.0		50	00/04	A 11 DPGXX	
SR 2702-75 FLUOROCARBON	SARGENT INDUSTRIES		71-2253-10	GOX 500.0		435	435	D 13 DPGXX	
SR 2702-75 FLUOROCARBON	SARGENT INDUSTRIES		71-2253-12	GOX 500.0		794	794	D 13 DPGXX	
SR 2702-75 FLUOROCARBON	SARGENT INDUSTRIES		71-2253-13	GOX 1500.0		396	396	D 13 DPGXX	
SR 2702-75 FLUOROCARBON	SARGENT INDUSTRIES		71-2253-14	GOX 2000.0		369	369	D 13 DPGXX	
SR 2702-75 FLUOROCARBON	SARGENT INDUSTRIES		71-2253-15	GOX 1000.0		461	461	D 13 DPGXX	
SR 2702-75 FLUOROCARBON	SARGENT INDUSTRIES		71-2253-16	GOX 1000.0		461	461	D 13 DPGXX	
SR 2702-75 FLUOROCARBON	SARGENT INDUSTRIES		71-2253-2	GOX 500.0		461	461	D 13 DPGXX	
SR 2702-75 FLUOROCARBON	SARGENT INDUSTRIES		71-2253-3	GOX 1500.0		50	00/04	A 11 DPGXX	
SR 2702-75 FLUOROCARBON	SARGENT INDUSTRIES		71-2253-4	GOX 1500.0		01/01	01/01	T 10 DPGXX	
SR 2702-75 FLUOROCARBON	SARGENT INDUSTRIES		71-2253-5	GOX 1000.0		50	00/04	T 10 DPGXX	
SR 2702-75 FLUOROCARBON	SARGENT INDUSTRIES		71-2253-6	GOX 5000.0		50	00/04	A 11 DPGXX	

MATERIAL TEST DATA BY MANUFACTURER S DESIGNATION AS OF 31 JAN 72

WFR S DESIGNATION	MANUFACTURER	SPEC. THICK.	TEST RPT NO.	TEST ENVR	TEST PRESS	TEST TEMP	TEST ENER	IMPT NO OF REACT	MD OF FLASH	PT OF FIRE	WT LOSS	F T CODE	Y T CODE	MATL T CODE
SR-2702-75 FLUOROCARBON	SARGENT INDUSTRIES		71-2253-8	GOX	75.0				829	836				0 13 DPGXX
SR-2702-75 FLUOROCARBON	SARGENT INDUSTRIES		71-2253-9	GOX	50.0				503	503				0 13 DPGXX
SR-634-70			10-62	GOX	1500.0		50	00/04						A 11 DUCZXX
SR-634-70			10-62-1	GOX	1500.0		50	01/02						T 10 DUCZXX
SRG-0610CTD F/G-5406-1023M	CO. ST. PAUL		71-2384	GOX	500.0		50	00/04						A 11 BCKGD
SRG-0310CTD F/G-5406-1023M	CO. ST. PAUL		71-2384-1	GOX	500.0		50	00/04						A 10 BCKGD
SRG-0310CTD F/G-5406-1023M	CO. ST. PAUL		71-2384-2	GOX	100.0		50	00/04	4.88	4.88				D 13 BCKGD
SRG-2115CTD F/G-5469-1023M	CO. ST. PAUL		71-2385	GOX	500.0		50	00/04						A 11 BCKGD
SRG-2115CTD F/G-5469-1023M	CO. ST. PAUL		71-2385-1	GOX	500.0		50	00/04						A 10 BCKGD
SRG-2115CTD F/G-5469-1023M	CO. ST. PAUL		71-2385-2	GOX	100.0		50	00/04	4.74	4.74				D 13 BCKGD
SS-304 00-5-763	GAC		70-2105	GOX	5000.0		50	00/04						A 11 DMMIMH
SS-304 00-5-763	GAC		70-2105-1	GOX	5000.0		50	00/04						A 10 DMMIMH
SS-304 00-5-763	GAC		70-2105-2	GOX	8800.0		50	00/04						A 10 DMMIMH
SS-2101 RTV PRIMER	G.E. SILICONE PRODUCTS		71-2268	GOX	1000.0	1000	50	03/03	N999	N999				A 13 AUDPXX
STABOND 136 ADHESIVE	AMERICAN LATEX PRODUCTS		71-2569-1	GOX	1500.0		50	00/03						T 11 AB8YXX
STABOND 136 ADHESIVE	AMERICAN LATEX PRODUCTS		71-2569-2	GOX	250.0		50	05/10						A 10 AB8YXX
STABOND 136 ADHESIVE	AMERICAN LATEX PRODUCTS		71-2569-3	GOX	1250.0		50	01/01						T 11 AB8YXX
STABOND 136 ADHESIVE	AMERICAN LATEX PRODUCTS		71-2569-4	GOX	900.0		50	00/04						A 11 AB8YXX
STABOND 136 ADHESIVE	AMERICAN LATEX PRODUCTS		71-2569-5	GOX	1000.0		25	02/05						T 11 AB8YXX
STABOND 136 ADHESIVE	AMERICAN LATEX PRODUCTS		71-2569-6	GOX	900.0		25	00/05						A 11 AB8YXX
STAYD POLYESTR-105A	RESULTRONIX INC		71-2677	A-50	755.0	500	50							T 15 BACCXX
STEEL CD PLATED	RESULTRONIX INC		71-2677-1	A-50	767.0	517	517							T 15 BACCXX
STEEL CD PLATED	RESULTRONIX INC		71-2715	A-50	759.0	509	509							T 15 BACCXX
STEEL CD PLATED	RESULTRONIX INC		71-2715-1	A-50	783.0	521	521							T 15 BACCXX
STEEL M-19-C4	ARMCO		71-2564	GOX	1500.0		50	00/04						A 11 BDMIMH
STEEL M-19-C4	ARMCO		70-2033	A-50	777.0	501	501	00/04						A 10 BDMIMH
STELLITE 98M-2	HAYNES ALLOY CORP		70-2033-1	MH	832.0	529	529							T 15 DMMDHO
STELLITE 98M-2	HAYNES ALLOY CORP		70-2033-2	MH	783.0	510	510							T 15 DMMDHO
STELLITE 98M-2	HAYNES ALLOY CORP		70-2033-3	MH	758.0	490	490							T 15 DMMDHO
STELLITE-25	HAYNES ALLOY CORP		71-2241	GOX	1500.0		50	00/04						A 11 DMMDHO
STELLITE-25	HAYNES ALLOY CORP		71-2241-1	GOX	1500.0		50	00/04						A 10 DMMDHO
STELLITE-48	HAYNES ALLOY CORP		71-2243	GOX	1500.0		50	00/04						A 11 DMMDHO
STELLITE-48	HAYNES ALLOY CORP		71-2243-1	GOX	1500.0		50	00/04						A 10 DMMDHO
STYCAST 1090	EMERSON CURING INC		71-2482	A-50	816.0	528	528							T 15 BABHXX
STYCAST 1090	EMERSON CURING INC		71-2482-1	A-50	769.0	498	498							T 15 BABHXX
STYCAST 1090	EMERSON CURING INC		71-5001	GOX	5000.0		50	00/04						A 11 BABHXX
STYCAST 1090	EMERSON CURING INC		71-5001-1	GOX	5000.0		50	00/04						A 11 BABHXX
STYCAST 1090	EMERSON CURING INC		71-5001-1	GOX	500.0		50	00/04						A 10 BABHXX
STYCAST 1090	EMERSON CURING INC		71-5001-10	GOX	1000.0		50	01/04						T 10 BABHXX
STYCAST 1090	EMERSON CURING INC		71-5001-10	GOX	1000.0		50	01/04	6.70	6.70				T 10 BABHXX
STYCAST 1090	EMERSON CURING INC		71-5001-11	GOX	50.0		50	01/04	6.70	6.70				D 13 BABHXX



MFGR S DESIGNATION	MANUFACTURER	SPEC. THICK.	TEST RPT NO.	TEST ENVR	TEST PRESS	TEST IMPT NO OF FLASH FIRE	WT PROP	R T	MATL
						POINT PT	LOSS	T	T
									CODE
STYCAST 1090	EMERSON CUMING INC		71-5001-2	GDX	1000.0	01/01		T	10 BARHXX
STYCAST 1090	EMERSON CUMING INC		71-5001-3	GDX	1500.0	01/01		T	10 BARHXX
STYCAST 1090	EMERSON CUMING INC		71-5001-4	GDX	2000.0	01/01		T	10 BARHXX
STYCAST 1090	EMERSON CUMING INC		71-5001-5	GDX	2500.0	01/01		T	10 BARHXX
STYCAST 1090	EMERSON CUMING INC		71-5001-6	GDX	1000.0	00/04		A	10 BARHXX
STYCAST 1090	EMERSON CUMING INC		71-5001-7	GDX	1000.0	01/03		T	10 BARHXX
STYCAST 1090	EMERSON CUMING INC		71-5001-8	GDX	1500.0	01/03		T	10 BARHXX
STYCAST 1090	EMERSON CUMING INC		71-5001-9	GDX	3000.0	01/01		T	10 BARHXX
STYCAST 2651/CAT 9	EMERSON CUMING INC	.0750	70-2045-1	GDX	1500.0	00/04	50	A	11 BARHGS
STYCAST 2651/CAT 9	EMERSON CUMING INC	.0750	70-2045-2	GDX	1500.0	00/04		A	11 BARHGS
STYCAST 2651/CAT 9	EMERSON CUMING INC		70-2045-3	GDX	2500.0	00/04	563	5A3	0 13 BARMGS
STYCAST 2651/CAT 9	EMERSON CUMING INC		70-2045-4	A-50	750.0	00/04		A	10 BARHGS
STYCAST 2651/CAT 9	EMERSON CUMING INC		70-2045-5	A-50	800.0	00/04	566	566	T 15 BARHGS
STYCAST 2651/CAT 9	EMERSON CUMING INC		71-2312-1	GDX	2000.0	01/04		T	10 BARHGS
STYCAST 2762-FT	EMERSON CUMING INC		71-2691-1	GDX	250.0	00/04		D	13 BARHGS
STYCAST 2762-FT	EMERSON CUMING INC		71-2691-2	GDX	1500.0	00/04		A	10 DF8GXX
STYCAST 2762-FT	EMERSON CUMING INC		71-2691-3	GDX	150.0	01/01		T	10 DP8GXX
SUPFLEX 18	EMERSON CUMING INC		71-2690	GDX	1000.0			D	13 DP8GXX
SUPFLEX 18	EMERSON CUMING INC		71-2600-1	A-50	773.0		518	T	15 FJOPFV
SUPERBRITE GLASS BEADS	3M CO. ST. PAUL		70-2031	GDX	200.0		514	T	15 FJOPFV
SUPERBRITE GLASS BEADS	3M CO. ST. PAUL		70-2031-1	GDX	1000.0		1000	R	13 BEIAXX
SUPERBRITE GLASS BEADS	3M CO. ST. PAUL		70-2031-2	GDX	1000.0		1000	R	13 BEIAXX
SVSK 81370-11.AMS-3674	HAMILTON STANDARD		71-2309	GDX	5000.0	01/01		A	13 BEIAXX
SVSK 81370-11.AMS-3674	HAMILTON STANDARD		71-2309-1	GDX	5000.0	00/04		T	10 DUBOXX
SVSK 81370-11.AMS-3674	HAMILTON STANDARD		71-2309-2	GDX	1500.0	00/04		A	11 DUBOXX
SVSK 81370-11.AMS-3674	HAMILTON STANDARD		71-2309-3	GDX	3000.0	00/04		D	13 DUBOXX
SVSK 81370-13B.MIL-AB625	HAMILTON STANDARD		71-2305	GDX	2000.0	00/04		D	13 DUBOXX
SVSK 81370-17 TUNGSTON	HAMILTON STANDARD		71-2301	GDX	2000.0	00/04		A	10 F1XXXX
SVSK 81370-18.AMS-4928	HAMILTON STANDARD		71-2374	GDX	2500.0	00/04		A	10 DTMDXX
SVSK 81370-19A TI ALLOY	HAMILTON STANDARD		71-2307	GDX	2500.0	00/04	50	A	11 DMHXX
SVSK 81370-21	HAMILTON STANDARD		71-2375	GDX	2500.0	00/04	50	A	11 F1MTXX
SVSK 81370-23A	HAMILTON STANDARD		71-2310-1	GDX	2000.0	00/04	50	T	11 DM1TXX
SVSK 81370-23A	HAMILTON STANDARD		71-2306	GDX	5000.0	00/04		T	10 ELCDHS
SVSK 81370-23A	HAMILTON STANDARD		71-2306-1	GDX	6800.0	00/04		D	13 ELCDHS
SVSK 81370-30A	HAMILTON STANDARD		71-2308	GDX	2000.0	00/04		A	10 FKMRXX
SVSK 81370-32A	HAMILTON STANDARD		71-2299	GDX	6000.0	00/04		A	10 FKMRXX
SVSK 81370-5	HAMILTON STANDARD		71-2298	GDX	2000.0	00/04	50	A	11 DMHXX
SVSK 81370-7	HAMILTON STANDARD		71-2298-1	GDX	1500.0	01/01		T	10 DVXXXX
SVSK 81370-7	HAMILTON STANDARD		71-2300	GDX	2000.0	00/04		D	13 DVXXXX
SVSK 81370-7	HAMILTON STANDARD		71-2300-1	GDX	1500.0	00/04		D	13 DVXXXX

