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NIST Technical Note 1407

Fire Data Management System, FDMS 2.0, Technical Documentation

Rebecca W. Portier

NIST

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[2]Some elements at Boulder, CO 80303.

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Fire Data Management System, FDMS, is a computer database specifically designed to store and retrieve fire test results. A version, FDMS 1.0, of the database is currently available. This guide provides detailed descriptions of the physical file implementations planned for the next generation of the database, FDMS 2.0

Key words: bench-scale fire tests; computer database; export; fire research; import; large-scale fire tests; numeric databases; real-scale fire tests; scalar data; small-scale fire tests; vector data

1. Introduction

A unified method of accessing data is crucial to both experimental and modeling efforts in the development of the science of fire. FDMS, the Fire Data Management System [1][1], is a computer database for organizing and presenting fire data obtained from bench-scale and real-scale tests as well as fire simulation programs. By storing available fire test values in a common format, this data is readily available to computer models, plotting programs, and report generators.

The goal for FDMS is to provide a centralized database of test values generated from a variety of sources within the fire community. Such a database could be accessed through communications networks providing all participants with immediate access to new results. The FDMS concept should not be limited by computer platforms, computer languages, or data inflexibilities. Development of this centralized FDMS database involves four stages and the release of two versions of the software program.

The initial stage of development provides a software program which can be used transitionally to store results and to exchange test values between participants. A version of the software, FDMS 1.0, currently exists [2] which provides this functionality. One goal of FDMS 1.0 is the generation of feedback from the user community. The later, centralized version of the FDMS software must provide an open file design that will easily accommodate future test apparatus formats. All file formats and program functionality provided in FDMS 1.0 will be supported in the later version along with appropriate user recommended additions.

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[1] Numbers in brackets refer to literature references listed in Section 7 at the end of this report.

Consequently, user response is critical to the successful design of the centralized FDMS database.

A programmer's reference guide [3] has been written to address the second stage of development. The programmer's guide provides details of the FDMS 1.0 internal file formats including database files and import/export formats. These formats are detailed to assist model developers in accessing test data in FDMS 1.0 and in verifying that all data required by their models is available. The later, centralized version of FDMS will include all test apparatus available in FDMS 1.0 including the fire-resistance table [4], all test apparatus detailed in the original design of FDMS [5], and appropriate recommended additions and modifications.

A second version of the FDMS software, FDMS 2.0, will be developed and released in the third stage of development by incorporating feedback from the FDMS 1.0 users and model developers. The FDMS 2.0 version will minimally support the functionality and data details of the FDMS 1.0 version and provide a new user interface that is independent of computer platform.

The technical documentation provided in this report is intended to present the current design plan for the physical files in FDMS 2.0. Initially, the sections in this document should be read in a sequential manner in order to follow the development of the physical design. After an initial review, the document should serve as a technical reference. In an attempt to explain the derivation of the physical files, section 2 evaluates potential queries of the database. Section 3 details the individual files and corresponding fields required to implement the views discussed in section 2. Sections 5 and 6 have been included as cross-reference sources between the proposed file and field structures in FDMS 2.0 and the existing structures in FDMS 1.0. Feedback to these proposed formats is critical since programming implementation is scheduled to begin immediately. Any anticipated problems associated with these formats are significantly easier to correct prior to program implementation.

In the final stage of development, the centralized database will be generated using data provided from each of the existing individual databases. Once the database has been generated, access through communication networks will be provided. Data from the central database can be accessed at user locations or downloaded for access in individual FDMS software programs.

This technical documentation is not intended to provide details on the functionality provided by FDMS 2.0, the accessing of data from the centralized database, or the method for interface to FDMS 2.0. This is not a user's guide. Operation details are available in the FDMS user's guide and technical documentation [5] for the FDMS 1.0 version software. Some knowledge and experience with computer databases and database concepts is assumed throughout the remainder of this technical reference documentation.

2. Test Data Logical Views

2.1 Definition of a Logical View

In order to accurately design a computer database, it is essential that all potential views of the data be evaluated first. A database of fire data could be accessed for a variety of queries other than the results of known fire tests. For example, a list of professional fire organizations might be desired, or within a laboratory, a technician might require the calibration history for a particular instrument. It is necessary to determine all potential views, and the data relevant for each, prior to the design of the physical file structures. At this design level, no consideration for the number of physical files, the size of each file, the type of each field, or the size of individual fields is necessary. Because these physical constraints are ignored, the database views being evaluated are referred to as logical views. Once all logical views of the database have been considered and the inclusion of all required data has been verified, these views are then merged into one comprehensive view. In database terminology, this comprehensive view is referred to as the conceptual view. From the FDMS conceptual view, the actual physical structure is derived.

In designing the FDMS database, the following logical views have been considered:

- Fire Professionals and Affiliated Organizations
- Fire Test Products
- Fire Test Measurements
- Fire Test Methods
- Fire Test Results
- Instrumentation Types
- Laboratory Instrumentation

A complete description of the purpose of each view can be found in the appropriate subsections below.

2.2 Entity-Relationship Diagrams and Entity-Attribute Diagrams

Each logical view of a database can be graphically represented using a variety of software engineering diagrams. The most common of these are the Entity-Relationship Diagram (ERD) and the Entity-Attribute Diagram (EAD). A combination of these diagrams is frequently used in the early stages of the software design process to represent the items of interest, relationships between items, and those attributes of individual items which have been identified as critical to meeting the user's requirements. Pictorial representations of these components simplify the description making it possible for a user to determine if critical components are missing or improperly represented.

Figure 1 below provides an overview of symbols used in the creation of all ERD and EAD diagrams throughout this report. These symbols have been categorized as basic constructs, advanced constructs, indicators of cardinality, and key representations.

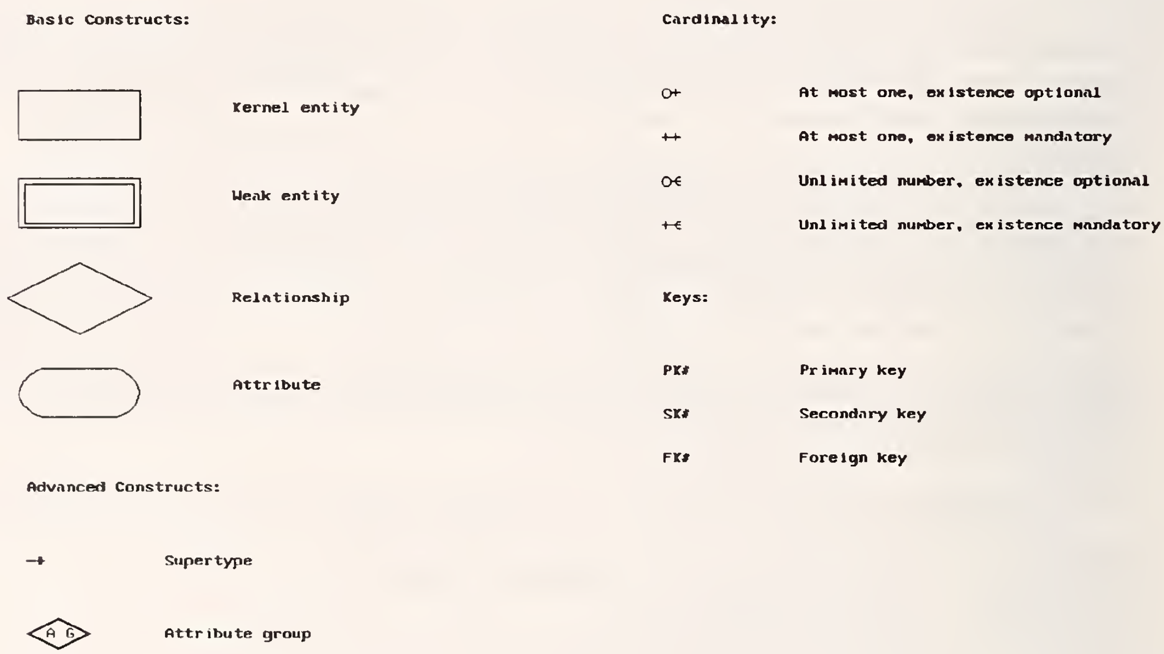


Figure 1. Fundamental Entity-Relationship Diagram Constructs.

The basic constructs of an ERD or EAD diagram are the entities, relationships, and attributes. **Entities** are the principal items for which information is stored. A group of similar items is referred to as an entity type while an occurrence within the group is referred to as an entity instance. For example, professional fire organizations is an entity type while the Building and Fire Research Laboratory is an entity instance. Typically, the use of the term entity without the modifier "instance" refers to the entity type. Entities can be further classified as one of two types: kernel and weak. **Kernel entities** exist independently of all other entities while **weak entities** require the existence of at least one other entity. For a laboratory technician tracking instrument calibrations, each instrument is a kernel entity. However, the calibrations are weak entities since they require the existence of an instrument before they can be recorded. The **relationships** in ERD diagrams represent any association between individual entities. The **attributes** are the actual characteristics of an entity or relationship. Attributes apply to relationships as well as entities since some characteristics become relevant only in the relationship between two entities.

Advanced EAD constructs utilized in this report include attribute groups and supertype attributes. **Attribute groups** provide the ability to replace a grouping of several attributes with a single attribute referred to as the **supertype attribute**. Attribute group notation can also be used to indicate the derivation of an attribute, the supertype attribute, from one or more additional attributes. This is commonly done to indicate those attributes which define a primary key for an entity instance.

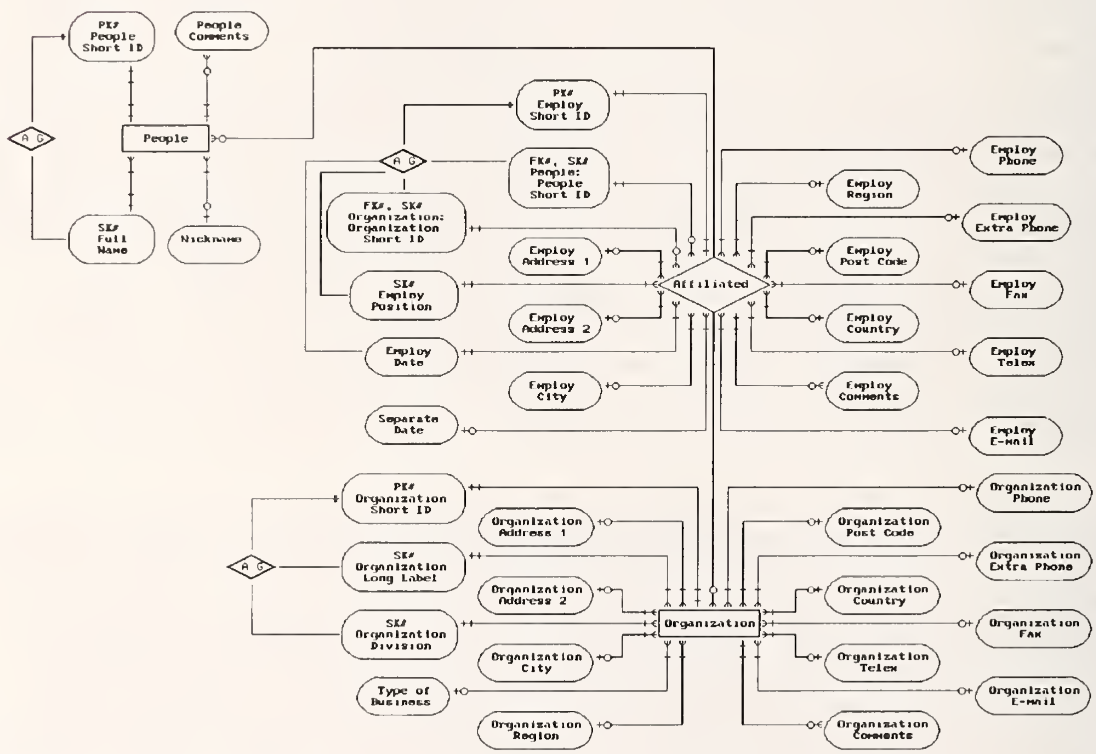
Cardinality in ERD diagrams indicates the minimum and maximum number of entity occurrences permitted in a relationship for any one occurrence of an entity. An example of cardinality in an ERD diagram is the relationship between a fire test and a standardized test method such as the Cone Calorimeter. For any fire test there is a cardinality of one and only one to the type of test method, in this case, the Cone Calorimeter. For the Cone Calorimeter test method, there may be zero or many fire test occurrences in the database. In EAD diagrams, cardinality indicates the minimum and maximum number of values each attribute may acquire for an entity or relationship instance. In an EAD diagram representing the calibration of laboratory instrumentation, a calibration history entry will have one and only one date, an operator might not be entered but at most one is possible, and there may be zero or many notes describing the calibration. Four types of cardinality are possible in this report: zero or one, one and only one, one or many, and zero or many. These cardinalities can be understood by considering any one occurrence of an entity or relationship. For a single occurrence, a cardinality of zero or one for a related entity or attribute implies that that entity or attribute does not have to exist, but if it does, there can be no more than one occurrence. A cardinality of one and only one implies that the object must exist and cannot have more than one possible value. The remaining cardinalities allow for multiple occurrences and differ only in the requirement for existence of an occurrence of the object.