MATERIAL TEST DATA BY MANUFACTURER S DESIGNATION AS OF 31 JAN 72

WFR S DESIGNATION	MANUFACTURER	SPEC. THICK.	TEST RPT NO.	TEST TEST ENVR PRESS	TEST IMPR NO OF TEST ENMR REACT	FLASH FIRE DIST LOSS	WT PROP	R T MATL
SVSK 01370-8A	HAMILTON STANDARD		71-2302	GOX 2000.0	00/04	564	564	A 10 DVXXXX
SVSK 01370-8A	HAMILTON STANDARD		71-2302-1	GOX 1500.0				D 13 DVXXXX
SYLGARD 103	DOW CORNING CORP		71-2350	MMH 785.0	510			T 15 BADPXX
SYLGARD 103	DOW CORNING CORP		71-2350-1	MMH 729.0	501			T 15 BADPXX
SYLGARD 104	DOW CORNING CORP	.0750	70-2057	GOX 1500.0	50	00/04		A 11 BADPXX
SYLGARD 104	DOW CORNING CORP	.0750	70-2057-1	GOX 1500.0	01/01			T 10 BADPXX
SYLGARD 104	DOW CORNING CORP		70-2057-10	GOX 50.0		616		D 13 BADPXX
SYLGARD 104	DOW CORNING CORP		70-2057-2	GOX 1000.0		371		D 13 BADPXX
SYLGARD 104	DOW CORNING CORP		70-2057-3	GOX 50.0		414		D 13 BADPXX
SYLGARD 104	DOW CORNING CORP		70-2057-4	GOX 100.0		397		D 13 BADPXX
SYLGARD 104	DOW CORNING CORP		70-2057-5	GOX 500.0		361		D 13 BADPXX
SYLGARD 104	DOW CORNING CORP		70-2057-6	GOX 1500.0		314		D 13 BADPXX
SYLGARD 104	DOW CORNING CORP		70-2057-7	GOX 2000.0		234		D 13 BADPXX
SYLGARD 104	DOW CORNING CORP		70-2057-8	GOX 1000.0	398			D 15 BADPXX
SYLGARD 104	DOW CORNING CORP		70-2057-9	GOX 25.0		656		D 13 BADPXX
SYNTHETIC RUBBER	NR		71-2711	A-50 655.0	480			T 15 DOCKXX
SYNTHETIC RUBBER	NR		71-2711-1	A-50 671.0	488			T 15 DOCKXX
SYNTHETIC RUBBER GLOVE	CHARLESTON RUBBER CO.		71-2361	GOX 500.0	50	00/04		A 11 DPDPXX
SYNTHETIC RUBBER GLOVE	CHARLESTON RUBBER CO.		71-2361-1	GOX 500.0				A 10 DPDPXX
SYNTHETIC RUBBER GLOVE	CHARLESTON RUBBER CO.		71-2361-2	GOX 100.0		419		D 13 UPDPXX
S417-7	PARKER SEAL/LOS ANGLS		69-1566	GOX 5.0		725		D 13 CHDQXX
S417-7	PARKER SEAL/LOS ANGLS	.0750	69-1566-1	GOX 25.0		578		D 13 CHDQXX
S417-7	PARKER SEAL/LOS ANGLS	.0750	69-1566-10	GOX 1500.0	01/01			T 10 CHDQXX
S417-7	PARKER SEAL/LOS ANGLS	.0750	69-1566-11	GOX 2000.0	01/04			T 10 CHDQXX
S417-7	PARKER SEAL/LOS ANGLS	.0750	69-1566-12	GOX 2500.0	01/01			T 10 CHDQXX
S417-7	PARKER SEAL/LOS ANGLS	.0750	69-1566-13	GOX 3000.0	01/02			T 10 CHDQXX
S417-7	PARKER SEAL/LOS ANGLS	.0750	69-1566-14	GOX 200.0	01/02			T 10 CHDQXX
S417-7	PARKER SEAL/LOS ANGLS	.0750	69-1566-15	GOX 4000.0	01/01			T 10 CHDQXX
S417-7	PARKER SEAL/LOS ANGLS	.0750	69-1566-16	GOX 4500.0	01/01			T 10 CHDQXX
S417-7	PARKER SEAL/LOS ANGLS	.0750	69-1566-17	GOX 5000.0	04/04			T 10 CHDQXX
S417-7	PARKER SEAL/LOS ANGLS	.0750	69-1566-18	GOX 4500.0	200	00/04		T 10 CHDQXX
S417-7	PARKER SEAL/LOS ANGLS	.0750	69-1566-19	GOX 5000.0	200	01/02		T 11 CHDQXX
S417-7	PARKER SEAL/LOS ANGLS	.0750	69-1566-20	GOX 50.0		689		D 13 CHDQXX
S417-7	PARKER SEAL/LOS ANGLS	.0750	69-1566-3	GOX 50.0	N999	N999		R 13 CHDQXX
S417-7	PARKER SEAL/LOS ANGLS	.0750	69-1566-4	GOX 100.0		523		D 13 CHDQXX
S417-7	PARKER SEAL/LOS ANGLS	.0750	69-1566-5	GOX 500.0		509		D 13 CHDQXX
S417-7	PARKER SEAL/LOS ANGLS	.0750	69-1566-6	GOX 1000.0		446		D 13 CHDQXX
S417-7	PARKER SEAL/LOS ANGLS	.0750	69-1566-7	GOX 1500.0		422		D 13 CHDQXX
S417-7	PARKER SEAL/LOS ANGLS	.0750	69-1566-8	GOX 2000.0		393		D 13 CHDQXX
S417-7	PARKER SEAL/LOS ANGLS	.0750	69-1566-9	GOX 1000.0		393		D 13 CHDQXX
T-83 FELT	MMH		71-2659	MMH 791.0		525		T 15 DUEFXX
T-83 FELT	MMH		71-2659-1	MMH 730.0		506		T 15 DUEFXX
TAPE P-211	PERMACEL TAPE CORP		71-2601	MMH 802.0		542		T 15 EBFVXX

MATERIAL TEST DATA BY MANUFACTURER S DESIGNATION AS OF 31 JUL 72

MFGR S DESIGNATION	MANUFACTURER	SPEC. THICK.	TEST RPT NO.	TEST ENVR	TEST PRESS	TEST TEMP	TEST ENER	IMPT ND OF REACT	FLASH POINT	FIRE PT	PROP DIST LOSS	WT	R T	MATL
TAPE P-211	PERMACEL TAPE CORP		71-2681-1	MMH	795.0	540							T 15	L8FVXX
TAPE P-422	PERMACEL TAPE CORP		71-2403	GOX	250.0		00/04		476	476			A 10	ERCNXX
TAPE P-422	PERMACEL TAPE CORP		71-2403-1	GOX	75.0								D 13	ERCNXX
TAPE 56	3M CO. ST. PAUL		70-2172	GOX	1500.0		01/01		194	194			D 13	DZCCDH
TAPE 56	3M CO. ST. PAUL		70-2172-1	GOX	1000.0				212	212			D 13	DZCCDH
TAPE 56	3M CO. ST. PAUL		70-2172-2	GOX	1000.0								D 13	DZCCDH
TAPE 56	3M CO. ST. PAUL		70-2172-3	GOX	1000.0	308							D 15	DZCCDH
TAPE 56	3M CO. ST. PAUL		71-2487	A-50	824.0	519							T 15	DZCCDH
TAPE 56	3M CO. ST. PAUL		71-2487-1	A-50	760.0	424							T 15	DZCCDH
TAPE 59	3M CO. ST. PAUL		70-2173	GOX	1500.0		01/31		232	232			T 10	DYCBCK
TAPE 59	3M CO. ST. PAUL		70-2173-1	GOX	1000.0				501	501			D 13	DYCBCK
TAPE 59	3M CO. ST. PAUL		70-2173-10	GOX	50.0				471	471			D 13	DYCBCK
TAPE 59	3M CO. ST. PAUL		70-2173-11	GOX	100.0				416	416			D 13	DYCBCK
TAPE 59	3M CO. ST. PAUL		70-2173-12	GOX	500.0				264	264			D 13	DYCBCK
TAPE 59	3M CO. ST. PAUL		70-2173-13	GOX	1000.0				196	196			D 13	DYCBCK
TAPE 59	3M CO. ST. PAUL		70-2173-14	GOX	1500.0				225	225			D 13	DYCBCK
TAPE 59	3M CO. ST. PAUL		70-2173-15	GOX	2000.0				265	265			D 15	DYCBCK
TAPE 59	3M CO. ST. PAUL		70-2173-16	GOX	3000.0				664	664			D 13	DYCBCK
TAPE 59	3M CO. ST. PAUL		70-2173-18	GOX	25.0				652	652			D 13	DYCBCK
TAPE 59	3M CO. ST. PAUL		70-2173-19	GOX	50.0				223	223			D 13	DYCBCK
TAPE 59	3M CO. ST. PAUL		70-2173-2	GOX	3000.0			50	01/01				Z 11	DYCBCK
TAPE 59	3M CO. ST. PAUL		70-2173-3	GOX	5000.0			50	01/01				Z 11	DYCBCK
TAPE 59	3M CO. ST. PAUL		70-2173-4	GOX	4000.0			50	01/01				Z 11	DYCBCK
TAPE 59	3M CO. ST. PAUL		70-2173-5	GOX	2000.0			50	01/01				Z 11	DYCBCK
TAPE 59	3M CO. ST. PAUL		70-2173-6	GOX	1000.0			50	01/01				Z 11	DYCBCK
TAPE 59	3M CO. ST. PAUL		70-2173-7	GOX	500.0			50	01/01				Z 11	DYCBCK
TAPE 59	3M CO. ST. PAUL		70-2173-8	GOX	1000.0			01/01					T 10	DYCBCK
TAPE 59	3M CO. ST. PAUL		70-2173-9	GOX	500.0			00/04					A 10	DYCBCK
TAPE 59	3M CO. ST. PAUL		71-2478	A-50	734.0	474							T 15	DYCBCK
TAPE 59	3M CO. ST. PAUL		71-2478-1	A-50	733.0	494							T 15	DYCBCK
TAPE 60	3M CO. ST. PAUL		71-2409	GOX	250.0								A 10	DZCCK
TAPE 61	3M CO. ST. PAUL		71-2409-1	GOX	75.0				542	542			D 13	DZCCK
TAPE 61	3M CO. ST. PAUL		71-2251	A-50	779.0	497							T 15	DZCCK
TAPE 67	3M CO. ST. PAUL		71-2261-1	A-50	828.0	516							T 15	DZCCK
TAPE 67	3M CO. ST. PAUL		71-2529	MMH	754.0	498							T 15	EB8GIA
TAPE 67	3M CO. ST. PAUL		71-2529-1	MMH	778.0	407							T 15	EB8GIA
TAPE 74	3M CO. ST. PAUL		71-2445	A-50	725.0	500							T 15	EB8GIA
TAPE 74	3M CO. ST. PAUL		71-2445-1	A-50	591.0	464							T 15	EB8GIA
TAPE 74	3M CO. ST. PAUL		71-2530	MMH	801.0	511							T 15	EB8GIA
TAPE 74	3M CO. ST. PAUL		71-2530-1	MMH	817.0	514							T 15	EB8GIA
TAPE 74	3M CO. ST. PAUL		71-2686	MMH	773.0	698							T 15	EB8GIA
TAPE 74	3M CO. ST. PAUL		71-2686-1	MMH	789.0	541							T 15	EB8GIA
TEFLON (.25GLASS FILLED)DIXON CORP			10-78	GOX	6.2	1000			N999	N999			Y 13	FJCPIA
TEFLON (.25GLASS FILLED)DIXON CORP			10-78	GOX	6.2	1000			N999	N999			Y 13	FJCPIA

MATERIAL TEST DATA BY MANUFACTURER S DESIGNATION AS OF 31 JAN 72

MPGR S DESIGNATION	MANUFACTURER	SPEC. THICK.	TEST RPT NO.	TEST TEST ENVR PRESS	TEST IMPT NO OF ENER REACT	FLASH POINT	FIRE PT	WT PRIP	DI ST	LOSS	R T	MATL
TEFLON (-25GLASS FILLED) LIQUID NITROGEN CORP			10-78-1	GOX 16.5	1000	961	N999				Y 13	FJCPIA
TEFLON (-25GLASS FILLED) LIQUID NITROGEN CORP		.0750	10-78-1	GOX 16.5	1000	961	N999				Y 13	FJCPIA
TEFLON (-25GLASS FILLED) LIQUID NITROGEN CORP		.0750	70-2099-1	GOX 1500.0				50	00/04		A 11	DKCPIA
TEFLON (-25GLASS FILLED) LIQUID NITROGEN CORP			70-2099-2	GOX 1500.0					00/04		A 10	DKCPIA
TEFLON (-25GLASS FILLED) LIQUID NITROGEN CORP		.0750	70-2099-3	GOX 1000.0		786	778				D 13	DKCPIA
TEFLON (-25GLASS FILLED) LIQUID NITROGEN CORP		.0750	70-2099-3	GOX 1000.0		786	778				D 13	DKCPIA
TEFLON (-25GLASS FILLED) LIQUID NITROGEN CORP		.0750	10-78-10	GOX 1500.0				50	00/04		D 11	FJCPIA
TEFLON (-25GLASS FILLED) LIQUID NITROGEN CORP		.0750	10-78-11	GOX 2000.0				200	01/01		D 11	FJCPIA
TEFLON (-25GLASS FILLED) LIQUID NITROGEN CORP		.0750	10-78-12	GOX 2500.0				200	01/01		D 11	FJCPIA
TEFLON (-25GLASS FILLED) LIQUID NITROGEN CORP		.0750	10-78-13	GOX 3000.0				200	01/02		D 11	FJCPIA
TEFLON (-25GLASS FILLED) LIQUID NITROGEN CORP		.0750	10-78-14	GOX 3500.0				200	04/04		D 11	FJCPIA
TEFLON (-25GLASS FILLED) LIQUID NITROGEN CORP		.0750	10-78-15	GOX 4000.0				200	01/01		D 11	FJCPIA
TEFLON (-25GLASS FILLED) LIQUID NITROGEN CORP		.0750	10-78-2	GOX 2500.0					00/04		A 10	FJCPIA
TEFLON (-25GLASS FILLED) LIQUID NITROGEN CORP		.0750	10-78-3	GOX 3000.0					01/01		D 10	FJCPIA
TEFLON (-25GLASS FILLED) LIQUID NITROGEN CORP		.0750	10-78-4	GOX 3500.0					01/01		D 10	FJCPIA
TEFLON (-25GLASS FILLED) LIQUID NITROGEN CORP		.0750	10-78-5	GOX 4000.0					01/03		D 10	FJCPIA
TEFLON (-25GLASS FILLED) LIQUID NITROGEN CORP		.0750	10-78-6	GOX 4500.0					01/02		D 10	FJCPIA
TEFLON (-25GLASS FILLED) LIQUID NITROGEN CORP		.0750	10-78-7	GOX 5000.0					01/02		D 10	FJCPIA
TEFLON (-25GLASS FILLED) LIQUID NITROGEN CORP		.0750	10-78-8	GOX 500.0				200	01/02		D 11	FJCPIA
TEFLON (-25GLASS FILLED) LIQUID NITROGEN CORP		.0750	10-78-9	GOX 1000.0				200	01/02		D 11	FJCPIA
TEFLON (-25GLASS FILLED) LIQUID NITROGEN CORP		.0750	70-1923	GOX 1500.0					00/04		A 10	FJCPIA
TEFLON (-25GLASS FILLED) LIQUID NITROGEN CORP		.0750	70-1923	GOX 1500.0				500	00/04		A 11	FJCPIA
TEFLON (-25GLASS FILLED) LIQUID NITROGEN CORP		.0750	70-1923	GOX 1500.0				50	00/04		A 11	FJCPIA
TEFLON (-25GLASS FILLED) LIQUID NITROGEN CORP		.0750	70-1923-1	GOX 1500.0					00/04		A 10	FJCPIA
TEFLON (-25GLASS FILLED) LIQUID NITROGEN CORP		.0750	70-1923-2	GOX 1500.0					00/04		A 10	FJCPIA
TEFLON (-25GLASS FILLED) LIQUID NITROGEN CORP		.0750	70-1923-3	GOX 1500.0				200	00/04		T 11	FJCPIA
TEFLON (-25GLASS FILLED) LIQUID NITROGEN CORP		.0750	70-1923-4	GOX 1500.0				200	01/03		T 11	FJCPIA
TEFLON (-25GLASS FILLED) LIQUID NITROGEN CORP		.0750	70-1923-5	A-50 802.0	526						T 15	FJCPIA
TEFLON (-25GLASS FILLED) LIQUID NITROGEN CORP		.0750	70-1923-6	A-50 771.0	509						T 15	FJCPIA
TEFLON (VIRGIN)	CADILLAC PLASTICS	.0750	10-41	GOX 1500.0		687	687		00/04		D 13	FJCPIA
TEFLON (VIRGIN)	CADILLAC PLASTICS	.0750	10-41-1	GOX 4000.0					00/04		A 10	CHCNXX
TEFLON (VIRGIN)	CADILLAC PLASTICS	.0750	10-41-2	GOX 4500.0					04/04		A 10	CHCNXX
TEFLON (VIRGIN)	CADILLAC PLASTICS	.0750	10-41-3	GOX 5000.0				50	00/04		A 11	CHCNXX
TEFLON (VIRGIN)	CADILLAC PLASTICS	.0750	10-41-4	GOX 16.5	1000						Y 13	CHCNXX
TEFLON ARS 3651C	MOKE INC		10-41-5	GOX 1000.0							D 13	CHCNXX
TEFLON ARS 3651C	MOKE INC		71-2842	GOX 5000.0				50	00/04		A 11	AZCOXX
TEFLON ARS 3651C	MOKE INC		71-2842-1	GOX 3000.0					01/01		D 10	AZCOXX
TEFLON ARS 3651C	MOKE INC		71-2842-2	GOX 2000.0					00/04		A 10	AZCOXX
TEFLON FEP	E-I. DUPONT CO. INC.		71-2842-3	GOX 1500.0							A 10	AZCOXX
TEFLON FEP	E-I. DUPONT CO. INC.		70-1962	A-50 754.0	500						T 15	DUROXX
TEFLON FEP	E-I. DUPONT CO. INC.		70-1962-1	A-50 771.0	504						T 15	DUROXX
TEFLON FEP	E-I. DUPONT CO. INC.		70-1962-2	A-50 739.0	490						T 15	DUROXX

MFR S DESIGNATION	MANUFACTURER	SPEC. THICK.	TEST RPT NO.	TEST ENVR	TEST PRESS	TEST TEMP	TEST ENER	IMPT NO OF REACT	NO OF FLASH POINT	PROP FIRE PT	WT DIST LOSS	R T MATL I T CODE
TEFLON FEP	E.I. DUPONT CO., INC.		70-1962-3	A-50	730.0	502						T 15 DUBOXX
TEFLON FEP	E.I. DUPONT CO., INC.		70-1962-4	MMH	818.0	567						T 15 DUBOXX
TEFLON FEP	E.I. DUPONT CO., INC.		70-1962-5	MMH	790.0	506						T 15 DUBOXX
TEFLON FRICTION WASHER	VICTOR EQUIPMENT CO.		71-2776-1	GOX	2500.0		02/02					D 10 CHCNXX
TEFLON FRICTION WASHER	VICTOR EQUIPMENT CO.		71-2776-2	GOX	2000.0		01/01					D 10 CHCNXX
TEFLON FRICTION WASHER	VICTOR EQUIPMENT CO.		71-2776-3	GOX	1500.0		01/02					D 10 CHCNXX
TEFLON FRICTION WASHER	VICTOR EQUIPMENT CO.		71-2776-4	GOX	1000.0		00/04					A 10 CHCNXX
TEFLON IMPREG GLASS FAB	DODGE FIBERS CORP.		71-2406	GOX	250.0		00/04					A 10 BFCNIA
TEFLON IMPREG GLASS FAB	DODGE FIBERS CORP.		71-2406-1	GOX	75.0				R2R			D 13 BFCNIA
TEFLON IMPREG GLASS FAB	DODGE FIBERS CORP.		71-2406-10	GOX	50.0	1000			N999			J 13 BFCNIA
TEFLON IMPREG GLASS FAB	DODGE FIBERS CORP.		71-2406-11	GOX	100.0				773			D 13 BFCNIA
TEFLON IMPREG GLASS FAB	DODGE FIBERS CORP.		71-2406-12	GOX	500.0				734			D 13 BFCNIA
TEFLON IMPREG GLASS FAB	DODGE FIBERS CORP.		71-2406-13	GOX	1000.0				684			D 13 BFCNIA
TEFLON IMPREG GLASS FAB	DODGE FIBERS CORP.		71-2406-14	GOX	1500.0				575			D 13 BFCNIA
TEFLON IMPREG GLASS FAB	DODGE FIBERS CORP.		71-2406-15	GOX	2000.0				650			D 13 BFCNIA
TEFLON IMPREG GLASS FAB	DODGE FIBERS CORP.		71-2406-16	GOX	5000.0		50	00/04				A 11 BFCNIA
TEFLON IMPREG GLASS FAB	DODGE FIBERS CORP.		71-2406-2	GOX	2500.0			01/01				T 10 BFCNIA
TEFLON IMPREG GLASS FAB	DODGE FIBERS CORP.		71-2406-3	GOX	1500.0			01/02				T 10 BFCNIA
TEFLON IMPREG GLASS FAB	DODGE FIBERS CORP.		71-2406-4	GOX	1000.0			01/01				T 10 BFCNIA
TEFLON IMPREG GLASS FAB	DODGE FIBERS CORP.		71-2406-5	GOX	500.0	1000		00/04				A 10 BFCNIA
TEFLON IMPREG GLASS FAB	DODGE FIBERS CORP.		71-2406-8	GOX	25.0	1000			N999			F 13 BFCNIA
TEFLON IMPREG GLASS FAB	DODGE FIBERS CORP.		71-2406-9	GOX	50.0				788			D 13 BFCNIA
TEFLON LINDER MOSE 919	PARKER-HAMMIFIN CORP		71-2947	GOX	2500.0		50	00/04				A 11 EFCOXX
TEFLON LINDER MOSE 919	PARKER-HAMMIFIN CORP		71-2947-1	GOX	2000.0		50	00/01				A 11 EFCOXX
TEFLON LINDER MOSE 919	PARKER-HAMMIFIN CORP		71-2947-2	GOX	1500.0		50	00/01				M 10 EFCOXX
TEFLON LINDER MOSE 919	PARKER-HAMMIFIN CORP		71-2947-3	GOX	2500.0			01/01				M 10 EFCOXX
TEFLON LINDER MOSE 919	PARKER-HAMMIFIN CORP		71-2947-4	GOX	2500.0			01/03				M 10 EFCOXX
TEFLON LINDER MOSE 919	PARKER-HAMMIFIN CORP		71-2947-5	GOX	1500.0			00/04				A 10 EFCOXX
TEFLON SEATS + SEALS	JAMESBURY CORP		71-2834	GOX	2500.0		50	00/04				A 11 CHCOXX
TEFLON SEATS + SEALS	JAMESBURY CORP		71-2834-1	GOX	2500.0			01/01				D 10 CHCOXX
TEFLON SEATS + SEALS	JAMESBURY CORP		71-2834-2	GOX	2000.0			01/03				D 10 CHCOXX
TEFLON SEATS + SEALS	JAMESBURY CORP		71-2834-3	GOX	1500.0			00/04				A 10 CHCOXX
TEFLON TAPE			70-1958	A-50	723.0	486						T 15 DYCXX
TEFLON TAPE			70-1958-1	A-50	754.0	515						T 15 DYCXX
TEFLON TAPE	DODGE INDUSTRIES, INC.		71-2485	A-50	758.0	500						T 15 DYCXX
TEFLON TAPE	DODGE INDUSTRIES, INC.		71-2485-1	A-50	532.0	451						T 15 DYCXX
TEFLON TAPE	DODGE INDUSTRIES, INC.		71-2485-2	A-50	801.0	511						T 15 DYCXX
TEFLON TAPE	DODGE INDUSTRIES, INC.		71-2485-3	A-50	766.0	510						T 15 DYCXX
TEFLON TAPE	DODGE INDUSTRIES, INC.		71-2485-4	A-50	757.0	520						T 15 DYCXX
TEFLON TFE	E.I. DUPONT CO., INC.		68-1106	GOX	5.0	1000						J 13 OKCNXX
TEFLON TFE	E.I. DUPONT CO., INC.		68-1106-1	GOX	25.0	1000			846			Y 13 OKCNXX
TEFLON TFE	E.I. DUPONT CO., INC.		68-1106-2	GOX	50.0				827			O 13 OKCNXX
TEFLON TFE	E.I. DUPONT CO., INC.		68-1106-3	GOX	50.0				928			O 13 OKCNXX
TEFLON TFE	E.I. DUPONT CO., INC.		68-1106-4	GOX	100.0				655			O 13 OKCNXX
TEFLON TFE	E.I. DUPONT CO., INC.		68-1106-4	GOX	100.0				759			O 13 OKCNXX

MATERIAL TEST DATA BY MANUFACTURER S DESIGNATION AS OF 31 JAN 72

MFGR S DESIGNATION	MANUFACTURER	SPEC. THICK.	TEST RPT NO.	TEST TEST ENVR PRESS	TEST IMPT NO OF FLASH	FIRF POINT PT	WT	PREP	DIST LOSS	R T	MATL
TEFLON TFE	E.I. DUPONT CO., INC.		68-1106-5	GDX 500.0		712	712			D	D 13 DKCNXX
TEFLON TFE	E.I. DUPONT CO., INC.		68-1106-6	GDX 1000.0		699	699			D	D 13 DKCNXX
TEFLON TFE	E.I. DUPONT CO., INC.		68-1106-7	GDX 1500.0		692	692			D	D 13 DKCNXX
TEFLON TFE	E.I. DUPONT CO., INC.		68-1106-8	GDX 2000.0		714	714			D	D 13 DKCNXX
TEFLON TFE	E.I. DUPONT CO., INC.		70-1959-1	A-50 347.0	450					T	T 15 DKCNXX
TEFLON TFE	E.I. DUPONT CO., INC.		70-1959-2	A-50 758.0	502					T	T 15 DKCNXX
TEFLON TFE	E.I. DUPONT CO., INC.		70-1959-3	MMH 761.0	500					T	T 15 DKCNXX
TEFLON TFE	E.I. DUPONT CO., INC.		70-1959-4	MMH 767.0	504					T	T 15 DKCNXX
TEFLON TFE	E.I. DUPONT CO., INC.		70-1974	A-50 202.0	333					T	T 15 DUCNXX
TEFLON TFE	E.I. DUPONT CO., INC.		70-1974-1	A-50 786.0	499					T	T 15 DUCNXX
TEFLON TFE	E.I. DUPONT CO., INC.		70-1974-2	A-50 771.0	500					T	T 15 DUCNXX
TEFLON TFE	E.I. DUPONT CO., INC.		70-1974-3	A-50 748.0	494					T	T 15 DUCNXX
TEFLON TFE	E.I. DUPONT CO., INC.		67-0146	GDX 1027.0		596	596			D	D 13 DKCDXX
TEFLON TFE	E.I. DUPONT CO., INC.		67-0146-1	GDX 1087.0		583	583			D	D 13 DKCDXX
TEFLON TFE	E.I. DUPONT CO., INC.		67-0146-2	GDX 1110.0		619	619			D	D 13 DKCDXX
TEFLON TFE	E.I. DUPONT CO., INC.		67-0146-3	GDX 1565.0		677	677			D	D 13 DKCDXX
TEFLON TFE	MR DOWNEY		70-2091-1	GDX 1500.0				50	00/04	A	A 11 DKCNXX
TEFLON TFE	MR DOWNEY		70-2091-2	GDX 1500.0				50	00/04	A	A 10 DKCNXX
TEFLON TFE	INSULECTRO CORP		70-2030	GDX 1500.0				50	00/04	A	A 11 E-CNXX
TEFLON TFE	INSULECTRO CORP		70-2030-1	GDX 1500.0				50	00/04	A	A 10 E-CNXX
TEFLON TFE	INSULECTRO CORP		70-2030-2	GDX 500.0		741	741			D	D 13 E-CNXX
TEFLON TFE	INSULECTRO CORP		70-2030-3	GDX 1000.0		781	781			D	D 13 E-CNXX
TEFLON TFE	E.I. DUPONT CO., INC.		70-1994	GDX 1500.0				50	00/04	A	A 11 DKCNXX
TEFLON TFE	E.I. DUPONT CO., INC.		70-1994-1	GDX 1500.0				50	00/04	A	A 10 DKCNXX
TEFLON TFE	SPARTA MANUFACTURING CO		71-2699	GDX 6500.0				50	00/04	A	A 11 D-CNXX
TEFLON TFE	SPARTA MANUFACTURING CO		71-2699-1	GDX 6500.0				50	01/01	D	D 10 DKCNXX
TEFLON TFE	SPARTA MANUFACTURING CO		71-2699-2	GDX 5000.0				50	01/01	D	D 10 DKCNXX
TEFLON TFE	SPARTA MANUFACTURING CO		71-2699-3	GDX 4000.0				50	01/01	D	D 10 DKCNXX
TEFLON 3651	GAC		71-2279	A-50 809.0	502					T	T 15 DKCNXX
TEFLON 3651	GAC		71-2279-1	A-50 830.0	511					T	T 15 DKCNXX
TEFLON .18 GLASS FILLED	JAMESBURY CORP		71-2833	GDX 2500.0				50	00/04	A	A 11 CHCDFW
TEFLON .18 GLASS FILLED	JAMESBURY CORP		71-2833-1	GDX 2500.0				50	01/01	D	D 10 CHCDFW
TEFLON .18 GLASS FILLED	JAMESBURY CORP		71-2833-2	GDX 2000.0				50	01/01	D	D 10 CHCDFW
TEFLON .18 GLASS FILLED	JAMESBURY CORP		71-2833-3	GDX 1500.0				50	00/04	A	A 10 CHCDFW
TEFLON-GLASS FILLED			71-2424	LOX 14.7				50	00/04	A	A 16 FJCPIA
TEFLON-GLASS FILLED			71-2424-1	LOX 14.7				200	00/04	A	A 16 FJCPIA
TEFLON-GLASS FILLED			71-2424-2	GDX 1000.0				50	00/04	A	A 11 FJCPIA
TEFLON-GLASS FILLED			71-2424-3	GDX 1000.0				200	00/04	A	A 11 FJCPIA
TEFLON-GLASS FILLED			70-1921	GDX 1500.0				50	00/04	A	A 11 FJCPIA
TEFLON-GLASS FILLED	DIXON CORP		70-1921	GDX 1500.0				50	01/02	T	T 10 FJCPIA
TEFLON-GLASS FILLED	DIXON CORP		70-1921-1	GDX 1500.0				50	00/04	A	A 10 FJCPIA

MFGR S DESIGNATION	MANUFACTURER	SPEC. THICK.	TEST RPT NO.	TEST ENVR	TEST PRESS	TEST TEMP	TEST ENER	TEST IMPT NO	FLASH POINT	FIRE PT	PRC	WT LOSS	R T	MATL
TEFLON-GLASS FILLED	DIXON CORP		70-1921-10	GDX	25.0	1000							Y	13 FJCPA
TEFLON-GLASS FILLED	DIXON CORP		70-1921-11	GDX	50.0								D	13 FJCPA
TEFLON-GLASS FILLED	DIXON CORP		70-1921-12	GDX	5000.0		50	00/04		954			A	11 FJCPA
TEFLON-GLASS FILLED	DIXON CORP		70-1921-13	GDX	1000.0			00/04					A	10 FJCPA
TEFLON-GLASS FILLED	DIXON CORP		70-1921-14	GDX	1500.0			01/01					T	10 FJCPA
TEFLON-GLASS FILLED	DIXON CORP		70-1921-15	GDX	2500.0			01/01		642			D	13 FJCPA
TEFLON-GLASS FILLED	DIXON CORP		70-1921-16	GDX	1500.0								D	15 FJCPA
TEFLON-GLASS FILLED	DIXON CORP		70-1921-17	GDX	1000.0	702				742			D	13 FJCPA
TEFLON-GLASS FILLED	DIXON CORP		70-1921-18	GDX	100.0								D	13 FJCPA
TEFLON-GLASS FILLED	DIXON CORP	.0050	70-1921-2	GDX	1500.0		200	01/03					D	11 FJCPA
TEFLON-GLASS FILLED	DIXON CORP		70-1921-3	GDX	50.0					774			D	13 FJCPA
TEFLON-GLASS FILLED	DIXON CORP		70-1921-4	GDX	1000.0					742			D	13 FJCPA
TEFLON-GLASS FILLED	DIXON CORP		70-1921-5	GDX	500.0					714			D	13 FJCPA
TEFLON-GLASS FILLED	DIXON CORP		70-1921-6	GDX	1000.0					693			D	13 FJCPA
TEFLON-GLASS FILLED	DIXON CORP		70-1921-7	GDX	2000.0					662			D	13 FJCPA
TEFLON-GLASS FILLED	DIXON CORP		70-1921-8	GDX	1500.0	642							D	15 FJCPA
TEFLON-GLASS FILLED	DIXON CORP		70-1921-9	GDX	1000.0	702							D	15 FJCPA
TEFLON-MALON G700	PARKER-HANNIFIN CORP		71-2832	GDX	2500.0		50	06/01					A	11 CHCOXX
TEFLON-MALON G700	PARKER-HANNIFIN CORP		71-2832-1	GDX	5000.0		50	03/04					A	11 CHCOXX
TEFLON-MALON G700	PARKER-HANNIFIN CORP		71-2832-2	GDX	5000.0			01/01					D	10 CHCOXX
TEFLON-MALON G700	PARKER-HANNIFIN CORP		71-2832-3	GDX	4000.0			01/01					D	10 CHCOXX
TEFLON-MALON G700	PARKER-HANNIFIN CORP		71-2832-4	GDX	3000.0			01/01					D	10 CHCOXX
TEFLON-MALON G700	PARKER-HANNIFIN CORP		71-2832-5	GDX	2500.0			01/03					D	10 CHCOXX
TEFLON-MALON G700	PARKER-HANNIFIN CORP		71-2832-6	GDX	2000.0			01/01					D	10 CHCOXX
TEFLON-MALON G700	PARKER-HANNIFIN CORP		71-2832-7	GDX	1500.0			00/03					A	10 CHCOXX
TEFLON/ALUMINUM	GAC		71-2234	A-50	820.0	513							T	15 DTCNNA
TEFLON/ALUMINUM	GAC		71-2234-1	A-50	779.0	504							T	15 DTCNNA
TEFLON-CERAMIC FILLED	UNKNOWN		71-2886-1	CXX	6000.0		500	00/04					A	11 HZEDHO
TEFLON-CERAMIC FILLED	UNKNOWN		71-2886-2	GDX	6000.0			02/02					D	10 HZEDHO
TEFLON-CERAMIC FILLED	UNKNOWN		71-2886-3	GDX	5500.0			02/02					D	10 HZEDHO
TEFLON-CERAMIC FILLED	UNKNOWN		71-2886-4	GDX	5000.0			00/01					A	10 HZEDHO
TEFLON-CERAMIC FILLED	UNKNOWN		71-2886-5	GDX	4500.0			01/01					D	10 HZEDHO
TEFLON-CERAMIC FILLED	UNKNOWN		71-2886-6	GDX	4000.0			01/02					D	10 HZEDHO
TEFLON-CERAMIC FILLED	UNKNOWN		71-2886-7	GDX	3500.0			01/02					D	10 HZEDHO
TEFLON-CERAMIC FILLED	UNKNOWN		71-2886-8	GDX	3000.0			00/04					A	10 HZEDHO
TEFLON TFE-9-18 WHITE	SPARTA MANUFACTURING CO		71-2699-4	GDX	3000.0			01/01					D	10 DKCNXX
TEFLON TFE-9-18 WHITE	SPARTA MANUFACTURING CO		71-2699-5	GDX	2500.0			01/01					D	10 DKCNXX
TEFLON TFE-9-18 WHITE	SPARTA MANUFACTURING CO		71-2699-6	GDX	2000.0			00/04					A	10 DKCNXX
TEMP SENSOR SHEATH COND	CONTROL PRODUCTS, INC.		71-2249	GDX	1500.0		50	00/04					A	11 EQMIMN
TE COATED FIBERGLASS	NR		71-2599-1	A-50	804.0	492							T	15 BGCNXX
TE COATED FIBERGLAS TAPE	NR		71-2599-1	A-50	823.0	471							T	15 BGCNXX
TE/FIBERGLAS TAPE	NR		70-2064	MMH	763.0	448							T	15 DYCNEV
TE/FIBERGLAS TAPE	NR		70-2064-1	MMH	534.0	459							T	15 DYCNEV