The final symbolic representation in the EAD diagrams below is the key indicator. Keys are used to quickly access particular entity instances in a database. Three types of keys have been used. Primary keys are used to uniquely identify an occurrence of the entity. A primary key attribute must have one value occurrence for each entity in the database and cannot have more than one. Secondary keys are used to access entities which share a common attribute occurrence. The existence of a secondary key attribute value is not mandatory, and the number of entity occurrences with this attribute value is unlimited. Finally, the foreign key attribute indicates that the value for the attribute is actually obtained from the attribute of another entity or relationship occurrence.

2.3 Fire Professionals and Affiliated Organizations

The Fire Professionals and Affiliated Organizations logical view of the FDMS supports inquiries such as the following:

- What fire testing organizations are located in the United States?
- With which organization(s) is a known fire professional affiliated and in what capacities?
- What is the mailing address for the Building and Fire Research Laboratory?
- I need to speak with a fire modeler at the Building and Fire Research Laboratory. Who should I call and what is the number?



View 1. Fire Professionals and Affiliated Organizations

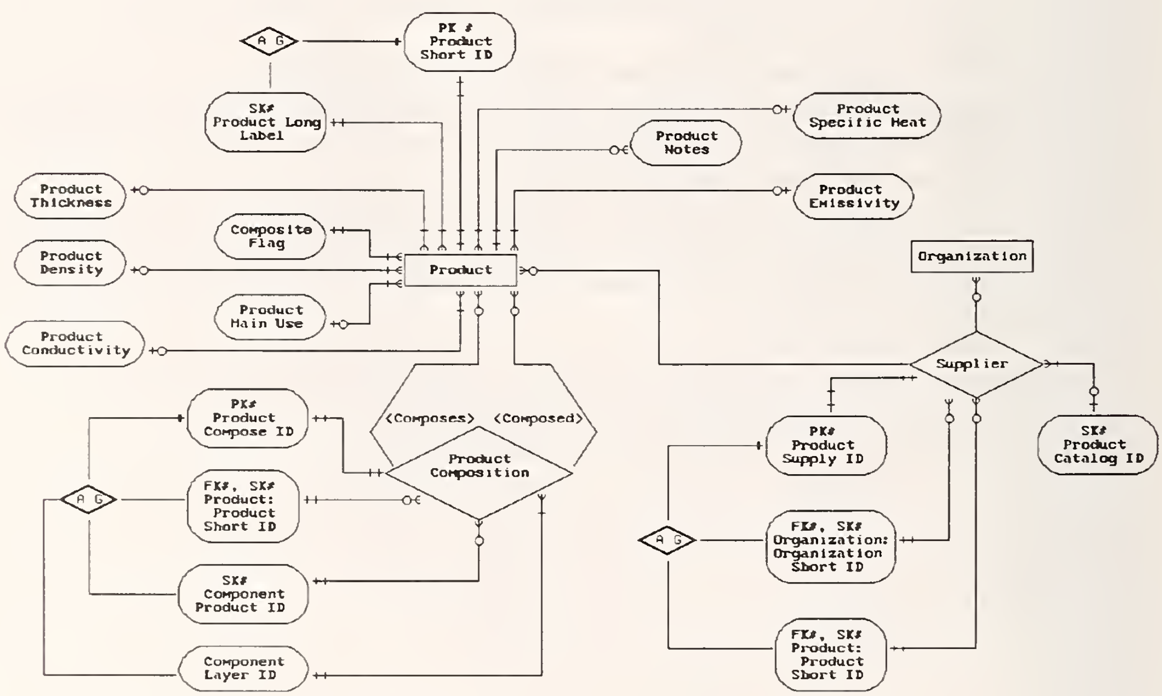
The following requirements were considered in the derivation of the logical view:

- People can share a common full name. There must be an additional way to determine uniqueness other than full name.
- An individual may be known by both a formal name and a less formal nickname. Inquiries should be possible for either.
- An individual can be affiliated with more than one organization at the same time whether as employee, member, committee officer, etc.
- An organization can have more than one individual affiliated at any time.
- An individual can be affiliated with the same organization in different capacities at the same time. Similarly, an individual's affiliation with an organization may vary over time assuming several distinct capacities.
- An organization may have several divisions each with different addresses.
- An individual can change employers, divisions within an employer organization, and professional organization memberships.
- An individual may return to a previous employer or organization at a future date.
- Entries for individuals may need to be made even though the affiliated organizations are not known.
- Entries for an organization may need to be made even though the affiliated individuals are not known.
- The ability to add general comments about an individual or an organization must be supported. The format of these comments should allow the user to include any information considered pertinent for that individual or organization. The number and length of comments needed is uncertain.
- The ability to add comments specifically about an individual's affiliation with an organization must be supported. The format of these comments should allow the user to include any information considered pertinent. The number and length of comments needed is uncertain.
- A variety of communication methods are available today. Do not limit the communications information exclusively to address and phone number.
- Inquiries on job titles must be supported.
- Inquiries on the type of business must be supported.

2.4 Fire Test Products

The terminology "test products" refers to materials of interest in fire tests. These products can be composites of additional materials. The terminology "product" will refer to both singular materials and composites. The Fire Test Products logical view of the FDMS supports inquiries such as the following:

- What products are commonly used in fire tests?
- A known product is a composite of other products. What are the other products? What are the thermophysical properties of these products, individually? What are the thermophysical properties of the composite?
- In what materials is a known product used as a component?
- A fire test is to be run using a known product. Who supplies this product?



View 2. Fire Test Products

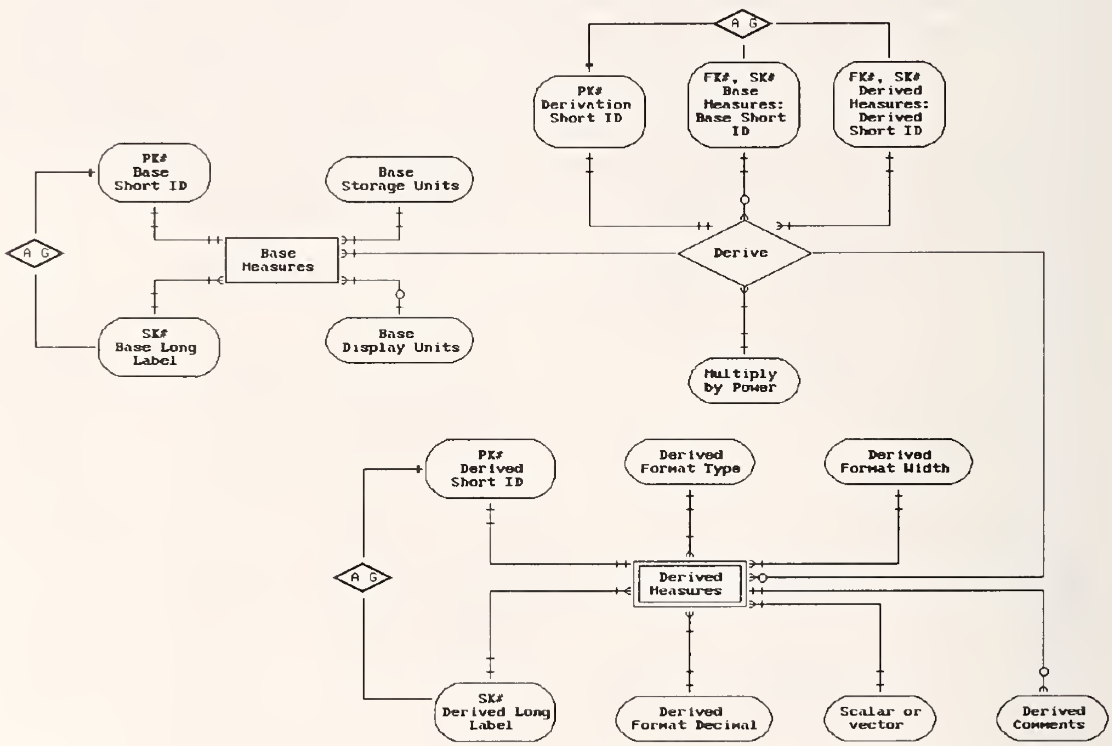
The following requirements were considered in the derivation of the logical view:

- Products could share a common description. There must be an additional way to determine uniqueness other than product description.
- Product thermophysical properties must be available for individual products as well as composite products. These thermophysical properties include density, thickness, conductivity, specific heat, and emissivity.
- A product may be a composition of several additional products. This is not required.
- A composite product may be composed of additional composite products.
- The number of products used to create a composite cannot be assumed.
- A product may be supplied by more than one supplier.
- A supplier may supply more than one product.
- Entries for products may need to be made even though the supplier is not known.
- Entries for a supplier cannot be made without knowing the product supplied.
- The product catalog number may vary depending on the supplier of the product.
- The ability to add general comments about a product must be supported. The format of these comments should allow the user to include any information considered pertinent. The number and length of comments needed is uncertain.
- Inquiries on the common use of a product must be supported.

2.5 Fire Test Measurements

The Fire Test Measurements logical view of the FDMS supports inquiries such as the following:

- What measurements are evaluated in fire tests?
- From what base measure is a known measurement derived?
- In what units is a derived measurement stored?
- In what units is a derived measurement displayed?



View 3. Fire Test Measurements

The following requirements were considered in the derivation of the logical view:

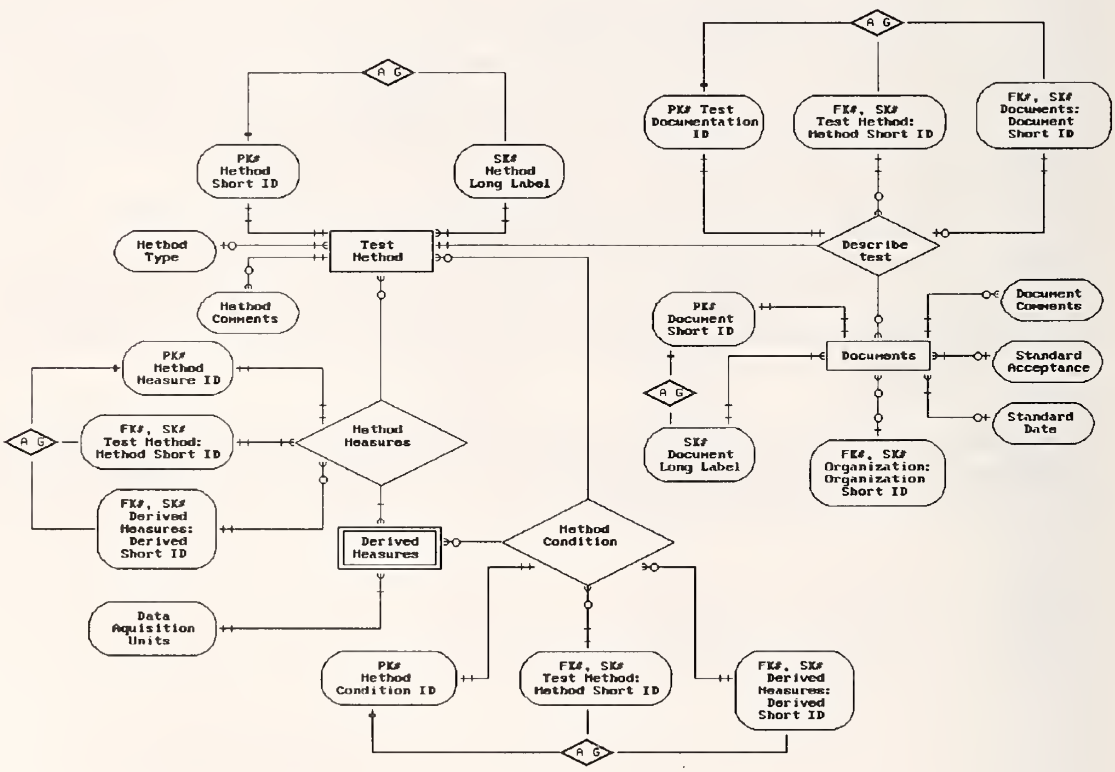
- Fire test measurements can be grouped into two types: base measures and measurements derived by some combination of the base measures.
- Base measurements are a finite set which should not be expanded or modified by the user.
- Users must be able to derive a new measurement from this set of base measures to use in the definition of new test methods or in experimental test runs.
- The units of storage for derived measurements are determined by the units of storage for the base measurements.
- The units of display for derived measurements are determined by the units of display for the base measurements. These display units should not vary between test methods so that value comparisons for a derived measurement can be made independent of the test method by which they were obtained.
- The units of storage for base measurements cannot be modified by the user.
- The units of display for base measurements should be customizable by the user.
- The units of data acquisition for a derived measurement can vary by the test method as well as by the laboratory for the same test method. For this reason, data acquisition units should be customizable by the user within each defined test method.
- The format type and size for a derived measurement should remain the same regardless of the type of fire test for which it was evaluated.
- Measurements could share a common description. There must be an additional way to determine uniqueness other than measurement description.
- The ability to add general comments about a derived measurement must be supported. The format of these comments should allow the user to include any information considered pertinent. The number and length of comments needed is uncertain.

See subsection 3.4.5 for a further discussion of base measurements and derived measurements in addition to a detailed list of the set of measurements provided in an initial installation.