MATERIAL TEST DATA BY MANUFACTURER'S DESIGNATION AS OF 31 JAN. 72

MPGR'S DESIGNATION	MANUFACTURER	SPEC. THICK.	TEST RPT NO.	TEST ENVIR PRESS	TEST TEMP	TEST IMPR NO OF EMER	NO OF FLASH REACT	PROP FIRE PT	WT LOSS	R T I T	MATL CODE
TFE/NYLON SANDWICH			71-2950	GOX 3000.0	50	00/04				A 11	DUCM8S
TFE/NYLON SANDWICH			71-2950-1	GOX 5000.0	50	00/04				A 11	DUCM8S
TFE/NYLON SANDWICH			71-2950-2	GOX 3000.0	01/01					M 10	DUCM8S
TFE/NYLON SANDWICH			71-2950-3	GOX 600.0	01/01					M 10	DUCM8S
TFE/TETRAEICH	DUPONT/N.L. GORE		71-2605	A-50 397.0	509					T 15	FJCNXX
TFE/TETRAEICH	DUPONT/N.L. GORE		71-2605-1	A-50 746.0	515					T 15	FJCNXX
TM-1167 SILICONE RUBBER	SARGENT INDUSTRIES		71-2252	GOX 100.0			571	571		D 13	DPDPXX
TM-1167 SILICONE RUBBER	SARGENT INDUSTRIES		71-2252-1	GOX 500.0						A 11	DPDPXX
TI-1167 SILICONE RUBBER	SARGENT INDUSTRIES		71-2252-2	GOX 500.0						A 10	DPDPXX
TITANIUM ALLOY NO 52	COAST METALS, INC.		71-2280	GOX 5000.0						A 10	DTMTXX
TITANIUM ALLOY NO 52	COAST METALS, INC.		71-2280-1	GOX 6800.0						A 10	DTMTXX
TITANIUM TUBING	REACTIVE METALS, INC.		70-1944	GOX 1500.0						A 11	DMCNXX
TITANIUM TUBING	REACTIVE METALS, INC.		70-1944-1	GOX 1500.0						A 10	DMCNXX
TITANIUM TUBING	REACTIVE METALS, INC.		70-1944-2	A-50 801.0	507					T 15	FFMTXX
TITANIUM TUBING	REACTIVE METALS, INC.		70-1944-3	A-50 805.0	478					T 15	FFMTXX
TITANIUM TUBING	REACTIVE METALS, INC.		70-1944-4	A-50 822.0	506					T 15	FFMTXX
TITANIUM TUBING	REACTIVE METALS, INC.		70-1944-5	A-50 826.0	531					T 15	FFMTXX
TITANIUM TUBING	REACTIVE METALS, INC.		70-1944-6	GOX 1500.0	1000					A 13	EFMTXX
TITANIUM TUBING	REACTIVE METALS, INC.		71-2291	GOX 6800.0						A 11	DMHMHJ
TITANIUM TUBING	REACTIVE METALS, INC.		71-2291-1	GOX 3000.0	1000					A 13	DMHMHJ
TITANIUM TUBING	REACTIVE METALS, INC.		71-2506	A-50 771.0	499					T 15	FINVBN
TITANIUM TUBING	REACTIVE METALS, INC.		71-2506-1	A-50 698.0	483					T 15	FINVBN
TITANIUM TUBING	REACTIVE METALS, INC.		70-1989	GOX 1500.0						A 11	FJGDXX
TITANIUM TUBING	REACTIVE METALS, INC.		70-1989-1	GOX 1500.0						A 10	FJGDXX
TITANIUM TUBING	REACTIVE METALS, INC.		71-2404	A-50 777.0	501					A 13	FJGDXX
TITANIUM TUBING	REACTIVE METALS, INC.		71-2404-1	A-50 850.0	494					T 15	FJCLFW
TITANIUM TUBING	REACTIVE METALS, INC.		70-2214	GOX 1500.0						A 10	DMNXX
TITANIUM TUBING	REACTIVE METALS, INC.		70-2214-1	GOX 1500.0						A 11	DMNXX
TITANIUM TUBING	REACTIVE METALS, INC.		67-0808	GOX 5.0	1000					R 13	DKCDXX
TITANIUM TUBING	REACTIVE METALS, INC.		67-0808-1	GOX 25.0	1000					R 13	DKCDXX
TITANIUM TUBING	REACTIVE METALS, INC.		67-0808-2	GOX 5000.0						A 11	DKCDXX
TITANIUM TUBING	REACTIVE METALS, INC.		67-0808-3	GOX 13.5	1000					A 13	DKCDXX
TITANIUM TUBING	REACTIVE METALS, INC.		67-0808-4	GOX 50.0	1000					R 13	DKCDXX
TITANIUM TUBING	REACTIVE METALS, INC.		67-0808-5	GOX 50.0	1000					D 13	DKCDXX
TITANIUM TUBING	REACTIVE METALS, INC.		67-0808-6	GOX 100.0						D 13	DKCDXX
TITANIUM TUBING	REACTIVE METALS, INC.		67-0808-7	GOX 500.0						D 13	DKCDXX
TITANIUM TUBING	REACTIVE METALS, INC.		67-0808-8	GOX 1000.0						D 13	DKCDXX
TITANIUM TUBING	REACTIVE METALS, INC.		67-0808-9	GOX 1500.0						D 13	DKCDXX
TITANIUM TUBING	REACTIVE METALS, INC.		67-0808-10	GOX 2000.0						D 13	DKCDXX
TITANIUM TUBING	REACTIVE METALS, INC.		67-0808-11	GOX 6.2	1700					R 13	DKCDXX
TITANIUM TUBING	REACTIVE METALS, INC.		67-0808-12	GOX 5000.0						A 10	DKCDXX
TITANIUM TUBING	REACTIVE METALS, INC.		67-0808-13	GOX 2000.0						A 10	DKCDXX
TITANIUM TUBING	REACTIVE METALS, INC.		70-1881	GOX 2000.0						A 11	DKCDXX
TITANIUM TUBING	REACTIVE METALS, INC.		70-1881-1	GOX 2000.0						A 11	DKCDXX



MATERIAL TEST DATA BY MANUFACTURER S DESIGNATION AS OF 31 JAN 72

MFGR S DESIGNATION	MANUFACTURER	SPEC. THICK.	TEST RPT NO.	TEST ENVR PRESS	TEST TEMP	TEST ENER	TEST IMPT NO OF REACT	FLASH POINT	FIRI PROP	WT LOSS	MATL T CODE
VESPEL SP-1	E.I. DUPONT CO., INC.		70-1881-1	GDX 50.0				953	953		0 13 DKCDXX
VESPEL SP-1	E.I. DUPONT CO., INC.		70-1881-2	GUX 100.0				917	917		0 13 DKCDXX
VESPEL SP-1	E.I. DUPONT CO., INC.		70-1881-3	GUX 500.0				R1R	R1R		0 13 DKCDXX
VESPEL SP-1	E.I. DUPONT CO., INC.		70-1881-4	GDX 1000.0				664	674		0 13 DKCDXX
VESPEL SP-1	E.I. DUPONT CO., INC.		70-1881-5	GDX 1500.0				674	574		0 13 DKCDXX
VESPEL SP-1	E.I. DUPONT CO., INC.		70-1881-6	GDX 25.0				N999	N999		0 13 DKCDXX
VESPEL SP-1	E.I. DUPONT CO., INC.		70-1881-7	GDX 50.0				N999	N999		0 13 DKCDXX
VESPEL SP-1	E.I. DUPONT CO., INC.		70-1881-8	GDX 2000.0				660	660		0 13 DKCDXX
VESPEL SF-21	E.I. DUPONT CO., INC.		M9-0399	GDX 5.0	1000			551	N999		13 DKCDGF
VESPEL SP-21	E.I. DUPONT CO., INC.		M9-0399-1	GDX 25.0	1000			951	N999		13 DKCDGF
VESPEL SP-21	E.I. DUPONT CO., INC.	.0750	M9-0399-10	GDX 5000.0		00/04					A 10 DKCDGF
VESPEL SP-21	E.I. DUPONT CO., INC.	.0750	M9-0399-11	GDX 5000.0		200 00/05					A 11 DKCDGF
VESPEL SP-21	E.I. DUPONT CO., INC.		M9-0399-12	GDX 6.2	1000			N999	N999		J 13 DKCDGF
VESPEL SP-21	E.I. DUPONT CO., INC.		M9-0399-13	GDX 16.5	1000			N999	N999		J 13 DKCDGF
VESPEL SP-21	E.I. DUPONT CO., INC.		M9-0399-2	GDX 50.0	1000			522	N999		J 13 DKCDGF
VESPEL SP-21	E.I. DUPONT CO., INC.		M9-0399-3	GDX 50.0				935	935		0 13 DKCDGF
VESPEL SP-21	E.I. DUPONT CO., INC.		M9-0399-4	GDX 100.0				921	921		0 13 DKCDGF
VESPEL SP-21	E.I. DUPONT CO., INC.		M9-0399-5	GDX 500.0				835	835		0 13 DKCDGF
VESPEL SP-21	E.I. DUPONT CO., INC.		M9-0399-6	GDX 1000.0				730	730		0 13 DKCDGF
VESPEL SP-21	E.I. DUPONT CO., INC.		M9-0399-7	GDX 1500.0				645	645		0 13 DKCDGF
VESPEL SP-21	E.I. DUPONT CO., INC.		M9-0399-8	GDX 2000.0				613	613		0 13 DKCDGF
VESPEL SP-21	E.I. DUPONT CO., INC.	.0750	M9-0399-9	GDX 4500.0		00/01					A 10 DKCDGF
VESPEL SP-21	E.I. DUPONT CO., INC.		70-1880	GDX 2000.0		00/04					A 10 DKCDGF
VESPEL SP-21	E.I. DUPONT CO., INC.		70-1880-1	GDX 50.0		50 00/04					A 11 DKCDGF
VESPEL SP-21	E.I. DUPONT CO., INC.		70-1880-2	GDX 100.0				894	894		0 13 DKCDGF
VESPEL SP-21	E.I. DUPONT CO., INC.		70-1880-3	GDX 500.0				785	785		0 13 DKCDGF
VESPEL SP-21	E.I. DUPONT CO., INC.		70-1880-4	GDX 1000.0				760	760		0 13 DKCDGF
VESPEL SP-21	E.I. DUPONT CO., INC.		70-1880-5	GDX 1500.0				666	666		0 13 DKCDGF
VESPEL SP-21	E.I. DUPONT CO., INC.		70-1880-6	GDX 2000.0				573	573		0 13 DKCDGF
VESPEL SP-21	E.I. DUPONT CO., INC.		70-1880-7	GDX 25.0	1000			N999	N999		R 13 DKCDXX
VESPEL SP-21	E.I. DUPONT CO., INC.		70-1880-8	GDX 50.0	1000			N999	N999		R 13 DKCDXX
VESPEL SP-21	E.I. DUPONT CO., INC.		71-5003	GDX 5000.0		50 00/04					A 11 DKCDGF
VESPEL SP-21	E.I. DUPONT CO., INC.		71-5003-1	GDX 5000.0		00/04					A 10 DKCDGF
VESPEL SP-21	E.I. DUPONT CO., INC.		71-5003-2	GDX 2500.0		01/01					T 10 DKCDGE
VESPEL SP-21	E.I. DUPONT CO., INC.		71-5003-3	GDX 2000.0		00/04					A 10 DKCDGE
VESPEL SP-21	E.I. DUPONT CO., INC.		71-5003-4	GDX 5000.0		01/03					T 10 DKCDGE
VESPEL SP-21	E.I. DUPONT CO., INC.		71-5003-5	GDX 4500.0		00/04					A 10 DKCDGE
VESPEL SP-21	E.I. DUPONT CO., INC.		71-5003-6	GDX 5000.0		01/02					T 10 DKCDGE
VESPEL SP-21	E.I. DUPONT CO., INC.		71-5003-7	GDX 4500.0		01/01					T 10 DKCDGE
VESPEL SP-21	E.I. DUPONT CO., INC.		71-5003-8	GDX 4000.0		01/01					T 10 DKCDGE
VESPEL SP-21	E.I. DUPONT CO., INC.		71-5003-9	GDX 3500.0		00/04					A 10 DKCDGE
VESPEL SP-21	E.I. DUPONT CO., INC.		71-2565	GDX 4000.0		01/01					T 10 DKCDGE
VESPEL SP-21	E.I. DUPONT CO., INC.		71-2565-1	GDX 2500.0		01/01					T 10 DKCDGE

LOT 1062

MATERIAL TEST DATA BY MANUFACTURER S DESIGNATION AS OF 31 JAN 72

MFR S DESIGNATION	MANUFACTURER	SPEC. THICK.	TEST RPT NO.	TEST ENVR	TEST PRESS	TEST TEMP	TEST ENER	NO OF REACT	FLASH POINT	FIRE PT	PROP DIST LOSS	WT	R T	MATL
VESPEL SP-21 LOT 1062	E.I. DUPONT CO., INC.		71-2565-2	GOX	3000.0			01/03					T 10	DKCOGE
VESPEL SP-21 LOT 1062	E.I. DUPONT CO., INC.		71-2565-3	GOX	2500.0			01/03					T 10	DKCOGE
VESPEL SP-21 LOT 1068	FLODYNE CONTROLS INC		71-2697	GOX	2000.0			01/04					T 10	DKCOGE
VESPEL SP-21 LOT 1068	FLODYNE CONTROLS INC		71-2697-1	GOX	4500.0			01/01					T 10	DKCOGE
VESPEL SP-211	E.I. DUPONT CO., INC.		71-2697-2	GOX	4000.0			01/01					T 10	DKCOGE
VESPEL SP-211	E.I. DUPONT CO., INC.		70-1879	GOX	3500.0		50	00/04					A 11	DKCOXX
VESPEL SP-211	E.I. DUPONT CO., INC.		70-1879	GOX	2000.0			00/04					A 10	DKCOXX
VESPEL SP-211	E.I. DUPONT CO., INC.		70-1879-1	GOX	100.0				830				D 13	DKCOXX
VESPEL SP-211	E.I. DUPONT CO., INC.		70-1879-2	GOX	500.0				653				D 13	DKCOXX
VESPEL SP-211	E.I. DUPONT CO., INC.		70-1879-3	GOX	1000.0				618				D 13	DKCOXX
VESPEL SP-211	E.I. DUPONT CO., INC.		70-1879-4	GOX	1500.0				550				D 13	DKCOXX
VESPEL SP-211	E.I. DUPONT CO., INC.		70-1879-5	GOX	50.0				910				D 13	DKCOXX
VESPEL SP-211	E.I. DUPONT CO., INC.		70-1879-5	GOX	25.0	1000			N999	N999			A 13	DKCOXX
VESPEL SP-211	E.I. DUPONT CO., INC.		70-1879-7	GOX	50.0	1000			N999	N999			A 13	DKCOXX
VESPEL SP-211	E.I. DUPONT CO., INC.		71-2315	GOX	2500.0			01/01					T 10	DKCOXX
VESPEL SP-211	E.I. DUPONT CO., INC.		71-2315-1	GOX	2000.0			01/01					T 10	DKCOXX
VESPEL SP-211	E.I. DUPONT CO., INC.		71-2315-2	GOX	1500.0			00/04					J 13	DOOFXX
VESPEL SP-211	E.I. DUPONT CO., INC.		M9-0295	GOX	5.0	1000			857	N999			D 13	DOOFXX
VITON A	E.I. DUPONT CO., INC.		M9-0295-1	GOX	25.0				836	855			D 13	DOOFXX
VITON A	E.I. DUPONT CO., INC.		M9-0295-10	GOX	2000.0				456	456			A 10	DOOFXX
VITON A	E.I. DUPONT CO., INC.		M9-0295-11	GOX	3500.0			00/04					D 10	DOOFXX
VITON A	E.I. DUPONT CO., INC.		M9-0295-12	GOX	4000.0			01/03					D 10	DOOFXX
VITON A	E.I. DUPONT CO., INC.		M9-0295-13	GOX	4500.0			01/01					D 10	DOOFXX
VITON A	E.I. DUPONT CO., INC.		M9-0295-14	GOX	5000.0			01/04					D 10	DOOFXX
VITON A	E.I. DUPONT CO., INC.		M9-0295-15	GOX	4000.0		50	00/01					A 11	DOOFXX
VITON A	E.I. DUPONT CO., INC.		M9-0295-16	GOX	5000.0		50	00/04					J 13	DOOFXX
VITON A	E.I. DUPONT CO., INC.		M9-0295-17	GOX	6.2	1000			875	N999			D 13	DOOFXX
VITON A	E.I. DUPONT CO., INC.		M9-0295-18	GOX	16.5				859	870			D 13	DOOFXX
VITON A	E.I. DUPONT CO., INC.		M9-0295-2	GOX	50.0				826	826			D 13	DOOFXX
VITON A	E.I. DUPONT CO., INC.		M9-0295-3	GOX	50.0				593	593			D 13	DOOFXX
VITON A	E.I. DUPONT CO., INC.		M9-0295-4	GOX	100.0				590	590			D 13	DOOFXX
VITON A	E.I. DUPONT CO., INC.		M9-0295-5	GOX	500.0				520	520			D 13	DOOFXX
VITON A	E.I. DUPONT CO., INC.		M9-0295-6	GOX	900.0				506	506			D 13	DOOFXX
VITON A	E.I. DUPONT CO., INC.		M9-0295-7	GOX	1000.0				485	485			D 13	DOOFXX
VITON A	E.I. DUPONT CO., INC.		M9-0295-8	GOX	1000.0				482	482			D 13	DOOFXX
VITON A	E.I. DUPONT CO., INC.		M9-0295-9	GOX	1500.0				480	480			D 13	DOOFXX
VITON B SHEET	E.I. DUPONT CO., INC.		M9-0268-1	GOX	25.0				562	855			D 13	CHDFXX
VITON B SHEET	E.I. DUPONT CO., INC.		M9-0268-10	GOX	1500.0		200	00/01					A 11	CHDFXX
VITON B SHEET	E.I. DUPONT CO., INC.		M9-0268-11	GOX	2000.0		200	00/04					D 13	CHDFXX
VITON B SHEET	E.I. DUPONT CO., INC.		M9-0268-12	GOX	50.0				725	725			D 13	CHDFXX
VITON B SHEET	E.I. DUPONT CO., INC.		M9-0268-13	GOX	100.0				657	657			D 13	CHDFXX
VITON B SHEET	E.I. DUPONT CO., INC.		M9-0268-17	GOX	500.0				572	572			D 13	CHDFXX
VITON B SHEET	E.I. DUPONT CO., INC.		M9-0268-15	GOX	1000.0				502	502			D 13	CHDFXX

MATERIAL TEST DATA BY MANUFACTURER S DESIGNATION AS OF 31 JAN 72

REFR S DESIGNATION	MANUFACTURER	SPEC. THICK.	TEST RPT NO.	TEST ENVR	TEST PRESS	TEST IMPR NO OF	FLASH FIRE	PROF	WT	R T	MATL
						TEMP ENER	POINT PT	DIST	LOSS	I I	CQUE
VITON B SHEET	E-I DUPONT CO., INC.		M9-0268-16	GOX	6.2	1000	RR9	1999		J 13	CHDFXX
VITON B SHEET	E-I DUPONT CO., INC.		M9-0268-17	GOX	16.5		RR5	900		D 13	CHDFXX
VITON B SHEET	E-I DUPONT CO., INC.		M9-0268-18	GOX	1500.0		470	490		D 13	CHDFXX
VITON B SHEET	E-I DUPONT CO., INC.		M9-0268-19	GOX	2000.0		515	515		D 13	CHDFXX
VITON B SHEET	E-I DUPONT CO., INC.		M9-0268-2	GOX	50.0		400	790		D 13	CHDFXX
VITON B SHEET	E-I DUPONT CO., INC.	.0750	M9-0268-3	GOX	900.0		472	472		D 13	CHDFXX
VITON B SHEET	E-I DUPONT CO., INC.	.0750	M9-0268-4	GOX	3500.0	00/01				A 10	CHDFXX
VITON B SHEET	E-I DUPONT CO., INC.	.0750	M9-0268-5	GOX	4000.0	00/01				A 10	CHDFXX
VITON B SHEET	E-I DUPONT CO., INC.	.0750	M9-0268-6	GOX	4500.0	00/01				A 10	CHDFXX
VITON B SHEET	E-I DUPONT CO., INC.	.0750	M9-0268-7	GOX	5000.0	00/01				A 10	CHDFXX
VITON B SHEET	E-I DUPONT CO., INC.	.0750	M9-0268-8	GOX	500.0	200				A 11	CHDFXX
VITON B SHEET	E-I DUPONT CO., INC.	.0750	M9-0268-9	GOX	1000.0	200				A 11	CHDFXX
VITON RUBBER	CAL-STATE SEAL CO.		70-2022	MNH	615.0	477				T 15	CHDEXX
VITON RUBBER	CAL-STATE SEAL CO.		70-2022-1	MNH	801.0	477				T 15	CHDEXX
VITON RUBBER	CAL-STATE SEAL CO.		70-2022-2	N204	405.0	214				T 14	CHDEXX
VITON RUBBER	CAL-STATE SEAL CO.		70-2022-3	N204	371.3	128				A 14	CHDEXX
VITON RUBBER	CAL-STATE SEAL CO.		70-2022-4	N204	358.5	73				A 14	CHDEXX
VITON RUBBER	CAL-STATE SEAL CO.		70-2022-5	N204	360.5	75				A 14	CHDEXX
VITON V-377-9	PARKER SEAL/LOS ANGLS		10-49	GOX	50.0		540	540		D 13	DVDFXX
VITON V-377-9	PARKER SEAL/LOS ANGLS		10-49-1	GOX	100.0		530	530		D 13	DVDFXX
VITON V-672-75	PARKER SEAL/LOS ANGLS		10-53	GOX	50.0		660	660		D 13	DVDFXX
VITON V-672-75	PARKER SEAL/LOS ANGLS		10-53-1	GOX	100.0		637	632		D 13	DVDFXX
VITON V-672-75	PARKER SEAL/LOS ANGLS		10-53-2	GOX	500.0		566	566		D 13	DVDFXX
VITON V-672-75	PARKER SEAL/LOS ANGLS		10-53-3	GOX	1000.0		529	529		D 13	DVDFXX
VITON V-672-75	PARKER SEAL/LOS ANGLS		10-53-4	GOX	1500.0		495	495		D 13	DVDFXX
VITON V-672-75	PARKER SEAL/LOS ANGLS		10-53-5	GOX	2000.0		482	482		D 13	DVDFXX
VITON V-672-75	PARKER SEAL/LOS ANGLS		70-1708	GOX	5.0	1000	832	N999		R 13	DVDFXX
VITON V-672-75	PARKER SEAL/LOS ANGLS	.0750	70-1708-1	GOX	25.0		740	825		R 13	DVDFXX
VITON V-672-75	PARKER SEAL/LOS ANGLS	.0750	70-1708-10	GOX	5000.0	04/04				T 10	DVDFXX
VITON V-672-75	PARKER SEAL/LOS ANGLS	.0750	70-1708-11	GOX	6.2	1000	857	N999		J 13	DVDFXX
VITON V-672-75	PARKER SEAL/LOS ANGLS	.0750	70-1708-12	GOX	13.5		853	853		D 13	DVDFXX
VITON V-672-75	PARKER SEAL/LOS ANGLS	.0750	70-1708-2	GOX	50.0		633	780		D 13	DVDFXX
VITON V-672-75	PARKER SEAL/LOS ANGLS	.0750	70-1708-3	GOX	1500.0	00/01				A 10	DVDFXX
VITON V-672-75	PARKER SEAL/LOS ANGLS	.0750	70-1708-4	GOX	2000.0	00/01				A 10	DVDFXX
VITON V-672-75	PARKER SEAL/LOS ANGLS	.0750	70-1708-5	GOX	2500.0	00/01				A 10	DVDFXX
VITON V-672-75	PARKER SEAL/LOS ANGLS	.0750	70-1708-6	GOX	3000.0	00/01				A 10	DVDFXX
VITON V-672-75	PARKER SEAL/LOS ANGLS	.0750	70-1708-7	GOX	3500.0	00/01				A 10	DVDFXX
VITON V-672-75	PARKER SEAL/LOS ANGLS	.0750	70-1708-8	GOX	4000.0	00/01				A 10	DVDFXX
VITON V-672-75	PARKER SEAL/LOS ANGLS	.0750	70-1708-9	GOX	4500.0	00/04				A 10	DVDFXX
VITON 77-545	PARKER SEAL/LOS ANGLS		71-2370	GOX	500.0	50				A 11	CHDFXX
VITON 77-545	PARKER SEAL/LOS ANGLS		71-2370-1	GOX	500.0					A 10	CHDFXX
VITON 77-545	PARKER SEAL/LOS ANGLS		71-2370-2	GOX	100.0		650	650		D 13	CHDFXX
VITON 77-545	PARKER SEAL/LOS ANGLS		71-2370-3	GOX	2000.0					A 10	CHDFXX
VITON 77-545	PARKER SEAL/LOS ANGLS		71-2370-4	GOX	2500.0	50				A 11	CHDFXX

MATERIAL TEST DATA BY MANUFACTURER S DESIGNATION AS OF 31 JAN 72

MPFR S DESIGNATION	MANUFACTURER	SPEC. THICK.	TEST RPT NO.	TEST ENVR	TEST PRESS	TEST TEMP	TEST EMER	IMPT NO	NO GF REACT	FLASH POINT	FIRE PT	PRDP DIST	WT LOSS	R T	MATL I T	CODE
VITOM 77-545	PARKER SEAL/LOS ANGLS		71-2370-5	GOX	1500.0					454	464			D	13	CHDFXX
VITRIFIED ALUMINA INSUL	ROSEMONT ENG. CORP		70-1983	GOX	1500.0		50	00/04						A	11	FJMAXX
VITRIFIED ALUMINA INSUL	ROSEMONT ENG. CORP		70-1983	GOX	1500.0			00/04						A	10	FJMAXX
VITRIFIED ALUMINA INSUL	ROSEMONT ENG. CORP		70-1983-1	GOX	1500.0	1000		00/04		N999	N999			A	11	FJMAXX
VULCALOCK	B.F. GOODRICH		71-2371	GOX	500.0		50	00/04						A	11	DPHDX
VULCALOCK	B.F. GOODRICH		71-2371-1	GOX	500.0			00/04						A	10	DPHDX
VULCALOCK	B.F. GOODRICH		71-2371-2	GOX	100.0			00/04		621	621			D	13	DPHDX
MESCO AL 500	WESTERN GOLD + PLATH CO.		70-2235	GOX	500.0			00/04						A	10	FIMHXX
WIRE ET	VICTOR WIRE & CABLE		71-2714	MNH	826.0	550								A	15	EPMCXX
WIRE ET	VICTOR WIRE & CABLE		71-2714-1	MNH	828.0	558								T	15	EPMCXX
WIRE ET	VICTOR WIRE & CABLE		71-2714-2	MNH	782.0	523								T	15	EPMCXX
WIRE-MELDING MIL-R-5031	NATIONAL STANDARDS		70-1927	GOX	1500.0		50	00/04						A	11	FMXXXX
WIRE-MELDING MIL-R-5031	NATIONAL STANDARDS		70-1927	GOX	1500.0			00/04						A	10	FMXXXX
WMT 33T	SIMMONS		71-2720	A-50	750.0	514								T	15	ERXXXX
WMT 33T	SIMMONS		71-2720-1	A-50	765.0	518								T	15	ERXXXX
XR-5038/NICA	3M CO. ST. PAUL		71-2602	A-50	681.0	489								T	15	AZBGHF
XR-5038/NICA	3M CO. ST. PAUL		71-2602-1	A-50	689.0	493								T	15	AZBGHF
XR-5038/NICA	3M CO. ST. PAUL		71-2602-2	A-50	761.0	514								T	15	AZBGHF
XR-5038/NICA	3M CO. ST. PAUL		71-2602-3	A-50	736.0	512								T	15	AZBGHF
007 O-RING COMP. V 377-9FLODYNE	CONTROLS INC		71-2567	GOX	3000.0			00/01						A	10	AMXXXX
007 O-RING COMP. V 377-9FLODYNE	CONTROLS INC		71-2567-1	GOX	3500.0			00/01						A	10	AMXXXX
007 O-RING COMP. V 377-9FLODYNE	CONTROLS INC		71-2567-2	GOX	4000.0			00/01						A	10	AMXXXX
007 O-RING COMP. V 377-9FLODYNE	CONTROLS INC		71-2567-3	GOX	4500.0			00/04						A	10	AMXXXX
007 O-RING COMP. V 377-9FLODYNE	CONTROLS INC		71-2567-4	GOX	5000.0			01/03						T	10	AMXXXX
008 O-RING COMP. V 377-9FLODYNE	CONTROLS INC		71-2566	GOX	2500.0			01/01						T	10	AMXXXX
008 O-RING COMP. V 377-9FLODYNE	CONTROLS INC		71-2566-1	GOX	2000.0			01/03						T	10	AMXXXX
008 O-RING COMP. V 377-9FLODYNE	CONTROLS INC		71-2566-2	GOX	1500.0			00/04						A	10	AMXXXX
011 O-RING COMP. V 377-9FLODYNE	CONTROLS INC		71-2648	GOX	550.0		50	03/03						T	11	AMXXXX
011 O-RING COMP. V 377-9FLODYNE	CONTROLS INC		71-2648-1	GOX	3050.0			01/01						T	10	AMXXXX
011 O-RING COMP. V 377-9FLODYNE	CONTROLS INC		71-2648-2	GOX	2550.0			01/02						T	10	AMXXXX
011 O-RING COMP. V 377-9FLODYNE	CONTROLS INC		71-2648-3	GOX	2050.0			00/04						A	10	AMXXXX
016 O-RING COMP. V 377-9FLODYNE	CONTROLS INC		71-2649	GOX	5000.0		50	00/04						A	11	AMXXXX
016 O-RING COMP. V 377-9FLODYNE	CONTROLS INC		71-2649-1	GOX	4500.0			01/01						T	10	AMXXXX
016 O-RING COMP. V 377-9FLODYNE	CONTROLS INC		71-2649-2	GOX	4000.0			01/03						T	10	AMXXXX
016 O-RING COMP. V 377-9FLODYNE	CONTROLS INC		71-2649-3	GOX	3500.0			01/02						T	10	AMXXXX
016 O-RING COMP. V 377-9FLODYNE	CONTROLS INC		71-2649-4	GOX	3000.0			01/03						T	10	AMXXXX
016 O-RING COMP. V 377-9FLODYNE	CONTROLS INC		71-2649-5	GOX	2500.0			00/04						A	10	AMXXXX
10R RED FIBER SHEET		.0750	SP-6931	GOX	25.0					600	600			D	13	CRBGXX
10R RED FIBER SHEET		.0750	SP-6931-1	GOX	50.0					597	597			D	13	CRBGXX
10R RED FIBER SHEET		.0750	SP-6931-10	GOX	1500.0		200	04/04						D	11	CRBGXX
10R RED FIBER SHEET		.0750	SP-6931-11	GOX	1500.0			00/04						A	10	CRBGXX
10R RED FIBER SHEET		.0750	SP-6931-12	GOX	2000.0			01/02						D	10	CRBGXX
10R RED FIBER SHEET		.0750	SP-6931-13	GOX	2500.0			01/02						D	10	CRBGXX
10R RED FIBER SHEET		.0750	SP-6931-14	GOX	3000.0			04/04						D	10	CRBGXX