2.6 Fire Test Methods

The Fire Test Methods logical view of the FDMS supports inquiries such as the following:

- What test methods are commonly used for fire tests? What measurements are obtained for each?
- What fire models are currently available? What type of evaluations does each provide?
- For a known test method, what documentation describes the method? What organization is responsible for this documentation and what is the document number?
- What test methods or fire models evaluate a known derived measurement?
- For a known test method, what setup conditions are required?



View 4. Fire Test Methods

For each fire test method, various derived measurements from the test measurement logical view are selected. The role for each measure is either as a setup condition prior to running the test or an evaluation of the effects of the test. Setup "conditions" will be used to refer to those measures needed for test setup while "measures" will refer to the results actually measured.

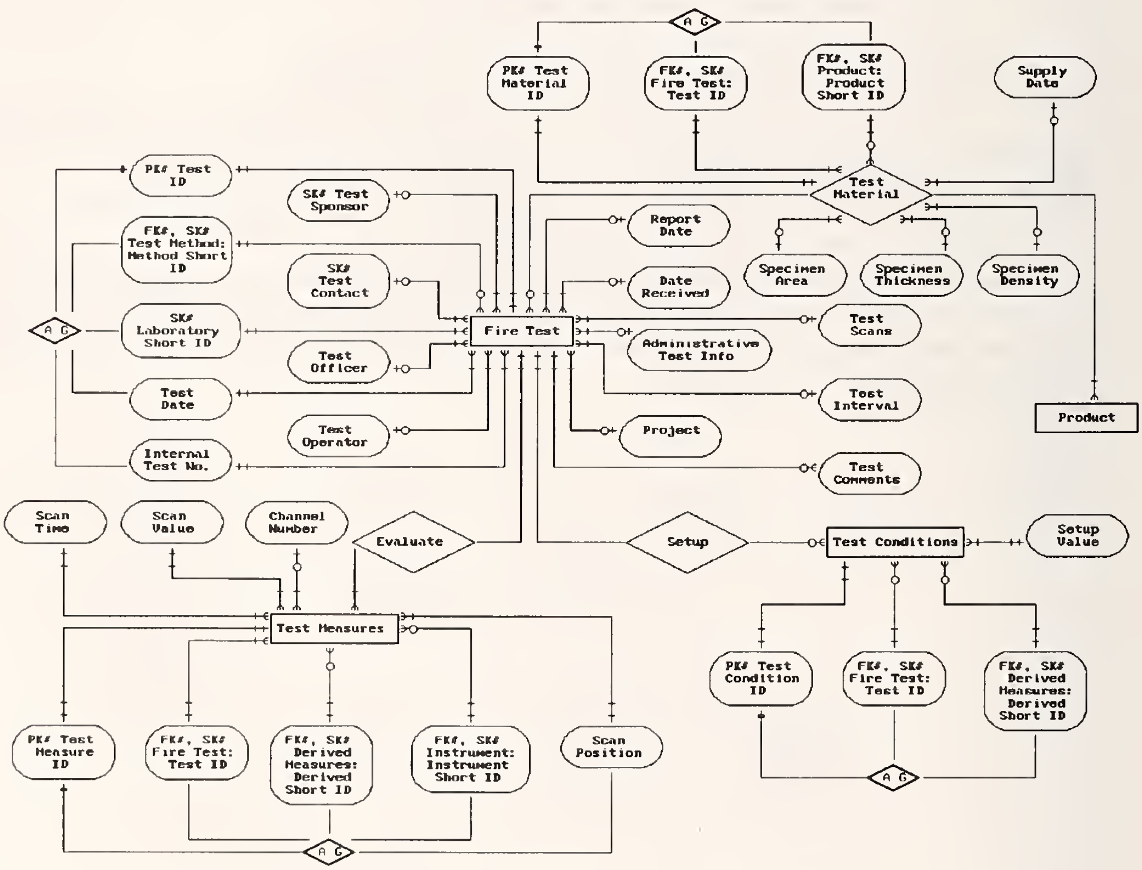
The following requirements were considered in the derivation of the logical view:

- Fire test methods and models are constantly evolving. The user must be able to define a new method in the database without requiring additional programming effort.
- A test method may evaluate derived measurements which are evaluated in other methods as well.
- A test method should be defined once. Multiple test runs for this method should be tracked separately from this definition.
- A document describes only one test method.
- Two or more documents can define identical test methods. This is due to the endorsement of a test method by separate organizations.
- For any one document number, one organization is responsible. Other organizations assign a distinct document number even if the text of the document does not change.
- Not all test methods tracked by users will be accepted as standards.
- Methods could share a common description. There must be an additional way to determine uniqueness other than method description.
- The ability to add general comments about a test method or document must be supported. The format of these comments should allow the user to include any information considered pertinent. The number and length of comments needed is uncertain.

2.7 Fire Test Results

The Fire Test Results logical view of the FDMS supports inquiries such as the following:

- For a known product and derived measurement, what test results are available?
- For a known laboratory, test method, and date, what tests were run?
- For a known test run, what were the results of all measurements?
- For a known test run, what were the setup conditions?
- For a known test run, what were the temperature readings from selected locations?
- For a known test run, what products were tested?
- For a known test run, what measurement was obtained through a specified channel?



View 5. Fire Test Results

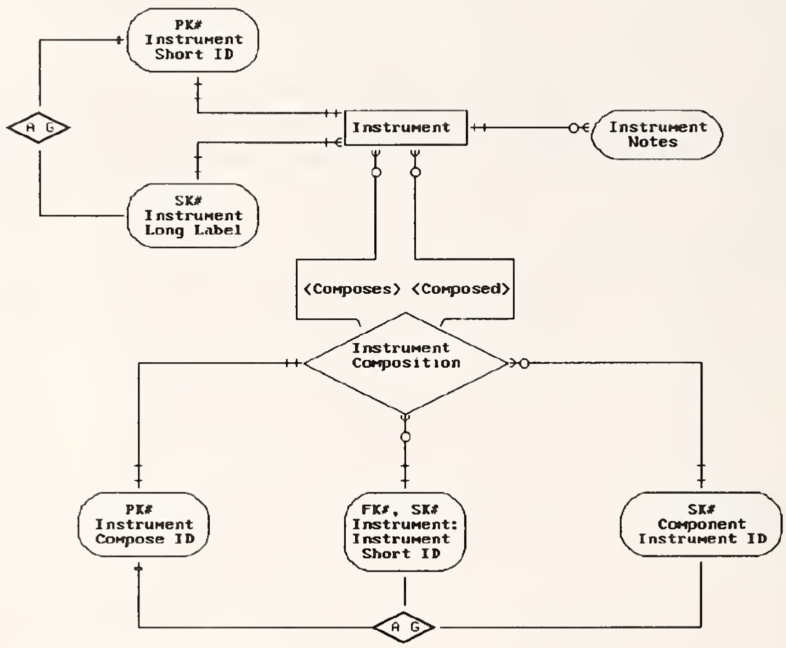
The following requirements were considered in the derivation of the logical view:

- Fire test methods and models are constantly evolving. The user must be able to define new results in the database without requiring additional programming effort.
- Fire test uniqueness is fully determined by the test method, the testing laboratory, the date of the test, and the run number within the laboratory.
- Multiple products may be tested at one time that are not part of a composite product.
- If a composite product is tested, the components must be easily determined.
- For any derived measurement, some real-scale tests report more than one set of time scans for that measurement. Additional scans are uniquely determined by the position of the instrumentation.
- For any test run, not all derived measurements defined for the method will be recorded.
- Inquiries for values of a particular derived measurement and a particular product without specifying a test will be more common than inquiries for the full set of test values of one test run.
- The ability to add general comments about a test run must be supported. The format of these comments should allow the user to include any information considered pertinent. The number and length of comments needed is uncertain.

2.8 Instrumentation Types

The Instrumentation Type logical view of the FDMS is the only instrumentation view required by the central database site. For the central FDMS database, knowledge of calibrations and the history of instrument composition are not important. The Instrumentation Type logical view supports inquiries such as the following:

- For a known instrument type, what other instrument types are components?
- What instrument types are commonly used in fire tests?



View 6. Instrumentation Types

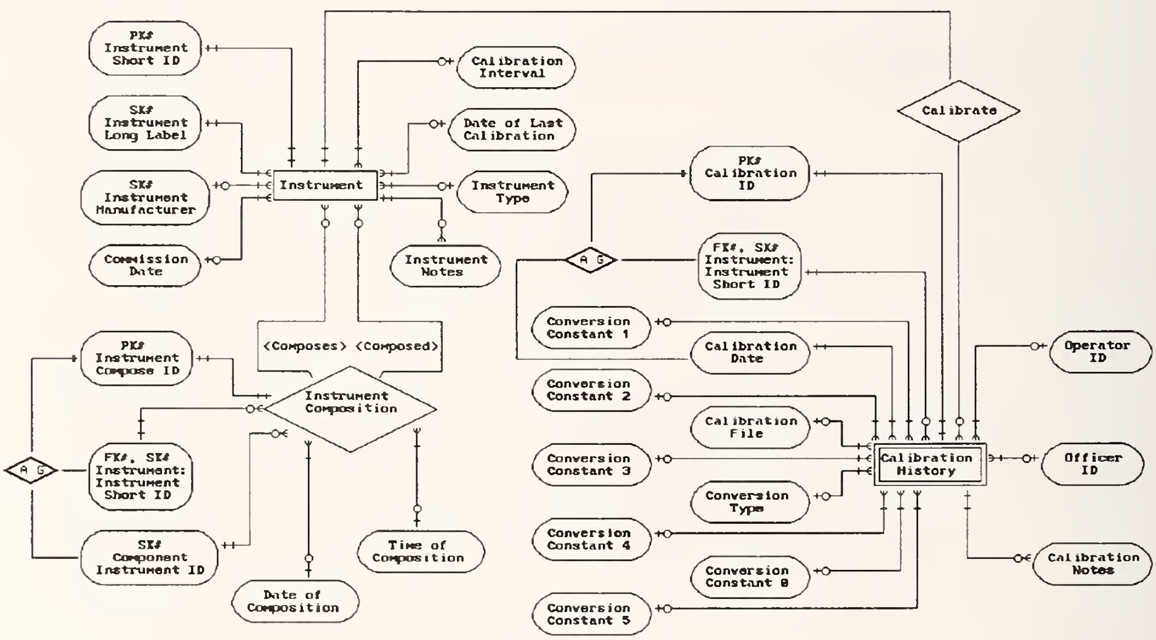
The following requirements were considered in the derivation of the logical view:

- Instrument types could share a common description. There must be an additional way to determine uniqueness other than instrument description.
- Instruments can be a composite of other types of instruments. Knowledge of this composition is important.
- Since instrument composition is not determined by particular instances of an instrumentation type, time variance is not important.
- The ability to add general comments about an instrument must be supported. The format of these comments should allow the user to include any information considered pertinent. The number and length of comments needed is uncertain.

2.9 Laboratory Instrumentation

The Laboratory Instrumentation logical view is provided for local site installations only. This logical view of the FDMS supports inquiries such as the following:

- For a known instrument, what is the calibration history?
- For a known instrument, when should the next calibration be done?
- For a known instrument, what other instruments are components?
- For a known instrument, who is the manufacturer?
- How many of a known type of instrument are currently in the laboratory? What are the corresponding instrument identification numbers?
- Who was responsible for an instrument calibration on a known date?



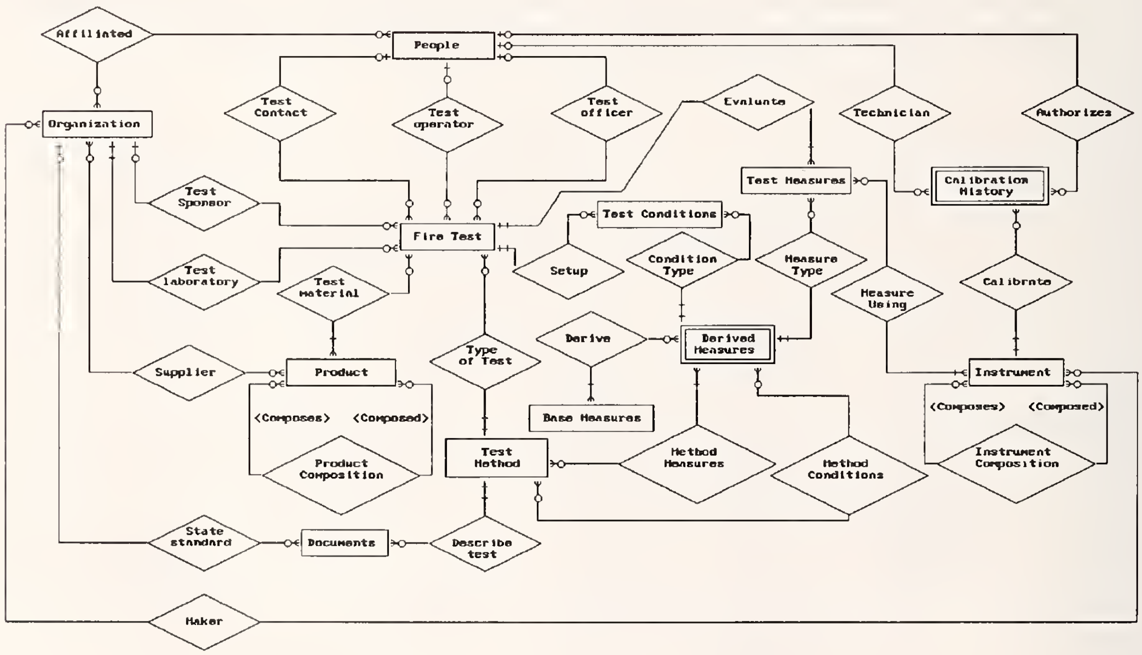
View 7. Laboratory Instrumentation

The following requirements were considered in the derivation of the logical view:

- Laboratories may have multiple instruments of a given type. The instrument name is not sufficient for unique identification.
- When multiple instruments are available, identification numbers have frequently been assigned within the laboratory. Unique identification is possible through this number.
- Instruments can be a composite of other instruments. Knowledge of this composition is important.
- Instrument composition varies over time and is not necessarily dependent on particular test runs.
- The ability to add general comments about an instrument must be supported. The format of these comments should allow the user to include any information considered pertinent. The number and length of comments needed is uncertain.
- The ability to add general comments about a calibration must be supported. The format of these comments should allow the user to include any information considered pertinent. The number and length of comments needed is uncertain.