MATERIAL TEST DATA BY MANUFACTURER S DESIGNATION AS OF 31 JAN 72

MFGR S DESIGNATION	MANUFACTURER	SPEC. THICK.	TEST RPT NO.	ENVR PRESS	TEST PRESS	TEST TEMP	EMPR	TMPT	NO OF REACT	FLASH POINT	FIRF	PROP WT	DIST LOSS	R T	MATL
10R RED FIBER SHEET	GAC	.0750	SP-6931-2	GDX	62.0	1000				567	N999			J	13 CRGXX
10R RED FIBER SHEET	GAC	.0750	SP-6931-3	GDX	165.0					586	592			D	13 CRGXX
10R RED FIBER SHEET	GAC	.0750	SP-6931-4	GDX	1565.0					331	331			A	11 CRGXX
10R RED FIBER SHEET	GAC	.0750	SP-6931-5	GDX	4000.0		50	00/01						A	11 CRGXX
10R RED FIBER SHEET	GAC	.0750	SP-6931-6	GDX	4500.0		50	00/01						A	11 CRGXX
10R RED FIBER SHEET	GAC	.0750	SP-6931-7	GDX	5000.0		50	00/04						A	11 CRGXX
10R RED FIBER SHEET	GAC	.0750	SP-6931-H	GDX	500.0		200	00/04						A	11 CRGXX
10R RED FIBER SHEET	GAC	.0750	SP-6931-9	GDX	1000.0		200	00/01						A	11 CRGXX
1018 NICKEL PLATE	GAC		71-2417	A-50	735.0	463								T	15 DMMDM
1018 NICKEL PLATE	GAC		71-2417-1	A-50	710.0	504								T	15 DMMDM
134115-14-16-17-KYNAR	MINTEC CORP		71-2322-1	GDX	3000.0			01/01						T	10 CHCTX
134115-14-16-17-METAL	MINTEC CORP		71-2322	GDX	3000.0		50	00/04						A	11 DTGIX
17-4PH SS	GAC		71-2511	A-50	767.0	516								T	15 FIMDX
17-4PH SS	GAC	.0750	71-2511-1	A-50	786.0	514								T	15 FIMDX
17-4PH SS	GAC		70-2112	GDX	5000.0		50	00/04						A	11 DMMDX
17-4PH SS	GAC		70-2112-1	GDX	2000.0									A	10 DMMDX
17-4PH SS	GAC		70-2112-2	GDX	4500.0									A	10 DMMDX
17-4PH SS	GAC		70-2112-3	GDX	5000.0									A	10 DMMDX
17-4PH SS	GAC		70-2112-4	GDX	6800.0									A	10 DMMDX
17-4PH SS	GAC		71-2320	A-50	778.0	507								T	15 DTMDM
17-4PH SS	GAC		71-2320-1	A-50	822.0	515								T	15 DTMDM
17-4PH SS	GAC		71-2416	A-50	725.0	488								T	15 DTMDM
17-4PH SS	GAC		71-2416-1	A-50	768.0	506								T	15 DTMDM
17-4PH W/TFE FEP	GAC		71-2486	A-50	740.0	487								T	15 DTMDHS
17-4PH W/TFE FEP	GAC		71-2486-1	A-50	756.0	501								T	15 DTMDHS
17-7PH CRES	MP	.0750	71-2486-2	A-50	830.0	513								T	15 DTMDHS
17-7PH CRES	MP	.0750	70-2219	GDX	1500.0		50	00/04						A	10 DMMDX
17-7PH SS	GAC	.0750	70-2219-1	GDX	1500.0									A	11 DMMDX
17-7PH SS	GAC	.0750	70-2116	GDX	2000.0									A	10 DTMDX
17-7PH SS	GAC	.0750	70-2116-1	GDX	2000.0		50	00/04						A	11 DTMDX
17-7PH SS	GAC	.0750	70-2116-2	GDX	5000.0		50	00/04						A	11 DTMDX
17-7PH SS	GAC	.0750	70-2116-3	GDX	5000.0									A	10 DTMDX
17-7PH SS	GAC	.0750	70-2116-4	GDX	6800.0									A	10 DTMDX
175043 POT. COMP.	SIMMONS		71-2716	A-50	766.0	503								T	15 BARGG
175043 POT. COMP.	SIMMONS		71-2716-1	A-50	764.0	486								T	15 BARGG
175047 EPOXY	SIMMONS		71-2717	A-50	771.0	514								T	15 BARGG
175047 EPOXY	SIMMONS		71-2717-1	A-50	774.0	514								T	15 BARGG
2T ADHESIVE	AIRESEARCH	.0050	SP-6930	GDX	25.0					696	696			D	13 ARXXX
2T ADHESIVE	AIRESEARCH	.0050	SP-6930-1	GDX	50.0					680	680			D	13 ARXXX
2T ADHESIVE	AIRESEARCH	.0050	SP-6930-10	GDX	4500.0			00/01						A	10 ABXXX
2T ADHESIVE	AIRESEARCH	.0050	SP-6930-11	GDX	5000.0			00/04						A	10 ABXXX
2T ADHESIVE	AIRESEARCH	.0050	SP-6930-12	GDX	2000.0		50	00/04						A	11 ABXXX
2T ADHESIVE	AIRESEARCH	.0050	SP-6930-13	GDX	3000.0		50	00/01						A	11 ABXXX
2T ADHESIVE	AIRESEARCH	.0050	SP-6930-14	GDX	4000.0		50	00/01						A	11 ABXXX

MATERIAL TEST DATA BY MANUFACTURER S DESIGNATION AS OF 31 JAN 72

MFGR S DESIGNATION	MANUFACTURER	SPEC. THICK.	TEST RPT NO.	TEST ENVR PRESS	TEST TEMP	TEST ENER	IMPACT NO OF REACT	FLASH FIRE DIST	PROP WT LOSS	R T MATL
2T ADHESIVE	AIRESEARCH INDST DIV	.0050	SP-6930-15	G0X 4500.0	50	00/04				A 11 ABXXXX
2T ADHESIVE	AIRESEARCH INDST DIV	.0050	SP-6930-16	G0X 5000.0	50	01/03				D 11 ABXXXX
2T ADHESIVE	AIRESEARCH INDST DIV	.0050	SP-6930-17	G0X 100.0	200	01/01				D 11 ABXXXX
2T ADHESIVE	AIRESEARCH INDST DIV	.0050	SP-6930-18	G0X 250.0	200	02/02				D 11 ABXXXX
2T ADHESIVE	AIRESEARCH INDST DIV	.0050	SP-6930-19	G0X 500.0	200	01/01	654	649		D 11 ABXXXX
2T ADHESIVE	AIRESEARCH INDST DIV	.0050	SP-6930-2	G0X 62.0	50	00/04				A 11 ABXXXX
2T ADHESIVE	AIRESEARCH INDST DIV	.0050	SP-6930-20	G0X 500.0	50	00/04				A 10 ABXXXX
2T ADHESIVE	AIRESEARCH INDST DIV	.0050	SP-6930-21	G0X 500.0	50	00/04				A 11 ABXXXX
2T ADHESIVE	AIRESEARCH INDST DIV	.0050	SP-6930-22	G0X 1500.0	50	00/04				D 13 ABXXXX
2T ADHESIVE	AIRESEARCH INDST DIV	.0050	SP-6930-23	G0X 50.0	559	00/04	559	559		D 13 ABXXXX
2T ADHESIVE	AIRESEARCH INDST DIV	.0050	SP-6930-24	G0X 200.0	472	00/04	472	472		D 13 ABXXXX
2T ADHESIVE	AIRESEARCH INDST DIV	.0050	SP-6930-25	G0X 1000.0	319	00/04	319	319		D 13 ABXXXX
2T ADHESIVE	AIRESEARCH INDST DIV	.0050	SP-6930-26	G0X 50.0	520	00/04	520	520		D 13 ABXXXX
2T ADHESIVE	AIRESEARCH INDST DIV	.0050	SP-6930-3	G0X 165.0	660	00/04	660	660		D 13 ABXXXX
2T ADHESIVE	AIRESEARCH INDST DIV	.0050	SP-6930-4	G0X 1500.0		00/01				A 10 ABXXXX
2T ADHESIVE	AIRESEARCH INDST DIV	.0050	SP-6930-5	G0X 2000.0		00/01				A 10 ABXXXX
2T ADHESIVE	AIRESEARCH INDST DIV	.0050	SP-6930-6	G0X 2500.0		00/01				A 10 ABXXXX
2T ADHESIVE	AIRESEARCH INDST DIV	.0050	SP-6930-7	G0X 3000.0		00/01				A 10 ABXXXX
2T ADHESIVE	AIRESEARCH INDST DIV	.0050	SP-6930-8	G0X 3500.0		00/01				A 10 ABXXXX
2T ADHESIVE	AIRESEARCH INDST DIV	.0050	SP-6930-9	G0X 4000.0		00/01				A 10 ABXXXX
2025 ALDOLINE	GAC		71-2860	G0X 2000.0		00/04				A 10 DTMAX
30 ANG MAGNET WIRE	GAC		71-2514	A-50 814.0	514					T 15 ERXXXX
30 ANG MAGNET WIRE	GAC		71-2514-1	A-50 820.0	507					T 15 ERXXXX
301 CRES STEEL	MC LOUTH STEEL CO.	.0750	70-2060	G0X 1500.0	50	00/04				A 11 DTMDXX
301 CRES STEEL	MC LOUTH STEEL CO.	.0750	70-2060-1	G0X 1500.0	50	00/04				A 10 DTMDXX
301 SS	GAC		70-2118	G0X 5000.0	50	00/04				A 10 DTMDXX
301 SS	GAC		70-2118-1	G0X 5000.0	50	00/04				A 10 DTMDXX
301 SS	GAC		70-2118-2	G0X 6800.0	514	00/04				A 10 DTMDXX
301 SS	GAC		71-2287	A-50 826.0	514					T 15 DMMDXX
302 CRES STEEL	UNIV. CAST IRON MFG. CO.	.0750	71-2287-1	A-50 777.0	503					T 15 DMMDXX
302 CRES STEEL	UNIV. CAST IRON MFG. CO.	.0750	70-2059	G0X 1500.0	50	00/04				A 11 DTMDXX
302 SS	GAC		70-2059-1	G0X 1500.0	50	00/04				A 10 DTMDXX
302 SS	GAC		70-2117	G0X 2000.0	50	00/04				A 11 DTMDXX
302 SS	GAC		70-2117-1	G0X 5000.0	50	00/04				A 11 DTMDXX
302 SS	GAC		70-2117-2	G0X 5000.0	50	00/04				A 10 DTMDXX
302 SS	GAC		70-2117-3	G0X 6800.0	496	00/04				A 10 DTMDXX
302 SS	GAC		71-2283	A-50 746.0	496					T 15 DMMDXX
302 SS	GAC		71-2283-1	A-50 791.0	509					T 15 DMMDXX
302 SS	GAC		71-2283-2	A-50 770.0	503					T 15 DMMDXX
302 SS	GAC		71-2283-3	A-50 754.0	497					T 15 DMMDXX
303 CRES STEEL	MR DOWNEY	.0750	70-2058	G0X 1500.0	50	00/04				A 10 DMMDXX
303 CRES STEEL	MR DOWNEY	.0750	70-2058-1	G0X 1500.0	50	00/04				A 11 DMMDXX
303 SE	GAC		70-2114	G0X 5000.0	50	00/04				A 11 DMMDXX
303 SS	GAC		70-2141	G0X 5000.0	50	00/04				A 11 DMMDXX

MATERIAL TEST DATA BY MANUFACTURER S DESIGNATION AS OF 31 JAN 72

MFGR S DESIGNATION	MANUFACTURER	SPEC. THICK.	TEST RPT NO.	TEST ENVR	TEST PRESS	TEST TEMP	TEST ENER	IMPT NO OF REACT	NO OF FLASH FIRE PT	PROP DIST LOSS	WT	R T	PLTL
												I	T
													CODE
303 SS	GAC		70-2141-1	G0X	5000.0			00/04				A	10
303 SS	GAC		70-2141-2	G0X	6800.0			00/04				A	10
303 SS	GAC		71-2286	A-50	719.0	489						T	15
303 SS	GAC		71-2394	A-50	773.0	498						T	15
303 SS	GAC		71-2394-1	A-50	791.0	508						T	15
303 SS	GAC		71-2394-2	A-50	762.0	520						T	15
304 CRES STEEL	UNITED STATES STEEL	.0750	70-2034	G0X	1500.0		50	00/04				A	11
304 CRES STEEL	UNITED STATES STEEL	.0750	70-2034-1	G0X	1500.0			00/04				A	10
304 SS	GAC		71-2284	A-50	741.0	508						T	15
304 SS	GAC		71-2284-1	A-50	662.0	499						T	15
304 SS	GAC		71-2419	A-50	742.0	496						T	15
304 SS	GAC		71-2419-1	A-50	608.0	505						T	15
304 SS	GAC		71-2427	A-50	814.0	505						T	15
304 SS	GAC		71-2427-1	A-50	553.0	456						T	15
304 SS	GAC		71-2427-2	A-50	693.0	504						T	15
304L SS	GAC	.0750	70-2154	G0X	4500.0		50	00/04				A	10
304L SS	GAC		70-2154-1	G0X	5000.0			00/04				A	11
304L SS	GAC		71-2282	A-50	688.0	486						T	15
304L SS	GAC		71-2282-1	A-50	803.0	514						T	15
304L SS	GAC		70-2170	G0X	2000.0			00/04				A	10
304L SS	GAC	.0750	70-2221-1	G0X	1500.0		50	00/04				A	11
308 SS	GAC	.0750	70-2124	G0X	4500.0			00/04				A	10
308 SS	GAC		71-2285	A-50	641.0	477						T	15
308 SS	GAC		71-2285-1	A-50	703.0	490						T	15
316 CRES STEEL	GAC		71-2695	G0X	1500.0		50	00/04				A	11
316 CRES STEEL	GAC		71-2695-1	G0X	1500.0			00/04				A	10
316 SS	GAC		71-2392	A-50	759.0	500						T	15
316 SS	GAC		71-2392-1	A-50	783.0	505						T	15
316 SS	GAC		71-2392-2	G0X	2000.0			00/04				A	10
321	GAC	.0750	70-2104	G0X	4500.0			00/04				A	10
321	GAC	.0750	70-2104-1	G0X	5000.0		50	00/04				A	11
321 CRES STEEL	UNITED STATES STEEL	.0750	70-2036	G0X	1500.0		50	00/04				A	11
321 CRES STEEL	UNITED STATES STEEL	.0750	70-2036-1	G0X	1500.0			00/04				A	10
347 SS	GAC	.0750	70-2119	G0X	2000.0		50	00/04				A	11
347 SS	GAC	.0750	70-2119-1	G0X	5000.0		50	00/04				A	11
347 SS	GAC		70-2119-2	G0X	5000.0			00/04				A	10
347 SS	GAC		70-2119-3	G0X	6800.0			00/04				A	10
347 SS	GAC		71-2389	A-50	811.0	531						T	15
347 SS	GAC		71-2389-1	A-50	740.0	499						T	15
410 CRES STEEL	ALLEN FRY STEEL CO.	.0750	70-2197	G0X	500.0		50	00/04				A	11
410 SS	GAC	.0750	70-2113	G0X	2000.0			00/04				A	10
416 CRES STEEL	PACIFIC METALS	.0750	70-2204	G0X	1500.0			00/04				A	10
416 CRES STEEL	PACIFIC METALS		70-2204	G0X	1500.0		50	00/04				A	11