2.10 FDMS Conceptual View

With all logical views completed and verified, the logical views are merged into a comprehensive view of the entire database. The FDMS conceptual view differs from the individual views only in the introduction of the relations: "test sponsor," "test laboratory," "test contact," "test operator," "test officer," and "state standard." These are shown as relations instead of the attributes indicated in the individual views since those attribute values are obtained from the related entities in the conceptual view. This relationship was seen in the individual views as foreign keys and is critical to avoid introducing redundancy into the database.



View 8. FDMS Conceptual View

3. Physical Organization of the Database

3.1 Derivation of Physical Files

Using the FDMS conceptual view, physical files are derived. For each entity in the FDMS ERD diagram, one file is created. The fields in that file are determined by the attributes specified for that entity in the individual EAD logical views. For those attributes which have a zero to many cardinality, such as comments, an additional physical file is created with the same primary key as the related entity. Relations represented in the FDMS conceptual view with a cardinality of zero or one for one entity and zero to many for the other become fields in the entity with the greater cardinality. All other relations become files with a primary key generated by combining the primary keys of the relating entities.

Wherever possible, file names and field names from FDMS 1.0 have been retained for consistency. The purpose of each file is summarized in a table in section 5. A description for each field is included in the table in section 6.

Prior to assigning field types and widths, the selection of a database engine is made. Selection at this point is necessary since some engines have more flexibility in the format of stored data than others. The database engine selected is c-tree Plus from FairCom Corporation[2]. This engine uses a B+ tree index algorithm and implements compression algorithms for index values. Applications developed with this database engine are portable across a wide variety of computer platforms with single-user and multi-user access modes supported. The engine is written using the C language so that the library can be modified to port to any platform not directly supported by FairCom Corporation. Additionally, c-tree Plus supports variable length records through variable length string fields.

Field types and widths for each attribute are assigned using formats from the existing FDMS 1.0 version whenever possible. Field types supported include: **string** (fixed-length strings), **vstring** (variable-length strings), **character**, **integer** (4 byte integer) **ushort** (unsigned 2 byte integer), **ulong** (unsigned 4 byte integer), **float** (single precision floating point), **date**, **logical**, and **choice**. Logical field types allow "Yes" or "No," "On" or "Off" type entries. Choice fields support selection of one value from an enumerated set of choices in the CHOICE data file. The format of the CHOICE data file is detailed in subsection 3.9. Possible entries for any choice field are enumerated for that field name in section 6.

There are two common techniques for storing date fields in database applications. The first technique requires the establishing of a base year for all stored dates. An unsigned

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[2] FairCom Corporation, 4006 W. Broadway, Columbia, MO 65203. Phone: (314) 445-6833. The use of company names or trade names within this report is made only for the purpose of identifying those computer hardware or software products with which the compatibility of the FDMS software has been tested. Such use does not constitute any endorsement of those products by the National Institute of Standards and Technology.

short integer field is then used to store a year offset of 0-119 packed into bits 9-15. The month is stored in bits 5-8 and the day in bits 0-4. For a date MM/DD/YYYY and a base year 1980, the stored short integer value would be (YYYY-1980)*512 + MM*32 + DD. The other storage approach requires an unsigned long integer and can store any date MM/DD/YYYY as YYYY*10000 + MM*100 + DD. This approach does not require a base year and can accommodate a large range of dates. Because storage in FDMS is likely to become an issue in the future, the first storage technique has been selected with a base year of 1970. This provides storage for any date from 1970 - 2089. This range can be easily adjusted by changing the base year. However, if this date range is inadequate, the base year should be adjusted prior to storing any dates in the database in order to avoid extensive modifications to existing data in the future. It is also possible to convert this date format to the longer format in the future if the upper date limit becomes a problem.

Two bookkeeping fields are added to the PEOPLE, ORGANISE, AFFILIAT, PRODUCT, INSTRUM, DRVDMEAS, DOCUMENT, METHOD, and TEST files. Since these fields pertain only to the internal handling of the physical files, they are not indicated as attributes in the logical views. The **PRIVATE** field is used to determine a level of update/view access for each record in the file. The **LAST_UPD** field stores the latest date for which the record information is considered current. This prevents outdated information imported from other FDMS applications from overwriting a more current version of the data.

The remainder of this physical file section details file formats under subsection headings that correspond to the logical view subsections. For each subsection, the **width** and **decimal** columns reflect storage requirements for string field types only. All other entries in these columns indicate display formats. Physical storage requirements are determined by the field type. If an entry exists under the **related/choice file** columns, this implies that any entry in the corresponding database field is required to use an existing entry from the specified related/choice file and field. Note that for those files with variable string fields, these fields are stored at the end of the file in order to take advantage of the variable length record formats of the database engine. A set of records is provided with the installed FDMS software for some physical files. When such a set exists, the entries provided are indicated in a corresponding initial installation subsection.

3.2 Fire Professionals and Affiliated Organizations

3.2.1 ORGANISE

Field Name	Type	Width	Decimal	Related/Choice File	Field
ORGID	String	10			
ORGTYPE	Choice				
LAST_UPD	Date				
PRIVATE	Choice				
ORGANISE	VString				
DIVISION	VString				
ADDRESS1	VString				
ADDRESS2	VString				
CITY	VString				
REGION	VString				
POSTCODE	VString				
COUNTRY	VString				
PHONE	VString				
MORPHONE	VString				
FAX	VString				
TELEX	VString				
E-MAIL	VString				

3.2.2 ORGNOTES

Field Name	Type	Width	Decimal	Related/Choice File	Field
ORGID	String	10		ORGANISE	ORGID
SEQNO	UShort				
NOTE	VString				

3.2.3 PEOPLE

Field Name	Type	Width	Decimal	Related/Choice File	Field
PERSONID	String	10			
LAST_UPD	Date				
PRIVATE	Choice				
FULLNAME	VString				
NICKNAME	VString				

3.2.4 PERNOTES

Field Name	Type	Width	Decimal	Related/Choice File	Field
PERSONID	String	10			
SEQNO	UShort				
NOTE	VString				

3.2.5 AFFILIAT

Field Name	Type	Width	Decimal	Related/Choice File	Field
PERSONID	String	10		PEOPLE	PERSONID
ORGID	String	10		ORGANISE	ORGID
DATE_BEG	Date				
DATE_END	Date				
LAST_UPD	Date				
PRIVATE	Choice				
POSITION	VString				
ADDRESS1	VString				
ADDRESS2	VString				
CITY	VString				
REGION	VString				
POSTCODE	VString				
COUNTRY	VString				
PHONE	VString				
MORPHONE	VString				
FAX	VString				
TELEX	VString				
E-MAIL	VString				

3.2.6 AFFNOTES

Field Name	Type	Width	Decimal	Related/Choice File	Field
PERSONID	String	10		PEOPLE	PERSONID
ORGID	String	10		ORGANISE	ORGID
SEQNO	UShort				
NOTE	VString				

3.3 Fire Test Products

3.3.1 PRODUCT

Field Name	Type	Width	Decimal	Related/Choice File	Field
PRODID	String	10			
MAINUSE	Choice				
COMPOS	Logical				
PRODENSI	Float				
PROTHICK	Float				
PROCOND	Float				
PROSHEAT	Float				
PROEMISS	Float				
LAST_UPD	Date				
PRIVATE	Choice				
PRODNAME	VString				

3.3.2 PRODNOTE

Field Name	Type	Width	Decimal	Related/Choice File	Field
PRODID	String	10		PRODUCT	PRODID
SEQNO	UShort				
NOTE	VString				

3.3.3 PRODBASE

Field Name	Type	Width	Decimal	Related/Choice File	Field
PRODMAIN	String	10		PRODUCT	PRODID
PRODSUB	String	10		PRODUCT	PRODID
LAYERID	VString				

3.3.4 PRODSUPP

Field Name	Type	Width	Decimal	Related/Choice File	Field
PRODID	String	10		PRODUCT	PRODID
MANUFID	String	10		ORGANISE	ORGID
CATNO	VString				

3.4 Fire Test Measurements

Typically, **temperature**, **pressure**, **length**, **energy**, **mass**, and **time** are considered a comprehensive set of base measures in the scientific and engineering communities. The FDMS base measure implementation is an expanded set of this traditional set of base measures in an attempt to accommodate display unit variations in the same fire test method. For example, it is not uncommon for one test to record some derived temperature measurements using °C and other measures using K. In order to accommodate this exception, two temperature base measures are provided in FDMS: **temperature** and **absolute temperature**. The **energy release rate** and **energy absorption rate** base measures have been included as a convenience to the user since these measures commonly display as watts instead of kilojoules/second. Four base measures have been added to accommodate dimensionless measures. A **ratio** base measure handles numerical ratios of two measured or calculated values. For example, an average value for any measured variable would be represented as a ratio. Similarly, a **percent** base measure exists for those measures expressed as percentages of other measures. Dimensionless numerical measures which are not numerical ratios or percentages are handled by the **dimensionless** base measure. The **text** base measure deals with derived measures having display values such as "Yes" or "No," "Horizontal" or "Vertical," or text descriptions of observed behavior.

3.4.1 BASEMEAS

Field Name	Type	Width	Decimal	Related/Choice File	Field
BASEID	String	10			
BASESTOR	Choice				
BASEDISP	Choice				
BASENAME	VString				

3.4.2 DRVDBASE

Field Name	Type	Width	Decimal	Related/Choice File	Field
DRVID	String	10		DRVDMEAS	DRVID
BASEID	String	10		BASEMEAS	BASEID
BASEPWR	Float				

3.4.3 DRVDMEAS

Field Name	Type	Width	Decimal	Related/Choice File	Field
DRVID	String	10			
DRVFORM	Choice				
DRVVECSC	Logical				
DRVWIDTH	Integer				
DRVDCML	Integer				
LAST_UPD	Date				
PRIVATE	Choice				
DRVNAME	VString				

3.4.4 DRVDNOTE

Field Name	Type	Width	Decimal	Related/Choice File	Field
DRVID	String	10		DRVDMEAS	DRVID
SEQNO	UShort				
NOTE	VString				

3.4.5 Initial Installation Data

Base measures cannot be defined by the user. Storage units for base measures are the SI units and cannot be modified. Display units for the base measures are user selectable. Base measures available with an installed FDMS system, the corresponding storage units, and available display units are:

Table 1. FDMS Base Measurements

Base Measure	Display Units	Storage Units
Temperature	Celsius, Fahrenheit	Kelvin
Absolute Temperature	Kelvin, Rankine	Kelvin
Pressure	Pascal, Atmosphere, Bar, Mercury (mm of mercury), Water (inches of water)	Pascal
Length	Meter, Centimeter, Millimeter, Foot, Inch	Meter
Energy	Joule, Kilojoule, Megajoule, BTU	Joule
Energy Release Rate	Watt, Kilowatt, Megawatt, BTU/sec, BTU/hour	Watt
Energy Absorption Rate	Watt, Kilowatt, Megawatt, BTU/sec, BTU/hour	Watt
Mass	Gram, Kilogram, Pound	Kilogram
Time	Second, Hour, Minute	Second
Ratio		
Percent		
Dimensionless		
Text		

Derived measures are created through combinations of the individual base measures. A large set of derived measures is initially available with an installed FDMS system and covers those vector and scalar measurements evaluated by the Cone Calorimeter, Furniture Calorimeter, LIFT, and the Room/Corner test in FDMS 1.0. Derived measures are also provided for any setup conditions required by these same test methods. Additional derived measures can be created as needed by the user for other test methods. One of the strengths of this physical file implementation is the ability to easily generate new derived measures, and consequently, new fire test methods, without creating a new physical file structure.

Storage units for derived measures are determined by the storage units for the base measures. Display units are determined by the user selected base measure display units. Data acquisition units are determined by the individual test methods and are discussed in subsection 3.5. Derived measures provided with the FDMS system, the component base measures, and the usage as scalar or vector are indicated in the table below.