MATERIAL TEST DATA BY MANUFACTURER S DESIGNATION AS OF 31 JAN 72

MFGR S DESIGNATION	MANUFACTURER	SPEC. THICK.	TEST RPT NO.	TEST ENVR	TEST PRESS	TEST TEMP	TEST EMER	IMPT NO OF REACT	NO OF FLASH FIRE PT	PROP DIST LOSS	R T MATL I T CODE
420 SS-00-S-763	GAC	.0750	70-2108	GOX	4500.0			00/04			A 10 DMHDX
430 SS	GAC		71-2422	A-50	723.0	497					T 15 DMHDX
430F CRES STEEL	GAC	.0750	71-2422-1	A-50	775.0	499					T 15 DMHDX
430F CRES STEEL	A.M. CASTLE CO.		70-2190	GOX	1500.0			00/04			A 10 DMHDX
440 SS	A.M. CASTLE CO.	.0750	70-2190-1	GOX	1500.0		50	00/04			T 15 DMHDX
448 SS	GAC		71-2317	A-50	807.0	511					T 15 DMHDX
448 SS	GAC		71-2317-1	A-50	818.0	514					T 15 DMHDX
440C	GAC	.0750	70-2107	GOX	2000.0			00/04			A 10 DMHDX
440C	GAC	.0750	70-2107-1	GOX	2000.0		50	00/04			A 11 DMHDX
440C	GAC		70-2107-2	GOX	5000.0		50	00/04			A 11 DMHDX
440C	GAC		70-2107-3	GOX	4500.0			00/04			A 10 DMHDX
440C 00-S-763	GAC	.0750	70-2111	GOX	5000.0		50	00/04			A 11 DMHDX
446 SS	GAC		71-2418	A-50	717.0	495					T 15 DMHDX
446 SS	GAC		71-2418-1	A-50	729.0	488					T 15 DMHDX
446 SS	GAC		71-2425	A-50	802.0	502					T 15 DMHDX
446 SS	THE ELECTROLYZING CO		71-2425-1	A-50	805.0	505					T 15 DMHDX
446 SS	THE ELECTROLYZING CO		71-2594	A-50	777.0	523					T 15 DTXXX
5052-M32			71-2594-1	A-50	765.0	523					T 15 DTXXX
52100 STEEL	ALLEN FRY STEEL CO.		70-2207	GOX	1500.0			00/04			A 10 DMHDX
52100 STEEL	ALLEN FRY STEEL CO.		70-2207-1	GOX	1500.0		50	00/04			A 11 DMHDX
6242/ML-A-8625 TYPE 2	ALCOA		71-2746	GOX	2000.0			00/04			A 10 FIMAX
7075 AL CR PLATED	GAC		70-2223	GOX	4500.0			00/04			A 10 DTMAHS
73X BLK MARKING INK	INDEPENDENT INK CO		71-2687	GOX	1500.0		50	00/04			A 11 APGTX
73X BLK MARKING INK	INDEPENDENT INK CO		71-2687-1	GOX	1500.0			01/01			T 10 APGTX
82 AL/18 NI	BRAZE ALLOY		71-2339	A-50	805.0	506					T 15 DTUUMN
82 AL/18 NI	BRAZE ALLOY		71-2339-1	A-50	818.0	502					T 15 DTUUMN



APPENDIX III - SELECTED SUMMARIES, CONCLUSIONS, AND RECOMMENDATIONS  
EXCERPTED FROM THE INDICATED REFERENCES.

Attwood and Allen (1971)

## "CONCLUSIONS AND RECOMMENDATIONS

- (1) The dependence of the spontaneous ignition temperature, SIT, of a material on test techniques such as heating rate and gas flow rate, and on sample conditions such as powder or block, new and clean or used and 'aged', has been demonstrated; but no consistent trends were apparent.
- (2) Previously reported large decreases in SIT with increase in pressure above atmospheric are likely to have been partly caused by the change in test technique. With few exceptions the 'Pot' test gives higher SITs than the 'Bomb' test, hence the use of the 'Pot' test alone, to assess the suitability of materials for use in oxygen, cannot be recommended.
- (3) Nylon is not recommended for use in high pressure oxygen. Even when new or unused its SIT can be below 300°C, and wear and 'ageing' during use can apparently lower the SIT to 155°C. These could have been contributory factors to the six fires from which this investigation stemmed.
- (4) ZX32 a material suspected in one fire, did not ignite in any test.
- (5) The SITs of several relatively new silicone materials have been measured and generally increase with an increase in oxygen pressure. As this is the reverse of the behaviour of many non-silicone materials tested in 1950, silicone materials might well be used more widely in high pressure oxygen systems. However, only limited tests have been made so far: further investigation would be necessary before any definite conclusions could be drawn.
- (6) The need for a test or set of tests by which to define the compatibility of a material with oxygen has been discussed and a programme of work aimed at establishing such a test has been outlined. An interim standard test has been proposed and a method of interpreting any spread of results suggested."

Baum, Goobich, and Trainer (1962)

### "Conclusions

1. Teflon and Kel-F are both compatible with high-pressure oxygen systems with regard to chemical reactivity, and they manifest a high degree of stability. Viton, however, shows questionable compatibility although an insufficient number of samples were tested in this program to draw firm conclusions. AiResearch also reports some failures with Viton O-rings but nevertheless they are using them as seals in the Mercury control equipment. In any case, neoprene seals were found to be incompatible with high-pressure oxygen.

Pure Teflon suffers from certain physical weaknesses. It tends to cold flow very easily, and because of its high ductility and lubricity, it is easily extruded out of shape when unconfined. Neither does a thin, unsupported Teflon disk have sufficient strength to prevent collapse when high-pressure forces are applied.

Kel-F has sufficient strength and rigidity to partially overcome the cold-flow problem for short periods and it can withstand instantaneous impacts from flow that would cause Teflon to collapse or extrude. However, Kel-F does not appear to be sufficiently ductile for seal use, nor does it provide the lubricity of Teflon. A possible solution, aside from the conventional compounding of Teflon with ceramic, glass fiber, and asbestos cloth, is use of a new compound of Teflon and Kel-F. This compound consists of 80 parts Kel-F and 20 parts Teflon. According to the developer, Minnesota Mining and Manufacturing Corporation, it is sufficiently strong to resist cold flow, is more ductile than pure Kel-F, and retains the lubricity of Teflon. However, both Kel-F and Teflon should be employed as seals only when closely confined (like O-rings) to prevent possible collapse or cold flow.

2. Apparently the hydrocarbon-oxygen mixture is a rather complex one in that merely mixing the two constituents does not appear to be the only thing necessary to initiate a chemical reaction. Case histories of storage vessels at 2000 psi or less suddenly exploding for no apparent reason seem to substantiate the suggestion that a third factor or sequence of events must be present. However, the triggering agent may not be the same in all cases. The only method whereby the explosive nature of hydrocarbon-oxygen mixtures may be properly and more fully understood is through an extensive series of carefully controlled deliberate explosions. Studies of this type have been conducted, but never at pressures of 500 atmospheres.

On the basis of the data available from the present experiments, the following can be concluded:

- (1) Below 400 F concentrations of 50 ppm or less are not highly reactive and do not constitute a major danger.
- (2) If a reaction did occur, it was either too rapid, too slow, or too slight to be detected by visual readings of the pressure gage or by temperature fluctuations recorded by the thermocouple.

Baum, et al. (Continued)

(3) If a reaction did occur, it did not go to completion. This conclusion is supported by the fact that traces of hydrocarbon were indicated in most gas analyses. The reaction may not have been sustained for two possible reasons: (1) because of the low concentration, the gas was too finely diffused and could not sustain a flame front and (2) the total heat of reaction was small and was too quickly dissipated to "set-off" the remaining unburned gases.

3. On the basis of the five evaluations just discussed, the four metals considered can be rated in the following order in terms of their possible application in high-pressure oxygen systems:

Stainless steel (Type 316)	Good+	Shows sufficient strength and ductility for pressure-vessel use; has low oxidation rate and good erosion resistance
Monel	Good-	Is less strong but sufficient where weight is not a restricting factor; has lowest oxidation rate
Brass	Poor to fair	Has insufficient strength for lightweight pressure-vessel application, but demonstrates good retention of original physical properties; good oxidation resistance in dry atmospheres but poor resistance in moist atmospheres; has only fair erosion resistance
Pure copper	Very poor	Too weak to be used for pressure vessels; poor retention of physical properties; has high auto-ignition temperature but also has high oxidation rate when exposed for long periods

The above rating is based on the investigation and analysis of only a small sampling of each metal. More extensive and detailed investigations are required to determine quantitative results. Qualitatively, on the basis of the experiments performed, only stainless steel and Monel are acceptable alloys. Brass and pure copper, although possessing some desirable characteristics, should not be used because of other factors which cannot be sufficiently compensated.

4. It is evident on the basis of the data gathered that electrostatic charges due to high-pressure oxygen flow are not significant in themselves. However, some factors which arise because of the flow of gas must be seriously considered. One possible problem is ozone formation caused by the cooling of the gas and the presence of electrostatic charges. The ozone molecule is much more active, chemically, than ordinary oxygen and therefore likely to lower the ignition temperature. A more important factor is the presence of dust or liquid moisture in the gas stream. It has been shown that gases passed through a pin-hole orifice under a pressure head of 1800 psi invariably show a strong electrostatic charge only when either dust or liquid moisture is present in the gas stream. These charges may be sufficiently large to cause ignition.

In the experiments performed at Battelle, some dust particles were present in the gas stream but probably they were not in sufficient quantity to increase the electrostatic charge greatly. Of course, the longest flow period was only 8 seconds and the pressure was not constant during the entire period.

Because the danger of detonation or chemical reaction being initiated by an electrostatic charge is potentially large, further investigations should be performed but with larger volumes which will permit longer flow periods. Also, attempts should be made to control and measure the amount of dust or moisture in the stream to compare the effect on the charges generated. In general, however, regardless of the negligible charge generated, equipment should be grounded wherever possible.

5. Rapid heating due to gas surging into confined spaces can produce a major hazard. During the experiments at Battelle, a pressure regulator failed and burned under surge conditions. Also AiResearch discovered that many materials including neoprene and Viton reacted chemically when impacted by a surging gas at 8000 psi.

However, there is also evidence that at lower pressures, or when the receiver volume is comparatively large, the effect of surge compression is minor. This conclusion is supported by the results of the surge experiments at Battelle and similar experiments performed at AiResearch.

On the basis of the experimental results and data available, it can be concluded that the rise in temperature due to adiabatic compression to 8000 psi is probably not sufficient to cause large masses of metal to ignite. However, the possibility of thin sectioned metal wire and of polymers such as neoprene igniting is great. Also the danger of organic or hydrocarbon contaminants chemically reacting is serious since many of these have ignition temperatures below 500 F, especially in high-pressure gaseous oxygen.

Baum, et al. (Continued)

6. Since the basic aims of the research were to evaluate the relative safety of 7500-psi gaseous oxygen systems and to identify the hazards which can be expected in their operation, the conclusions listed below concern these subjects specifically.

Although some of the research results indicate that relative safety can be maintained apart from absolutely ideal conditions, it cannot be assumed that high standards of cleanliness and handling technique are not desirable. Whenever ideal conditions and procedures are possible, they must be insisted upon. However, although danger increases with less ideal conditions, certain compromises can sometimes be tolerated. Only through continued research and through accumulated engineering experience can a more confident assessment of the extent of these allowable compromises be made. Until the time that further research and engineering provides additional information for formulation of recommendations, the conclusions given below can be used as general guides:

- (1) Contaminated oxygen gas at 7500 psi, as investigated in this program and under the environmental conditions imposed when considered independently of the equipment or system employed, is relatively safe from spontaneous combustion or detonation.
- (2) Hazardous chemical reactions of 7500-psi oxygen gas with foreign elements seem to be dependent upon conditions other than simple mixing, proximity, or high-velocity flow. Temperature is believed to be the most critical variable and the minimum temperature at which a reaction will occur is in turn dependent upon the existing pressure.
- (3) Hazards and difficulties encountered in the operation of high-pressure gaseous oxygen systems seem to be attributable primarily to poor system design and to the use of poorly designed equipment.

In addition to the general conclusions above the following more technical and specific conclusions have been drawn:

- (1) Absolutely clean, dust-free atmospheres are not essential to safe operation.
- (2) Concentrations of hydrocarbons in the order of 50 ppm or less are not dangerously reactive.
- (3) Electrostatic charges caused by short flow periods through a small orifice appear to be negligible.
- (4) Stainless steel and Monel are acceptable materials of construction.
- (5) Uncoated or unplated copper appears to oxidize too readily to be used extensively.
- (6) Although cases of combustion involving Teflon and Kel-F have been reported, the experiments conducted show that these are acceptable nonmetallic sealing materials.

### RECOMMENDATIONS

Two primary recommendations have been formulated on the basis of the conclusions presented above.

(1) A broader, more detailed study of materials compatibility with 7500-psi oxygen gas should be pursued. This study should be an attempt to derive a more exact understanding of the conditions that initiate combustion. Extensive experimentation with stainless steel, Monel, anodized aluminum, Teflon compounds, Kel-F compounds, and various thread lubricants and sealants should be conducted to permit a proper statistical analysis. These experiments should have two objectives:

(a) Determination of the spontaneous ignition temperature under static conditions and after various periods of exposure.

(b) Determination of the spontaneous ignition temperature during surge conditions and evaluation of the influence of the volume to surface-area ratio.

(2) Because of the inadequacy of available equipment to provide reliable, long-time performance for absolutely leakproof operation, a development program should be initiated. This program should be planned to investigate critical design criteria. The components that require further study, in estimated order of priority, are:

- Fittings
- Valves, manual and remote
- Lightweight pressure vessels
- Regulators."

Guter (1967)

## "SUMMARY AND DISCUSSION

Ignition temperatures in high pressure gas were determined using a stainless steel bomb in which samples could be raised to the ignition temperature in a few minutes. The effect on ignition temperature of changes in total pressure, rate of heating, "ageing", i. e. prolonged storage of material in oxygen under pressure, oxygen concentration, and the physical state of the sample were determined in the high pressure apparatus. A simpler apparatus called the 'pot' ignition apparatus was developed for the rapid determination of ignition temperatures in oxygen at atmospheric pressure.

The many materials examined have been classified in the following five groups:

1. Lubricants, including thread sealing compounds.
2. Natural and Synthetic Rubber Hose Materials.
3. Polymers.
4. Valve Seat materials.
5. Metals and Alloys.

The ignition temperatures of the materials in Class I were relatively unaffected by changes in oxygen pressure. The Aroclors (chlorinated diphenyls) were particularly resistant, and had ignition temperatures above 400°C. If their other properties are satisfactory they should prove suitable for use as lubricants and hydraulic fluids in oxygen systems. Acheson Grease G. 30 and the Ministry's anti-seize and sealing compound also had high ignition temperatures which were unaffected by pressure. For this reason they would be preferred to the silicone greases for use in oxygen.

The ignition temperatures of the rubber hose materials in Class II were all considerably reduced by increasing the oxygen pressure, except in the case of silicone rubber which ignited above 300°C. The natural and synthetic rubbers, other than silicone, were found to ignite at temperatures below 200°C in oxygen at pressures of 100 atmospheres or higher. The ignition temperatures were considerably reduced if traces of the fabric used as reinforcement in the completed hose were included with the sample. Increases in heating rate led to significant reductions in the ignition temperatures of hycar, neoprene and BTR Hose (Specification 1180). Provided certain precautions are strictly observed it is suggested that rubber hoses may be used with high pressure oxygen.

Included in Class III were Teflon, Kel-F and phosphorylated polyvinyl alcohol which were the most resistant non-metallic materials examined. They failed to ignite in oxygen at 250 atmospheres when heated to 350°C.



Guter (Continued)

In the 'pot' test they sometimes ignited at temperatures above 500°C. Increasing the oxygen pressure to 175 atmospheres reduced the ignition temperature of most of the other materials included in Class III, but with polythene, nylon and perspex a further increase in pressure to 250 atmospheres caused only an insignificant increase in the ignition temperature. Polythene, red vulcanised fibre and rosin bonded fabric were also examined in air; the ignition temperatures in air were found to be rather higher than in oxygen but no definite relationship between the partial pressure of the oxygen and the ignition temperature of these materials was obtained. Special ageing experiments provided interesting results, but unfortunately did not yield general conclusions.