Table 2. FDMS Derived Measurements

Derived Measures			
Short Label	Long Label	Base Measure	Scalar/Vector
AREA	Specimen area.	$Length^2$	S
ASCARITE	Indicates if CO_2 was removed from the sample before O_2 was measured using Ascarite or equivalent means.	Text	S
AVGCO	Test average of the CO yield.	Ratio	S
AVGCO2	Test average of the CO_2 yield.	Ratio	S
AVGH2O	Test average of the H_2O yield.	Ratio	S
AVGHC	Test average of the effective heat of combustion.	$Energy \cdot mass^{-1}$	S
AVGMDOT	Test average of the mass loss rate.	$Mass \cdot time^{-1} \cdot length^{-2}$	S
AVGQDOT	Test average of the rate of heat release.	$Energy\ release\ rate \cdot length^{-2}$	S
AVGSIGMA	Test average of the specific smoke extinction area.	$Length^2 \cdot mass^{-1}$	S
B-LIFT	LIFT Ignition parameter.	$Time^{-0.5}$	S
BURNER	Burner heat release rate.	Energy release rate	V
BURNSPEC	Heat output values specified for the burner program.	Energy release rate	S
C-CONE	Orifice constant as determined from the CH_4 burner calibration.	$Length^{0.5} \cdot mass^{0.5} \cdot temperature^{0.5}$	S
C-LIFT	Slope of correlated flame spread data.	$Time^{0.5} \cdot length^{1.5} \cdot energy\ release\ rate^{-1}$	S
CO60	Average CO yield over 60 seconds subsequent to ignition.	Ratio	S

Derived Measures			
Short Label	Long Label	Base Measure	Scalar/Vector
CO180	Average CO yield over 180 seconds subsequent to ignition.	Ratio	S
CO300	Average CO yield over 300 seconds subsequent to ignition.	Ratio	S
CONDUCT	Conductivity.	Energy absorption rate · length^{-1} · temperature^{-1}	S
COPROD	Production rate of Carbon monoxide.	Mass · time^{-1}	V
COSTACK	Carbon monoxide concentration in exhaust stack.	Percent	V
COYIELD	Carbon monoxide yield.	Ratio	V
CO260	Average CO_2 yield over 60 seconds subsequent to ignition.	Ratio	S
CO2180	Average CO_2 yield over 180 seconds subsequent to ignition.	Ratio	S
CO2300	Average CO_2 yield over 300 seconds subsequent to ignition.	Ratio	S
CO2PROD	Production rate of Carbon dioxide.	Mass · time^{-1}	V
CO2STACK	Carbon dioxide concentration in exhaust stack.	Percent	V
CO2YIELD	Carbon dioxide yield.	Ratio	V
DENSITY	Density.	Mass · length^{-3}	S
E	Oxygen consumption constant.	Energy · mass^{-1}	S
EXTCOEFF	Smoke extinction coefficient in exhaust stack.	Length^{-1}	V
FLAMEOUT	Time to flameout.	Time	S
FLASH	Time when flashover is observed in the room.	Time	S
FLOW	Flow rate of a gas burner.	Mass · time^{-1}	S
FLOWDUCT	Duct flow rate.	Mass · time^{-1}	V
FLOWGAS	Flow rate of gas to ignition burner.	Mass · time^{-1}	V
FLOWVEL	Volumetric flow rate.	Length^{3} · time^{-1}	V

Derived Measures			
Short Label	Long Label	Base Measure	Scalar/Vector
FLUX	Flux.	Energy release rate · length^{-2}	S
FLUXCEIL	Heat flux measurement at compartment ceiling.	Energy release rate · length^{-2}	V
FLUXFLOR	Heat flux measurement at compartment floor.	Energy release rate · length^{-2}	V
FRAME	Denotes if the edge frame was used.	Text	S
GRID	Denotes if the wire grid was used.	Text	S
H2O60	Average H_2O yield over 60 seconds subsequent to ignition.	Ratio	S
H2O180	Average H_2O yield over 180 seconds subsequent to ignition.	Ratio	S
H2O300	Average H_2O yield over 300 seconds subsequent to ignition.	Ratio	S
H2OPROD	Production rate of water vapor.	Mass · time^{-1}	V
H2OSTACK	Water vapor concentration in exhaust stack.	Percent	V
H2OYIELD	Water vapor yield.	Ratio	V
HBR	HBr yield.	Ratio	S
HC	Effective heat of combustion.	Energy · mass^{-1}	V
HC60	Average heat of combustion over 60 seconds subsequent to ignition.	Energy · mass^{-1}	S
HC180	Average heat of combustion over 180 seconds subsequent to ignition.	Energy · mass^{-1}	S
HC300	Average heat of combustion over 300 seconds subsequent to ignition.	Energy · mass^{-1}	S
HCL	HCl yield.	Ratio	S
HCLPROD	Production rate of HCl.	Mass · time^{-1}	V
HCLSTACK	Hydrogen chloride concentration in exhaust stack.	Percent	V
HCLYIELD	Hydrogen chloride yield.	Ratio	V
HCN	HCN yield.	Ratio	S
HRR	Heat release rate.	Energy release rate	V

Derived Measures			
Short Label	Long Label	Base Measure	Scalar/Vector
HRR/A	Heat release rate per unit area.	Energy release rate · length^{-2}	V
HRRTOT	Total heat released.	Energy	V
IGNITOR	Ignitor used.	Text	S
IGNTYPE	Ignition type.	Text	S
INERTIA	Thermal inertia.	Energy release rate^{2} · time · length^{-4} · absolute temperature^{-2}	S
IRRAD	Heat flux calibration meter.	Energy release rate · length^{-2}	V
LOCATION	Location of the specimen.	Text	S
MASS	Specimen mass.	Mass	V
MASS/A	Specimen mass per unit area.	Mass · length^{-2}	V
MASSF	Specimen mass at the end of the test.	Mass	S
MASSFLOW	Mass flow rate.	Mass · time^{-1}	V
MASSI	Specimen mass before the start of the test.	Mass	S
MASSLOSS	Specimen mass loss during the test.	Mass	S
MAXEXT	Maximum value of the smoke extinction area flow rate.	Length^{2} · time^{-1}	S
MAXMDOT	Peak mass loss rate.	Mass · time^{-1} · length^{-2}	S
MAXQDOT	Peak rate of heat release.	Energy release rate · length^{-2}	S
MAXSIGMA	Peak specific smoke extinction area.	Length^{2} · mass^{-1}	S
MAXTIME	Time to the peak rate of heat release.	Time	S
MDOT60	Average mass loss rate over 60 seconds subsequent to ignition.	Mass · time^{-1} · length^{-2}	S
MDOT180	Average mass loss rate over 180 seconds subsequent to ignition.	Mass · time^{-1} · length^{-2}	S
MDOT300	Average mass loss rate over 300 seconds subsequent to ignition.	Mass · time^{-1} · length^{-2}	S
MLR	Mass loss rate of the sample.	Mass · time^{-1}	V
MLR/A	Mass loss rate of the sample per unit area.	Mass · time^{-1} · length^{-2}	V

Derived Measures			
Short Label	Long Label	Base Measure	Scalar/Vector
MOUNT	Specifies the means of mounting.	Text	S
O2SUPPLY	Oxygen concentration in supply air.	Percent	V
O2STACK	Oxygen concentration in exhaust stack.	Percent	V
ORIENT	Specimen orientation, horizontal or vertical.	Text	S
OXYGEN	Nominal value of the oxygen concentration in the enclosure around the heater and sample.	Percent	S
PHI	Flame heating parameter.	Energy release rate^2 · length^{-3}	S
PILOT	Indicates if ignition was piloted.	Text	S
PRESORI	Pressure drop across exhaust orifice plate.	Pressure	V
PRESPROB	Pressure drop across bi-directional flow probe.	Pressure	V
PRESTUBE	Pressure difference at pitot-static tube.	Pressure	V
PYRLYSIS	Pyrolysis rate.	Mass · time^{-1}	V
QDOT60	Average rate of heat release over 60 seconds subsequent to ignition.	Energy release rate · length^{-2}	S
QDOT180	Average rate of heat release over 180 seconds subsequent to ignition.	Energy release rate · length^{-2}	S
QDOT300	Average rate of heat release over 300 seconds subsequent to ignition.	Energy release rate · length^{-2}	S
QIG	Minimum flux for ignition.	Energy release rate · length^{-2}	S
QSMIN	Minimum flux for spread.	Energy release rate · length^{-2}	S
RHCOND	Relative humidity for specimen conditioning.	Percentage	S
RHTEST	Relative humidity of the supply air for conducting the test.	Percentage	S
SEA	Smoke specific extinction area in exhaust stack.	Length^2 · mass^{-1}	V
SEARATE	Smoke extinction area flow rate.	Length^2 · time^{-1}	V

Derived Measures			
Short Label	Long Label	Base Measure	Scalar/Vector
SIGMA60	Average specific smoke extinction area over 60 seconds subsequent to ignition.	$Length^2 \cdot mass^{-1}$	S
SIGMA180	Average specific smoke extinction area over 180 seconds subsequent to ignition.	$Length^2 \cdot mass^{-1}$	S
SIGMA300	Average specific smoke extinction area over 300 seconds subsequent to ignition.	$Length^2 \cdot mass^{-1}$	S
SOOT	Ratio of mass of soot deposited on the soot filter to mass of specimen loss during the test.	Ratio	S
SOOTMASS	Soot mass sampler flow rate.	$Mass \cdot time^{-1}$	V
SPHEAT	Specific heat.	$Energy \cdot mass^{-1} \cdot temperature^{-1}$	S
SUMEXT	Total smoke extinction area released during the test.	$Length^2$	S
SURFDENS	When thin textiles, papers, etc. are covering some standard substrate, it is most appropriate to describe them by their surface density.	$Mass \cdot length^{-3}$	S
TEMP1	Temperature at specimen location 1.	Temperature	V
TEMP2	Temperature at specimen location 2.	Temperature	V
TEMP3	Temperature at specimen location 3.	Temperature	V
TEMPCOND	Temperature for specimen conditioning.	Temperature	S
TEMPFLOW	Temperature at the flow measuring station.	Temperature	V
TEMPGAS	Temperature of the gas at specified depth in compartment.	Temperature	V
TEMPLAS	Temperature at laser extinction beam.	Temperature	V
TEMPORI	Temperature at the orifice plate.	Temperature	V
TEMPSMK	Temperature at the smoke meter.	Temperature	V
TEMPSTCK	Temperature of gas in exhaust stack.	Temperature	V
TEMPSURF	Surface temperature of the ceiling or wall at specified location.	Temperature	V

Derived Measures			
Short Label	Long Label	Base Measure	Scalar/Vector
TEMPTEST	Temperature of the supply air for conducting the test.	Temperature	S
THICK	Specimen thickness.	Length	S
TIG	Minimum temperature for ignition.	Temperature	S
TIGN	Time to ignition.	Time	S
TIME	Time from start of ignition source.	Time	V
TOTLHEAT	Total heat released during the test	Energy	S
TOTLHEAT/A	Total heat released during the test per unit area.	Energy $\cdot$ length^{-2}	S
TSMIN	Minimum temperature for spread.	Temperature	S
TSTAR	Characteristic equilibrium or thermal steady state time.	Time	S
TUH	Total unburned fuel yield.	Ratio	S
TUHSTACK	Total unburned hydrocarbon concentration in exhaust stack.	Percent	V
TUHYIELD	Total hydrocarbons yield.	Ratio	V
VELOCITY	Velocity.	Length $\cdot$ time^{-1}	V
VOLLAS	Volumetric flow at laser extinction beam.	Length^3 $\cdot$ time^{-1}	V
VOLSTACK	Volumetric flow in exhaust stack.	Length^3 $\cdot$ time^{-1}	V
VOLUME	Volume.	Length^3	S

3.5 Fire Test Methods

The EAD logical view for fire test methods in subsection 2.6 can be implemented in several ways. The traditional approach creates one physical file for each test method with a field position assigned to each setup condition and test measurement. In this implementation, the test method description is the file format description for the storage of the actual test results. Methods measuring a common derived measurement might assign these fields at different positions within the different method files and could potentially use different field formats for each. The consequence is that inquiries for the fire test results of a particular derived measurement regardless of test method can be difficult to obtain. All files with this measurement field would need to be searched individually. The search is complicated by the varying position and field format of the measurement field for each test method format. Additionally, the creation and modification of physical file formats for individual test methods involves programming effort. Because these consequences severely restrict the expandability of FDMS, this approach will not be implemented.

The alternative approach implemented in FDMS creates a record for each test method in a combined file of methods, **METHOD**. For each test method entry in this file, additional records specifying setup conditions and test measurements are stored in the **METHMEAS** file, one for each derived measurement. One physical file is used to store setup conditions and test measurement definitions with differentiation handled by a logical field, **MEASCOND**, for each record. The differentiation between setup conditions and test measurements becomes important in the storage implementation of the test results since additional information is required for the test measurements. This physical implementation for fire test methods allows new measurements to be added to existing methods, old measurements to be deleted, and new methods to be defined without generating new file structures or programming routines. Queries for the values of a selected derived measurement can be handled without requiring knowledge of the particular file, field, or format specifiers. Storage for the actual test results is handled by the files discussed in subsection 3.6.

For each setup condition and test measurement within the method, data acquisition units can be specified. These are the units the laboratory used in evaluating the measurement and are needed to determine how to convert imported values to the appropriate stored SI units for that derived measurement in the FDMS database. If no units are specified for the measurement, the default assumed will be the SI storage units for that derived measurement. Most derived measurements are generated from 2 to 3 base measurements. However, this is not a number which can be assumed since derived measurements now or in the future could be composed of 4, 5, or more base measurements each. For each base measurement composing the derived measurement, a different data acquisition unit must be specified. In order to accommodate the varying number of components, the traditional database implementation generates individual records in a separate file, one for each component base measurement, indicating the data acquisition units for that base measurement. An alternative approach could store the base measurement units as a comma-delimited variable length string in the **METHMEAS** file for the derived measurement. The problem with this approach is in determining the order with which to match the units to the component base measurements.

Since the composition of a derived measurement could potentially be altered at a later time by a user, this further complicates interpretation of this string when implementing data conversion. For this reason, the traditional approach will be implemented in FDMS 2.0 with one modification. For each measurement in **METHMEAS**, a flag field is used to indicate when the default SI storage units should override the user specified units. This prevents the need to delete the individual records when switching back to the default only to create new records at a later time. For further details on the use of the data acquisition units when importing data, refer to section 4.

3.5.1 METHOD

Field Name	Type	Width	Decimal	Related/Choice File	Field
METHID	String	10			
METHTYPE	Choice				
LAST_UPD	Date				
PRIVATE	Choice				
METHNAME	VString				

3.5.2 METHMEAS

Field Name	Type	Width	Decimal	Related/Choice File	Field
METHID	String	10		METHOD	METHID
DRVID	String	10		DRVDMEAS	DRVID
MEASCOND	Choice				
DATAACQU	Logical				

3.5.3 METHACQU

Field Name	Type	Width	Decimal	Related/Choice File	Field
METHID	String	10		METHOD	METHID
DRVID	String	10		DRVDMEAS	DRVID
BASEID	String	10			
BASEACQU	Choice				

3.5.4 METHDOC

Field Name	Type	Width	Decimal	Related/Choice File	Field
METHID	String	10		METHOD	METHID
DOCID	String	10		DOCUMENT	DOCID

3.5.5 METHNOTE

Field Name	Type	Width	Decimal	Related/Choice File	Field
METHID	String	10		METHOD	METHID
SEQNO	UShort				
NOTE	VString				

3.5.6 DOCUMENT

Field Name	Type	Width	Decimal	Related/Choice File	Field
DOCID	String	10			
DOCSTD	Logical				
STDORG	String	10		ORGANISE	ORGID
STDDATE	Date				
LAST_UPD	Date				
PRIVATE	Choice				
DOCTITLE	VString				

3.5.7 DOCNOTE

Field Name	Type	Width	Decimal	Related/Choice File	Field
DOCID	String	10		DOCUMENT	
SEQNO	UShort				
NOTE	VString				

3.5.8 Initial Installation Data

Test methods initially defined within an installed FDMS system include the Cone Calorimeter, the Furniture Calorimeter, the Lateral Ignition and Flame spread Test apparatus, and the room/corner test. Entries provided for each include:

Table 3. FDMS Standardized Test Methods

Test Methods	
Short Label	Long Label
CONE	Cone Calorimeter
FURN	Furniture Calorimeter
LIFT	Lateral Ignition and Flame spread Test apparatus.
ROOM	Room/corner test

Table 4. FDMS Derived Measurements and Data Acquisition Units by Test Method

Method Measurements			
Derived Measurement	Method Short Label	Measure/Condition	Data Acquisition Units
ASCARITE	CONE, FURN, ROOM	C	
AVGCO	CONE, FURN, ROOM	M	kg/kg
AVGCO2	CONE, FURN, ROOM	M	kg/kg
AVGH2O	CONE, FURN, ROOM	M	kg/kg
AVGHC	CONE, FURN, ROOM	M	MJ/kg
AVGMDOT	CONE, FURN, ROOM	M	$g/(s \cdot m^2)$
AVGQDOT	CONE, FURN, ROOM	M	kW/m^2
AVGSIGMA	CONE, FURN, ROOM	M	m^2/kg
B-LIFT	LIFT	M	$s^{-0.5}$
BURNER	ROOM	C	kW
BURNSPEC	ROOM	M	
C-CONE	CONE, FURN	C	
C-LIFT	LIFT	M	$s^{0.5} \cdot m^{0.5} \cdot W^{-1}$
CO60	CONE, FURN, ROOM	M	kg/kg
CO180	CONE, FURN, ROOM	M	kg/kg

Method Measurements			
Derived Measurement	Method Short Label	Measure/Condition	Data Acquisition Units
CO300	CONE, FURN, ROOM	M	kg/kg
COPROD	ROOM	M	g/s
COSTACK	CONE, FURN, ROOM	M	
COYIELD	CONE, FURN, ROOM	M	kg/kg
CO260	CONE, FURN, ROOM	M	kg/kg
CO2180	CONE, FURN, ROOM	M	kg/kg
CO2300	CONE, FURN, ROOM	M	kg/kg
CO2PROD	ROOM	M	g/s
CO2STACK	CONE, FURN, ROOM	M	
CO2YIELD	CONE, FURN, ROOM	M	kg/kg
E	CONE, FURN, ROOM	C	kJ/g
EXTCOEFF	CONE, FURN, ROOM	M	m^{-1}
FLAMEOUT	CONE, FURN, LIFT, ROOM	M	s
FLASH	ROOM	M	s
FLOW	CONE, FURN, ROOM	C	kg/s
FLOWDUCT	CONE, FURN, ROOM	M	kg/s
FLOWGAS	FURN, ROOM	M	kg/s
FLUX	CONE, FURN, ROOM	C	kW/m^2
FLUXCEIL	ROOM	M	kW/m^2
FLUXFLOR	ROOM	M	kW/m^2
FRAME	CONE	C	
GRID	CONE	C	
H2O60	CONE, FURN, ROOM	M	kg/kg
H2O180	CONE, FURN, ROOM	M	kg/kg
H2O300	CONE, FURN, ROOM	M	kg/kg
H2OPROD	ROOM	M	g/s
H2OSTACK	CONE, FURN, ROOM	M	
H20YIELD	CONE, FURN, ROOM	M	kg/kg
HBR	CONE, FURN, ROOM	M	kg/kg

Method Measurements			
Derived Measurement	Method Short Label	Measure/Condition	Data Acquisition Units
HC	CONE, FURN, ROOM	M	MJ/kg
HC60	CONE, FURN, ROOM	M	MJ/kg
HC180	CONE, FURN, ROOM	M	MJ/kg
HC300	CONE, FURN, ROOM	M	MJ/kg
HCL	CONE, FURN, ROOM	M	kg/kg
HCLPROD	ROOM	M	g/s
HCLSTACK	CONE, FURN, ROOM	M	
HCLYIELD	CONE, FURN, ROOM	M	kg/kg
HCN	CONE, FURN, ROOM	M	kg/kg
HRR	ROOM	M	kW
HRR/A	CONE, FURN	M	kW/m^2
HRRTOT	ROOM	M	kJ
IGNITOR	ROOM	C	
IGNTYPE	FURN	C	
INERTIA	LIFT	M	$kW^2 \cdot s \cdot m^{-4} \cdot K^{-2}$
IRRAD	CONE, FURN, ROOM	M	kW/m^2
LOCATION	ROOM	C	
MASS	CONE, FURN, ROOM	M	kg
MASS/A	CONE, FURN, ROOM	M	kg/m^2
MASSI	CONE, FURN, LIFT, ROOM	M	kg
MASSF	CONE, FURN, LIFT, ROOM	M	kg
MASSFLOW	ROOM	M	kg/s
MASSLOSS	CONE, FURN, LIFT, ROOM	M	kg
MAXEXT	ROOM	M	m^2/s
MAXMDOT	CONE, FURN, ROOM	M	$g/(s \cdot m^2)$
MAXQDOT	CONE, FURN, ROOM	M	kW/m^2
MAXSIGMA	CONE, FURN, ROOM	M	m^2/kg
MAXTIME	CONE, FURN, ROOM	M	s

Method Measurements			
Derived Measurement	Method Short Label	Measure/Condition	Data Acquisition Units
MDOT60	CONE, FURN, ROOM	M	$g/(s{\cdot}m^2)$
MDOT180	CONE, FURN, ROOM	M	$g/(s{\cdot}m^2)$
MDOT300	CONE, FURN, ROOM	M	$g/(s{\cdot}m^2)$
MLR	CONE, FURN, ROOM	M	g/s
MLR/A	CONE, FURN, ROOM	M	$g/(s{\cdot}m^2)$
MOUNT	ROOM	C	
O2STACK	CONE, FURN, ROOM	M	
O2SUPPLY	CONE, FURN, ROOM	M	
ORIENT	CONE	C	
OXYGEN	CONE, FURN, ROOM	C	
PHI	LIFT	M	kW^2/m^3
PILOT	CONE	C	
PRESORI	CONE, FURN, ROOM	M	Pa
PRESPROB	FURN, ROOM	M	Pa
PRESTUBE	FURN, ROOM	M	Pa
QDOT60	CONE, FURN, ROOM	M	kW/m^2
QDOT180	CONE, FURN, ROOM	M	kW/m^2
QDOT300	CONE, FURN, ROOM	M	kW/m^2
QIG	LIFT	M	kW/m^2
QSMIN	LIFT	M	kW/m^2
RHCOND	CONE, FURN, LIFT, ROOM	C	
RHTEST	CONE, FURN, LIFT, ROOM	C	
SEA	CONE, FURN, ROOM	M	m^2/kg
SEARATE	CONE, FURN, ROOM	M	m^2/s
SIGMA60	CONE, FURN, ROOM	M	m^2/kg
SIGMA180	CONE, FURN, ROOM	M	m^2/kg
SIGMA300	CONE, FURN, ROOM	M	m^2/kg
SOOT	CONE, FURN, ROOM	M	kg/kg
SOOTMASS	CONE, FURN, ROOM	M	kg/s

Method Measurements			
Derived Measurement	Method Short Label	Measure/Condition	Data Acquisition Units
SUMEXT	ROOM	M	m^2
SURFDENS	ROOM	C	kg/m^3
TEMP1	CONE, FURN, ROOM	M	°C
TEMP2	CONE, FURN, ROOM	M	°C
TEMP3	CONE, FURN, ROOM	M	°C
TEMPCOND	CONE, FURN, LIFT, ROOM	C	°C
TEMPFLOW	FURN, ROOM	M	°C
TEMPGAS	ROOM	M	°C
TEMPLAS	CONE	M	°C
TEMPORI	CONE	M	°C
TEMPSMK	CONE, FURN, ROOM	M	°C
TEMPSURF	ROOM	M	°C
TEMPSTCK	ROOM	M	°C
TEMPTEST	CONE, FURN, LIFT, ROOM	C	°C
TIG	LIFT	M	°C
TIGN	CONE, FURN, LIFT, ROOM	M	s
TOTLHEAT	CONE, FURN, ROOM	M	MJ
TOTLHEAT/A	CONE, FURN, ROOM	M	MJ/m^2
TSMIN	LIFT	M	°C
TSTAR	LIFT	M	s
TUH	CONE, FURN, ROOM	M	kg/kg
TUHSTACK	CONE, FURN, ROOM	M	
TUHYIELD	CONE, FURN, ROOM	M	kg/kg
VOLLAS	CONE	M	m^3/s
VOLSTACK	CONE, FURN, ROOM	M	m^3/s

3.6 Fire Test Results

The physical file implementation for the fire setup condition values requires several files. The need for this type of implementation can be seen when the formats of the values are considered. Because the set of derived measurements specified as setup conditions has a variety of value formats, for example, integer, floating point, or string, implementation in one combined file requires that the value field be stored as a variable string. Each condition or result value is then determined by parsing this string using the appropriate format specifiers. Since most values will be integer or floating point, this implementation requires more storage space than would be required by storing the value as the appropriate integer or floating point type. Storage by type, however, can only be accomplished by creating a different physical file for each format. **TSTCONDI**, **TSTCONDR**, and **TSTCONDS** are used to store the setup condition values by format type.

The physical file implementation for the fire test measurements is similar to the setup condition values. However, since the same derived measurement might be evaluated multiple times during the same test for different instrument devices and positions, test measurement values are stored separately from setup conditions. **TSTMEASI** and **TSTMEASR** are used to store integer or floating point scalar fire test measurement values.