The materials in Class IV with the exception of GACO seating materials had relatively low ignition temperatures. The much higher ignition temperatures obtained with some of the materials in Class III suggest that they may be preferred for making valve seats, provided their mechanical properties are satisfactory.

None of the metals and alloys in Class V ignited in oxygen at 250 atmospheres when heated alone to 350°C. Copper, magnesium alloy and mild steel turnings ignited in the presence of a drop of oil if heated to about 200°C in oxygen at 250 atmospheres.

Changes in gas flowrate, oxygen concentration, heating rate and physical state had no marked effect on ignition temperature for most of the materials examined. Exceptions were some Class II materials which were affected by heating rate and Buna which in the form of shavings ignited at temperatures more than 100° below the corresponding ignition temperatures for samples in block form.

Materials in Classes II, III and IV were examined by the 'pot' test. In general, it was found that the higher the 'pot' ignition temperature the higher was the ignition temperature in high pressure oxygen. Unfortunately the 'pot' ignition temperature gave no indication of the effect of pressure in the range 50 - 250 atmospheres on ignition temperature.

No attempt was made to examine the behaviour of the materials under actual working conditions at high pressure. It is not possible therefore to relate the ignition temperatures observed under controlled conditions to the hazards associated with the everyday use of combustible materials in high pressure oxygen. However as no materials ignited at a temperature below 100°C and very few below 150°C in oxygen at pressures up to 250 atmospheres it seems highly probable that with careful selection a number of materials which are not entirely non-inflammable can be safely used in oxygen at high pressures. When using such materials it is important to avoid any sudden changes in pressure or temperature, and to ensure the absence of any inflammable dust or other material more susceptible to ignition, which might initiate combustion.

Guter (Continued)

The possibility of fires in high pressure oxygen systems would be largely avoided by measures that would prevent conversion of the free energy of the compressed gas into heat. If this could be achieved in the design of equipment then the ignition characteristics of the materials that come into contact with the oxygen would be of secondary importance. Until this ideal is reached, safety in the use of high pressure oxygen will depend not only on the selection of materials with a high ignition temperature, but on careful attention to the design of the apparatus, and upon the observance of a number of elementary but essential precautions. As the starting-point of combustion will clearly be determined by the material of lowest ignition temperature which happens to be present, it is important to exclude carefully all traces of organic dust and oil. Particles of dust and fibre introduce a special hazard in connection with the temperature rise which occurs on adiabatic compression in a closed tube. In this case the rise in temperature of the gas may be considerable, but its heat capacity is small. The gas is therefore unable to raise appreciably the temperature of any massive body with which it is in contact, and its heat is rapidly dissipated. A small particle of fibre in the gas stream, however, can be raised to a temperature approaching that of the gas, and can therefore readily be ignited. When this occurs it will cause the ignition of any other inflammable material in its vicinity.

The work described in this report does not provide a basis for choice of materials for use in high pressure oxygen without regard to the circumstances of use, but it is hoped that it will serve as a useful guide for the selection of the best materials for a particular duty, and the range of conditions under which they can be safely used."

(Parts of the summary and discussion are omitted.)

Johnston (1970)

"CONCLUSIONS:

1. No great technology differences exist among the fields reviewed.
2. Breathing oxygen systems utilized today have been quite successful in meeting their intent. The majority of the relatively few failures which have occurred have been traced to poor handling practices.
3. The success of today's designs has been the result of designing by experience, largely without thorough scientific understanding.
4. Improvement in and standardization of specifications and guidelines are needed in the following areas:
  - a. System design requirements as a function of pressure, and use.
  - b. Materials requirements and a suitable list of materials for specific applications.
  - c. Materials test methods which will verify suitability of materials for the given applications.
  - d. Accurate testing methods for determination of a given systems contamination level.
  - e. Allowable contamination levels and materials including particle sizes for the various system pressure levels."

Kimzey (1970)

"CONCLUDING REMARKS

The literature available prior to the Apollo 13 incident indicates that little work has been performed on electrically induced ignition of metals. Much work has been done on impact ignition, particularly in LOX environments; however, much of the data are not directly usable due to the wide variety of experimental techniques employed. Sufficient work has been performed to permit the following observations:

1. The ignition temperature of a metal in LOX is independent of pressure, convection, and oxygen percentage.
2. The effect of halogen impurities on the ignition temperature of metals cannot be determined from existing data.
3. Ignition temperatures, like boiling points, or melting points, appear to be depressed by the addition of impurities."

Marzani (1968)

## "CONCLUSION

The following conclusions are made with regard to material evaluation:

From a fire-resistance standpoint, TFE is superior to the other materials tested.

- CTFE is nearly as high in fire resistance. Polyvinylidene fluoride and the polyimides are intermediate. Polyurethanes, ethylene-propylene rubbers and polyethylene are lowest.
- The inclusion of fire-resistant materials in composites with less fire-resistant materials does not insure that the composite will have improved fire resistance.
- Of the parameters affecting combustion, pressure has the greatest effect on material ignition temperature. Sample size is important in determining the flammability limits. Sample geometry can be an important factor in ignition temperature and reaction kinetics.
- Materials ignite more readily at lower pressures in oxygen than in air. Above 2400 psig the difference disappears.

The following conclusions are made with regard to the method of study:

- The modified high-pressure bomb satisfactorily provided reproducible spontaneous-ignition data on small samples of solid materials in an oxygen atmosphere. Data indicate a favorable degree of correlation with published data.
- This test method should be considered in any effort to establish a standardized test procedure for determining the spontaneous-ignition temperatures of solid materials at elevated pressures.
- A standardized test will not necessarily yield a result which will be applicable under every condition of material usage."

Nihart and Smith (1964)

## "CONCLUSIONS

The following conclusions are based upon the results of the present experimental test program and other data referenced in this report.

1. The spontaneous ignition temperatures of the materials tested are essentially the same in 7500 psi oxygen as in 2000 psi oxygen.

2. The relative resistance of metals and alloys to ignition and combustion in 7500 psi oxygen agrees in general with results obtained in earlier Linde test work at 2000 psi and with the results of Dean and Thompson (1961) except for aluminum.

3. Only three thread lubricants might have possible safe application in 7500 psi oxygen. These lubricants are Dixon's Flake Graphite No. 1, Burnil Brand Microplates, and Almasol Powder. Further information on their lubricating properties and thermal stability would need to be known before a complete recommendation could be made. One drawback to this type of lubricant is that there is always a possibility of particulate matter inadvertently getting into the high pressure system.

4. The only thread sealant tested in this program which might be recommended for 7500 psi oxygen service would be 50-50 soft solder (which could be used in tinning threads). TFE tape is not recommended because of the possibility of pieces getting into the gas stream.

5. Recognizing that some type of packing is needed for static and dynamic seals, glass-filled TFE would be the only material presently recommended for use. Even its use presents a hazard and it should only be used when tightly confined.

6. Inconel alloy 600, brass, Monel alloy 400, and nickel are recommended for use in 7500 psi oxygen. Other metals might be acceptable if plated with nickel, silver, or gold. Monel alloy K-500 might also be acceptable but it was not given the promoted ignition test in 7500 psi oxygen.

7. Of the materials tested, stainless steel and aluminum are the least satisfactory for use at oxygen pressures of 7500 psi.

8. Copper is not recommended because of the results of Baum, Goobich, and Trainer (1962). Other copper alloys might be acceptable material but would need to be tested.

9. Electrostatic charges developed during the charging of a small high pressure receiver were found to be negligible.

10. The simulated system was pressurized with oxygen to instantaneous pressures ranging from 665 to 7100 psi without incident. Pressurization time varied from 0.5 to 0.21 seconds.

Nihart et al. (Continued)

The hazards considered to be most responsible for ignitions in oxygen systems are:

a. Adiabatic Compression - High temperatures may be produced when low pressure oxygen is suddenly brought to a high pressure, such as when a valve is suddenly opened between a high pressure and a low pressure portion of the system. These temperatures can be high enough to ignite organic materials or small particles of metal.

b. Particulate Matter - Particles may be accelerated in a high velocity stream and impacted against organic materials or metallic burrs, projections, etc. Their energy is converted to high local temperatures by this impact with subsequent ignition of associated materials. Even the particles themselves might be ignited if they were either organic or metallic in nature.

These hazards may be substantially reduced by proper cleaning of the equipment initially, use of filters (especially ahead of regulators) minimum use of organic material, and judicious operation of valves and regulators to prevent rapid increases in pressure.

There are other mechanisms by which ignition may occur but these have been well covered by Reynales (1959).

#### RECOMMENDATIONS

1. Further study should be made on the copper alloys to define more clearly their compatibility and applicability in 7500 psi systems.
2. More tests should be conducted on metals and alloys to determine the effect of geometric configuration on the relative ignition temperatures.
3. There is need for further investigation into thread lubricants and thread sealants. This study would need to cover their physical properties such as lubrication and sealing qualities as well as their compatibility with oxygen. Development of special lubricants and sealants might be required.
4. A program is needed to develop and build better hardware constructed of materials more compatible with high pressure oxygen. The program should cover any and all equipment which would be used in a 7500 psi oxygen system."

Ordin (1971)

## "SAFETY RECOMMENDATIONS

Although the solution to many of the problems which caused the oxygen mishaps cannot be specifically prescribed without further research and development efforts, several practical safety regulations are recommended to increase the operational safety. These recommendations based on specific mishaps include the following:

- (a) Prevent the cross connecting of fuel, oxygen and purge lines by means of designs and permit no subsequent uncontrolled revisions by maintenance personnel.
- (b) Suitably restrain all flexible lines at specific intervals.
- (c) Prevent the venting and disposal of oxygen near electrical systems or other ignition sources capable of initiating and promoting fires.
- (d) Provide controlled valve operation of oxygen valves to limit generation of heat due to gas compression.
- (e) Label pressure lines with values of operational, proof, and design burst pressure.
- (f) Conduct pre-operational hazard analyses on liquid and gaseous pressure systems before checkout, operation or maintenance.
- (g) Insure verification of pressure relief before liquid and gas lines are disconnected.
- (h) Emphasize hazards of operations in oxygen systems through training. Many operating personnel are not fully aware of the hazards associated with oxygen systems.
- (i) Maintain records of any rework on tanks, lines and related equipment. The operations performed should be available to evaluate continued use of equipment.
- (j) Fluids used should be identified and environmental chamber operations include a verification of the composition of the gas mixtures employed.
- (k) Liquid oxygen loading rates should be established commensurate with duct and equipment fatigue capacities. Material failures have been induced by low stress, high frequency vibrations caused by excessive fill rates. Instrumentation should be installed to measure and monitor induced vibrations.



Orain (Continued)

(l) Standards should be established interfacing the electrical systems to the oxygen systems. Problems of electrical arcing of interior lights and fixtures should be resolved.

(m) Insure availability of recent information on results of testing and of field experiences on the compatibility of materials with oxygen."

Schwinghamer (1971)

## "CONCLUSIONS

Without a satisfactory solution to the problem of materials reaction sensitivity in LOX and GOX, highly reliable expendable launch vehicles and non-reusable spacecraft would not have been possible. The basic test method which accomplished this end was the ABMA and MSFC-SPEC-106B. As a result of the Apollo 13 incident, increased emphasis is being placed on materials compatibility in a high pressure GOX environment.

Besides impact sensitivity of materials, approximately adiabatic compression conditions can contrive to induce materials reactivity. Tests run at high pressure using the new MSFC tester have so far shown that:

- 1) The materials used in the tests cited in Table II showed an inverse relationship between thickness and impact sensitivity.
- 2) Of the materials tested to date, several tend to indicate that impact sensitivity in GOX is more pressure dependent than in LOX.
- 3) The impact sensitivity of the materials tested to date in GOX at the pressures tested showed enhanced impact sensitivity with higher pressure.
- 4) The rank ordering of the materials tested so far in LOX up to 1000 psia ( $6.8 \times 10^5$  Newtons/m<sup>2</sup>) is the same as the rank ordering resulting from tests in LOX at 14.7 psia ( $9.5 \times 10^4$  Newtons/m<sup>2</sup>).

While there is agreement on the syntactical basis of probability theory as it applies to LOX/GOX compatibility testing, there is indeed the danger of a disparity between the syntactics and the explanation and interpretation of these signs in terms of the real-world. Statistics can be a useful indicator if cautiously and correctly applied. There is the distinct danger of a retreat to, or a preoccupation with, "cure all" test methods and techniques, meanwhile disregarding the necessity for hard data acquired from statistically meaningful numbers of tests.

Future plans at MSFC include investigation and research on a variety of LOX/GOX sensitivity testing methods and techniques. It is expected that configuration testing will continue to be necessary in special situations.

In the final analysis, the many questions of materials compatibility in LOX and GOX will undoubtedly continue to be crucial considerations to the aerospace designer concerned with our future space vehicles and spacecraft."

White and Ward (1966)

## "SUMMARY AND CONCLUSIONS

The ignition of metals in oxygen and oxygen atmospheres was reviewed from the viewpoints of (a) methods that have been used to study behavior, (b) experimental values that have been obtained, and (c) the status of theories that permit the calculation of ignition temperatures.

While no clearcut definition of ignition temperature has been developed, it appears probable that a definite or an absolute ignition temperature does exist for a particular metal-oxygen system. In general terms, if the energy input as converted to heat is greater than the heat dissipation, a temperature will be reached at which ignition of the metal will occur. Practically, this temperature appears dependent on many factors some of which are relatively static (e. g., atmosphere, composition, purity, metal surface area and condition, etc.) and others that may be dynamic (e. g., pressure, impact, impact velocity, vibration, etc.). No standard test procedures or methods have been developed to evaluate the ignition temperatures of metals. The net result is that varying values have been reported for the same or similar metal-oxygen systems.

Despite these differences, the following generalizations can be offered on the basis of the experimental evaluations performed to date:

- (1) All metals, with the possible exception of gold and platinum, can be expected to ignite in oxygen at some elevated temperature.
- (2) Alloys of several systems have been shown to ignite in oxygen systems at relatively low temperatures and some at LOX temperatures if some external source of energy input is present. Generally, the presence of a fresh metal surface is also necessary to cause ignition at these low temperatures. These ignition-sensitive alloy systems include the alloys of titanium, zirconium, thorium, uranium, lead, tin, and magnesium.
- (3) A number of secondary energy input sources have been shown to cause ignition of these sensitive alloys in oxygen systems. These sources also probably produce a fresh metal surface and are identified as follows:

### In Gaseous Oxygen

Electric spark  
Puncture

Stress rupture  
Explosive shock.

### In Liquid Oxygen

Mechanical impact  
Explosive shock.

Puncture

White et al. (Continued)

(4) A number of other methods of secondary energy input and methods of exposing fresh metal do not produce ignition. These are as follows:

In Gaseous Oxygen

High-velocity flow

Low-cycle fatigue cracking

Impact on the outside of a container without puncture

High-velocity flow through a small orifice

Rapid pressurization

In Liquid Oxygen

Impact on the outside of a container without puncture

Rapid pressurization

Machining

Friction and galling

Tensile rupture

Mechanical vibration

Sonic vibration

Ultrasonic vibration

High-velocity flow through an orifice.

(5) An increase in pressure of a gaseous oxygen system tends to promote ignition at lower temperatures or with lower secondary energy inputs. The dilution of oxygen with an inert material, gaseous or liquid, tends to reduce sensitivity of metals in oxygen systems. However, propagation is not affected much until the dilution is very great, on the order of 90 percent inert gas or liquid.

(6) A number of alloy systems have been shown to be relatively insensitive to ignition in an oxygen environment either at high temperatures or at low temperatures with high secondary energy inputs. These alloy systems include: austenitic stainless steels, nickel alloys, cobalt alloys, copper alloys, and silver alloys. Alloys of these systems show the best service record and also show the least sensitivity in laboratory tests.

White et al. (Continued)

(7) Another group of alloys appears to be somewhat intermediate between the sensitive and insensitive groups cited in Items 2 and 6. This group includes aluminum alloys, the 400 series stainless steels, and carbon and low-alloy high-strength steels. These materials would be expected to find limited use in relatively nonsensitive applications."

(Remaining discussion has been omitted).