Vector value test measurements require a third type of file implementation. Several alternatives were considered for the implementation of the vector values. One alternative stores all vector measurements for a test in a common external file with a file identifier stored as a field for that test in FDMS. This is the approach used in FDMS 1.0. With this implementation approach, queries for the results of a particular measurement involve reading all entries in the file and selecting the appropriate time and value entries. This is a time-consuming interface for fire models since multiple disk accesses are involved making this approach unacceptable. A more traditional database approach stores one record for each derived measurement scan using a particular instrument and position. For example, suppose stored vector values for the carbon dioxide concentration in the exhaust stack are queried for the value at time 20 seconds. Seven CO2STACK records are stored:

```
CO2STACK  0   .141575
CO2STACK  5    0.1511
CO2STACK  10   0.181125
CO2STACK  15   0.238425
CO2STACK  20   0.2998
CO2STACK  25   0.35435
CO2STACK  30   0.408925
```

To determine the value at time 20 seconds, one disk access is required. However, the time values must be repeated for each distinct derived measurement scan. For the FDMS application using floating point time values, storage requirements for the time and value pair are 8 bytes for each record entry. Also, since the time is part of the primary index with this approach, an entry is also required in the index file. Entries in the index file are stored as string equivalents rather than the 4 byte floating point representation. Consequently, for each time and value pair in the database, a minimum of 12 bytes is required for storage. The approach implemented in FDMS combines the two previous approaches and creates one database record for each derived measurement. Vector values are stored as a comma-delimited string. This approach provides quick access to a particular measurement but requires accessing a separate TIME record to determine individual time points. For the previous example, two vector records are stored as follows:

```
TIME     0,5,10,15,20,25,30
CO2STACK 0.141575,0.1511,0.181125,0.238425,0.2998,0.35435,0.408925
```

To determine the value at time 20 seconds, the TIME record is accessed first. The number of values until time 20 is counted, in this case, 5. The CO2STACK record is now accessed and the string parsed until the fifth value is read. The answer to the query is 0.2998. Aside from two disk accesses, this parsing takes place in memory and should be fast. Storage requirements are determined by the length of each observation value represented as a string. However, since time is not repeated and is not stored as part of the index, storage of the floating point values as string values should require less storage space than the traditional database approach.

The primary key identifier for a particular test run stored in FDMS is a combination of the test method, the laboratory, the testdate, and a laboratory assigned internal test number. Since this primary key must be repeated for each record in the setup condition and test measurement physical files for that test, a large amount of storage space is required. For this reason, a unique unsigned 4 byte integer identifier is assigned by FDMS to each unique combination of test method, laboratory, testdate, and test number. This assigned test identifier, **TESTID**, is then stored for all related test records. The **TESTID** field is specific to local installations and is not imported to the central FDMS database. If the combination of test method, laboratory, testdate, and test number do not already exist in the central database, a new **TESTID** value is generated.

Similarly, the primary key identifier for a set of vector test measurement scans is the derived measurement, the instrument used, and the x,y, and z positions of that instrument. This combination is assigned a unique unsigned 2 byte integer identifier, **TESTIID**, by FDMS to reduce the storage requirements for each scan of that measure in the vector value file. If TIME scan values are different for different derived measurements within a test method, an additional **TSTINSTR** entry can be created for the **TESTID** which then generates a new **TESTIID** field to distinguish the two types of time scans.

3.6.1 TEST

Field Name	Type	Width	Decimal	Related/Choice File	Field
METHID	String	10		METHOD	METHID
LABID	String	10		ORGANISE	ORGID
TESTDATE	Date				
TESTNO	UShort				
TESTID	ULong				
SPONID	String	10		ORGANISE	ORGID
SPCONTID	String	10		PEOPLE	PERSONID
OFFID	String	10		PEOPLE	PERSONID
OPERID	String	10		PEOPLE	PERSONID
REPDATE	Date				
RECEIVED	Date				
LAST_UPD	Date				
PRIVATE	Choice				
SUMFLAG	Logical				
ADMIN	VString				
PROJECT	VString				

3.6.2 TSTINSTR

Field Name	Type	Width	Decimal	Related/Choice File	Field
TESTID	ULong			TEST	TESTID
INSTRID	String	10		INSTR	INSTRID
ZONE	String	10			
XPOS	Float				
YPOS	Float				
ZPOS	Float				
TESTIID	UShort				
CHANNEL	UShort				
SCANS	UShort				
INTERVAL	UShort				

3.6.3 TESTPROD

Field Name	Type	Width	Decimal	Related/Choice File	Field
PRODID	String	10		PRODUCT	PRODID
TESTID	ULong			TEST	TESTID
SPDATE	Date				
DENSITY	Float				
AREA	Float				
THICK	Float				

3.6.4 TSTCONDI

Field Name	Type	Width	Decimal	Related/Choice File	Field
TESTID	ULong			TEST	TESTID
DRVID	String	10		DRVDMEAS	DRVID
VALUE	Integer				

3.6.5 TSTCONDR

Field Name	Type	Width	Decimal	Related/Choice File	Field
TESTID	ULong			TEST	TESTID
DRVID	String	10		DRVDMEAS	DRVID
VALUE	Float				

3.6.6 TSTCONDS

Field Name	Type	Width	Decimal	Related/Choice File	Field
TESTID	ULong			TEST	TESTID
DRVID	String	10		DRVDMEAS	DRVID
VALUE	VString				

3.6.7 TSTMEASI

Field Name	Type	Width	Decimal	Related/Choice File	Field
TESTID	ULong			TEST	TESTID
TESTIID	UShort			TESTINSTR	TESTIID
DRVID	String	10		DRVDMEAS	DRVID
VALUE	Integer				

3.6.8 TSTMEASR

Field Name	Type	Width	Decimal	Related/Choice File	Field
TESTID	ULong			TEST	TESTID
TESTIID	UShort			TESTINSTR	TESTIID
DRVID	String	10		DRVDMEAS	DRVID
VALUE	Float				

3.6.9 TSTMEASV

Field Name	Type	Width	Decimal	Related/Choice File	Field
TESTID	ULong			TEST	TESTID
TESTIID	UShort			TESTINSTR	TESTIID
DRVID	String	10		DRVDMEAS	DRVID
VALUE	VString				

3.6.10 TESTNOTE

Field Name	Type	Width	Decimal	Related/Choice File	Field
TESTID	ULong			TEST	TESTID
SEQNO	UShort				
NOTE	VString				

3.6.11 SUMMARY

Once real-scale tests are imported into the FDMS, the storage requirements of the data could quickly overload most storage platforms. For this reason, an additional physical file is provided to store the definitions of polynomial curves over a variety of time intervals for any of the derived measures recorded in the test. These curves can be used to reproduce statistically acceptable values for the original measures, but cannot be expected to produce exact values. Consider a test with scans every 5 seconds for 4 hours producing results for 50 measures throughout a room. This test will require space for (12 scans/minute) * (60 minutes/hour) * (4 hours/measure) * (50 measures) = 144,000 results in the **TSTMEASV** file. If instead these values can be represented with 5 curves for each measure, and each curve is a polynomial of degree 3, the required space becomes (4 coefficients/curve) * (5 curves/measure) * (50 measures) = 1000 results. The savings in space for large quantities of data can be easily seen.

The initial implementation of FDMS 2.0 will not provide the ability to represent real-scale test results at local sites in these summary files. This is a reduction process which must take place through the Building and Fire Research Laboratory. Such summary files will be provided for non-standardized, real-scale tests only. Results for these types of types can be distributed from the central location as either full vector values or the summary curves. All other data will be distributed as full vector values.

Field Name	Type	Width	Decimal	Related/Choice File	Field
TESTID	ULong			TEST	TESTID
TESTIID	UShort			TESTINSTR	TESTIID
DRVID	String	10		DRVDMEAS	DRVID
ISTART	Float				
PDEGREE	UShort				
COEF0	Float				
COEF1	Float				
COEF2	Float				
COEF3	Float				
COEF4	Float				
COEF5	Float				

3.7 Instrumentation Types

3.7.1 INSTRUM

Field Name	Type	Width	Decimal	Related/Choice File	Field
INSTRID	String	10			
LAST_UPD	Date				
PRIVATE	Choice				
SERIAL	VString				

3.7.2 INSTRBAS

Field Name	Type	Width	Decimal	Related/Choice File	Field
INSTRMAN	String	10		INSTR	INSTRID
INSTRSUB	String	10		INSTR	INSTRID

3.7.3 INSTRNOT

Field Name	Type	Width	Decimal	Related/Choice File	Field
INSTRID	String	10		INSTR	INSTRID
SEQNO	UShort				
NOTE	VString				

3.7.4 Initial Installation Data

Instrumentation types will be stored in a file which can be expanded by the user. Instrument types which have been identified and will be provided with an installed FDMS system are listed below. Additional common instrumentation not included in this list should be noted so that they can be included with each initial installation of FDMS rather than requiring each user to create their own.

Table 5. FDMS Instrumentation Types

Instrument Type
Carbon Dioxide Analyzer
Carbon Monoxide Analyzer
Heat Flux Meter
Load Cell
Oxygen Analyzer
Pressure Transducer
Smoke Extinction Laser System
Type K thermocouple
Water Vapor Analyzer

3.8 Laboratory Instrumentation

3.8.1 INSTRUM

Field Name	Type	Width	Decimal	Related/Choice File	Field
INSTRID	String	10			
MAKERID	String	10		ORGANISE	ORGID
INSTRTYP	String	10		INSTRUM	INSTRID
COMMDATE	Date				
CALINTER	UShort				
CALDATE	Date				
LAST_UPD	Date				
PRIVATE	Choice				
SERIAL	VString				

3.8.2 INSTRBAS

Field Name	Type	Width	Decimal	Related/Choice File	Field
INSTRMAN	String	10		INSTR	INSTRID
INSTRSUB	String	10		INSTR	INSTRID
COMPDATE	Date				
COMPTIME	UShort				

3.8.3 INSTRNOT

Field Name	Type	Width	Decimal	Related/Choice File	Field
INSTRID	String	10		INSTR	INSTRID
SEQNO	UShort				
NOTE	VString				

3.8.4 CALIB

Field Name	Type	Width	Decimal	Related/Choice File	Field
INSTRID	String	10		INSTR	INSTRID
CALDATE	Date				
OPERID	String	10		PEOPLE	PERSONID
OFFID	String	10		PEOPLE	PERSONID
CONV	Choice				
PDEGREE	UShort				
COEF0	Float				
COEF1	Float				
COEF2	Float				
COEF3	Float				
COEF4	Float				
COEF5	Float				
CALFILE	VString				

3.8.5 CALIBNOT

Field Name	Type	Width	Decimal	Related/Choice File	Field
INSTRID	String	10		INSTR	INSTRID
CALDATE	Date				
SEQNO	UShort				
NOTE	VString				

3.9 CHOICE File

Entries for choice field types in any FDMS file must link to a CHOICE data file using a primary key derived from the file name, the choice field name, and one of the possible choices for that field. All available choices for a field can be enumerated using the file name and choice field name to match entries in the CHOICE data file. The one exception is the key for available display units for base measures in **BASEMEAS**. In this case, selection is achieved using the file name and the **BASEID** entry for the base measure, *e.g.*, temperature or pressure. Enumerated choices for each field can be found in the description of that field in section 6. The code for each enumerated choice are the underlined letters of the choice value. Storage space required for a choice field in a linked data file are the character codes required to uniquely select a choice from the list. The use of several letters to represent the choice was done to simplify selection of codes for similar phrases and to accommodate current SI representation for measurement units.

3.9.1 CHOICE

Field Name	Type	Width	Decimal	Related/Choice File	Field
FILE	String	8			
FIELD	String	8			
CODE	String	4			
VALUE	VString				

4. Importing Test Data

Import formats supported by FDMS 2.0 include the FDMS 1.0 import file format and a slightly modified version of the FDMS 1.0 import file as the FDMS 2.0 import file.

4.1 Importing From FDMS Version 1.0

FDMS 1.0 fields and tables to be imported to FDMS 2.0 should use the format reviewed in the FDMS 1.0 file format document [3] and the original FDMS design document [5]. Use a header for each field that matches the field name in that FDMS 1.0 file as indicated in the file format document. All fields will be imported and stored in the appropriate FDMS 2.0 file structures. Those fields indicated in section 6 as **no longer used** will not be imported into FDMS 2.0.

FDMS 2.0 will provide the functionality to generate import files from existing FDMS 1.0 databases in order to import this data into the FDMS 2.0 database.

4.2 Importing FDMS 2.0 Import Files

The FDMS 2.0 import file format resembles the FDMS 1.0 file format with two significant modifications. Field names for internal identifiers such as **TESTID** and **TESTIID** will not import the associated values for these fields. Since these are intended as internal identifiers only, any necessary assignments will be handled when the data is imported. This prevents any confusion caused by two laboratories having the same **TESTID** to identify separate test runs.

The second modification to the FDMS 1.0 file format for FDMS 2.0 concerns the use of data acquisition unit specification. This specification is necessary to identify the units used by the laboratory when the measurements were evaluated so that the values are converted appropriately to the SI storage units in the FDMS database. This is accomplished by including on the field header line the corresponding measurement units. For example, importing the oxygen consumption constant for a Cone Calorimeter test measured in kJ/g requires the line:

E kJ/g

In order to indicate that the oxygen consumption constant was measured in J/g, the import file requires the line:

E J/g

For derived vector measurements, the FDMS 1.0 file format specifying the data acquisition units on a separate line will continue to be supported.

If no units are specified in the import file for a derived measurement, the current user specified data acquisition units for that derived measurement and test method type are used. For the standardized tests such as the Cone Calorimeter, Furniture Calorimeter, Lateral Ignition and Flame spread Test apparatus, and the room/corner test, these would be the units specified in the table in subsection 3.5.8. In the above example, for the Cone Calorimeter, the units would be kJ/g. If no units are specified on the field header line, and no data acquisition units have been specified by the user for that derived measurement and test method, the default SI storage units for the component base measures are assumed, and no data conversion will be performed. FDMS import format files generated by FDMS 2.0 will automatically write the data acquisition units on the appropriate field header lines.

4.2.1 Critical Changes from FDMS 1.0 Import Files

Vector data will be imported into FDMS 2.0 rather than storing values in external ASCII files. For this reason, it is critical that short labels in the FDMS import files match exactly the derived measurement short labels specified in subsection 3.4.5. Vector data will only be imported when the short labels match a derived measurement for that test method. Since terminology between methods and models may not be consistent, the current short label HRR in the import file for the Cone Calorimeter should be changed to HRR/A to accurately reflect the measure as heat release rate per unit area. Similar cautions are noted for the derived measures: MLR versus MLR/A, MASS versus MASS/A, and TOTLHEAT versus TOTLHEAT/A.

5. File Definitions

Table 6. FDMS File Definitions

File	Purpose
AFFILIAT	Indicates affiliations between an individual and an organization
AFFNOTES	Notes pertaining to an entry in AFFILIAT.
BASEMEAS	A set of FDMS provided base measures. Used for creating all derived measurements in FDMS.
CALIB	Calibration entries for laboratory instrumentation.
CALIBNOT	Notes pertaining to an entry in CALIB.
DOCNOTE	Notes pertaining to an entry in DOCUMENT.
DOCUMENT	A set of documents specifying fire test methods.
DRVDBASE	Indicates combination of base measures from BASEMEAS required to generate an entry in DRVDMEAS.
DRVDMEAS	A set of derived measures from the base measures in BASEMEAS.
DRVDNOTE	Notes pertaining to an entry in DRVDMEAS.
INSTRBAS	Indicates components of laboratory instrumentation in INSTRUM.
INSTRNOT	Notes pertaining to an entry in INSTRUM.
INSTRUM	A set of laboratory specific instrumentation at local FDMS sites or instrumentation types at the central FDMS database site.
METHACQU	The data acquisition units for each component base measure of a derived measurement. Used in data conversion when importing data to the database.
METHDOC	Documents describing a particular fire test method.
METHMEAS	Setup conditions and test measurements for a particular fire test method.
METHNOTE	Notes pertaining to an entry in METHOD.
METHOD	A set of fire test methods available in FDMS.
ORGANISE	A set of organizations involved with the collection or evaluation of fire test results.
ORGNOTES	Notes pertaining to an entry in ORGANISE.
PEOPLE	A set of fire professionals.
PERNOTES	Notes pertaining to an entry in PEOPLE.
PRODBASE	Indicates components of a product in PRODUCT.

File	Purpose
PRODNOTE	Notes pertaining to an entry in PRODUCT.
PRODSUPP	Indicates suppliers of a product entry in PRODUCT.
PRODUCT	A set of products for which fire tests are typically conducted.
TEST	Descriptions of all fire tests stored in FDMS.
TESTNOTE	Notes pertaining to an entry in TEST.
TESTPROD	Products from PRODUCT which were tested for an entry in TEST.
TSTCONDI	Integer condition values for an entry in TEST.
TSTCONDR	Floating point condition values for an entry in TEST.
TSTCONDS	String condition values for an entry in TEST.
TSTINSTR	Instruments from INSTRUM which were used to measure results for an entry in TEST.
TSTMEASI	Integer test results for an entry in TEST.
TSTMEASR	Floating point test results for an entry in TEST.
TSTMEASV	Floating point vector test results for an entry in TEST.

6. Field Definitions

Table 7. FDMS Field Definitions

FDMS 1.0	FDMS 2.0	FDMS 2.0 File	Description
ADDINFO	NOTE	PERNOTES	Supplementary information about an individual.
ADDRESS1	ADDRESS1	ORGANISE, AFFILIAT	Street address.
ADDRESS2	ADDRESS2	ORGANISE, AFFILIAT	Additional mailing information
ADMIN	ADMIN	TEST	Laboratory specific code used to store internal administrative information such as Cost Center code or invoice number.
AREA	AREA	TESTPROD	Specimen area. For the Cone Calorimeter, the area under the specimen holder edge or the edge frame is *not* included.
ASCARITE	Derived measure	TSTCONDS	Indicates if the CO_2 was removed from the sample before O_2 was measured using Ascarite or equivalent means.
AVGCO	Derived measure	TSTMEASR	Test average of the CO yield.
AVGCO2	Derived measure	TSTMEASR	Test average of the CO_2 yield.
AVGH2O	Derived measure	TSTMEASR	Test average of the H_2O yield.
AVGHC	Derived measure	TSTMEASR	Test average of the effective heat of combustion Δh_c.
AVGMDOT	Derived measure	TSTMEASR	Test average of the mass loss rate $\dot{m}''$.
AVGQDOT	Derived measure	TSTMEASR	Test average of the rate of heat release $\dot{q}''$.
AVGSIGMA	Derived measure	TSTMEASR	Test average of the specific smoke extinction area σ_m.
B	Derived measure	TSTMEASR	Ignition parameter.
	BASEACQU	METHACQU	Data acquisition units for a base measure component of a derived measurement within a test method. Used in data conversion when importing data to the database.

FDMS 1.0	FDMS 2.0	FDMS 2.0 File	Description
	BASEDISP	BASEMEAS	Display units for the base measure. User selectable. Choices are: Temperature: Celsius, Fahrenheit Absolute Temperature: Kelvin, Rankine Pressure: Pascal, Atmosphere, Bar, Mercury, Water Length: Meter, Centimeter, Millimeter, Foot, Inch Energy: Joule, Kilojoule, Megajoule, BTU Energy Release Rate: Watt, Kilowatt, Megawatt, BTU/second, BTU/hour Energy Absorption Rate: Watt, Kilowatt, Megawatt, BTU/second, BTU/hour Mass: Gram, Kilogram, Pound Time: Second, Hour, Minute
	BASEID	BASEMEAS, DRVDBASE, METHACQU	Short label ID for a base measure. User selectable or computer generated.
	BASENAME	BASEMEAS	Long label for a base measure. Used to generate a short label ID.
	BASEPWR	DRVDBASE	Power to which a base measure is raised in deriving a derived measure.

FDMS 1.0	FDMS 2.0	FDMS 2.0 File	Description
	BASESTOR	BASEMEAS	Storage units for the base measure. SI units. Units are: Temperature — Kelvin Absolute Temperature — Kelvin Pressure — Pascal Length — Meter Energy — Joule Energy Release Rate — Watt Mass — Kilogram Time — Second Conductivity Time — Second
BURNER	Derived measure BURNSPEC	TSTCONDS	When the ignitor is a burner, the heat output values used for the burner program have to be specified. These are entered as a string of numbers, separated by at least one blank. The order is: Time (s) Output (kW) Time (s) Output (kW) ...
C	Derived measure C-CONE, C-LIFT	TSTCONDR, TSTMEASR	Parameter. For the Cone Calorimeter, this is the orifice constant as determined from the CH_4 burner calibration. For the LIFT, this is the slope of correlated flame spread data.
CALDATE	CALDATE	INSTR, CALIB, CALIBNOT	Date of the last calibration.
CALFILE	CALFILE	CALIB	Reference field indicating where the original or official calibration report may be found, *e.g.*, a report number or a notebook page. Most laboratories will have a different system for doing this.
CALIBREF	INSTRID	CALIB, CALIBNOT	INSTRID number from the INSTRUM table.
CALINTER	CALINTER	INSTRUM	Recommended calibration interval in months.
CALNOTE1	NOTE	CALIBNOT	Any comments which need recording about operation or calibration of this instrument such as repairs made.
CALNOTE2	NOTE	CALIBNOT	Additional calibration notes.
CATNO	CATNO	PRODSUPP	Optional catalog number since it may not exist for all products. May include alphabetical characters as well as numbers.
	CHANNEL	TSTINSTR	Channel number used for laboratory instrument during test.
CHEKORG	No longer used		
CHEKPER	No longer used		
CHEKPROD	No longer used		
CITY	CITY	ORGANISE, AFFILIAT	City name.

FDMS 1.0	FDMS 2.0	FDMS 2.0 File	Description
CO60	Derived measure	TSTMEASR	Average CO yield over 60 seconds subsequent to ignition.
CO180	Derived measure	TSTMEASR	Average CO yield over 180 seconds subsequent to ignition.
CO300	Derived measure	TSTMEASR	Average CO yield over 300 seconds subsequent to ignition.
CO260	Derived measure	TSTMEASR	Average CO_2 yield over 60 seconds subsequent to ignition.
CO2180	Derived measure	TSTMEASR	Average CO_2 yield over 180 seconds subsequent to ignition.
CO2300	Derived measure	TSTMEASR	Average CO_2 yield over 300 seconds subsequent to ignition.
	COEF0	CALIB, SUMMARY	Coefficient required for the polynomial conversion of instrument data to physical units, or summary data to fire test vector values. Refer to the conversion equations in the CONV field description for exact details involving polynomial conversion.
	COEF1	CALIB, SUMMARY	Optional coefficient required for the polynomial conversion of instrument data to physical units, or summary data to fire test vector values. Refer to the conversion equations in the CONV field description for exact details involving polynomial conversion.
	COEF2	CALIB, SUMMARY	Optional coefficient required for the polynomial conversion of instrument data to physical units, or summary data to fire test vector values. Refer to the conversion equations in the CONV field description for exact details involving polynomial conversion.
	COEF3	CALIB, SUMMARY	Optional coefficient required for the polynomial conversion of instrument data to physical units, or summary data to fire test vector values. Refer to the conversion equations in the CONV field description for exact details involving polynomial conversion.
	COEF4	CALIB, SUMMARY	Optional coefficient required for the polynomial conversion of instrument data to physical units, or summary data to fire test vector values. Refer to the conversion equations in the CONV field description for exact details involving polynomial conversion.
	COEF5	CALIB, SUMMARY	Optional coefficient required for the polynomial conversion of instrument data to physical units, or summary data to fire test vector values. Refer to the conversion equations in the CONV field description for exact details involving polynomial conversion.
COMMDATE	COMMDATE	INSTRUM	Date the instrument was first commissioned.

FDMS 1.0	FDMS 2.0	FDMS 2.0 File	Description
COMMENT1	NOTE	TESTNOTE	Test comments entered by the operator any time before, during, or after a test. In some cases, *e.g.*, second ignition, the comment is directly inserted by the device software and not by the operator.
COMMENT2	NOTE	TESTNOTE	Additional operator comments.
COMMENT3	NOTE	TESTNOTE	Additional operator comments.
COMMENT4	NOTE	TESTNOTE	Additional operator comments.
COMMENT5	NOTE	TESTNOTE	Additional operator comments.
	COMPDATE	INSTRBAS	Date the laboratory instrument composition was modified.
COMPOS	COMPOS	PRODUCT	Indicates if the product is a composite.
	COMPTIME	INSTRBAS	Time the laboratory instrument composition was modified.
CONST0	COEF0	CALIB	
CONST1	COEF1	CALIB	
CONST2	COEF2	CALIB	
CONST3	COEF3	CALIB	
CONST4	COEF4	CALIB	
CONST5	COEF5	CALIB	
CONTACID	No longer used		
CONTACT	No longer used		

FDMS 1.0	FDMS 2.0	FDMS 2.0 File	Description
CONV	CONV	CALIB	Type of conversion of instrument data to physical units. Three types of conversion are possible: polynomial, logarithmic, and Type K thermocouples. For polynomial conversion, CONV contains a capital P with the degree of the polynomial specified in **PDEGREE**. Required constants are entered in the CONST fields. The polynomial conversion equation is: $\text{(physical units)} = \text{COEF0} + \text{COEF1} * \text{(analog units)} + \text{COEF2} * \text{(analog units)}^2 + \text{COEF3} * \text{(analog units)}^3 + \text{COEF4} * \text{(analog units)}^4 + \text{COEF5} * \text{(analog units)}^5.$ For logarithmic conversion, CONV contains LOG. The logarithmic conversion equation is: $\text{(physical units)} = \text{COEF0} * \ln(1 - \text{CONST1} * \text{(analog units)})$ If CONV contains TYPEK, the software will perform an automatic conversion to the physical temperature units using built in conversion algorithms.
COUNTRY	COUNTRY	ORGANISE, AFFILIAT	Country name, common name instead of full name (*e.g.*, USA, not United States of America)
	DATAACQU	METHMEAS	Indicates when user specified data acquisition units should be used for data conversion or the default SI storage units. Used in data conversion when importing data to the database.
	DATE_BEG	AFFILIAT	Date affiliation between individual and organization began.
	DATE_END	AFFILIAT	Date affiliation between individual and organization ended.
DELETED	DELETED	ALL	Used by the database system to indicate a deleted record.
DENSITY	DENSITY	TESTPROD	Density of the composite product specimen.
DIVISION	DIVISION	ORGANISE	Division/department/branch (*e.g.*, Building and Fire Research Laboratory).
	DOCID	DOCUMENT, DOCNOTE, METHDOC	Number of a document proposing a fire test method.
	DOCSTD	DOCUMENT	Indicates if document has been accepted as a standard.
	DOCTITLE	DOCUMENT	Title of a document proposing a fire test method.

FDMS 1.0	FDMS 2.0	FDMS 2.0 File	Description
	DRVDCML	DRVDMEAS	Number of decimal positions of derived measure value.
	DRVFORM	DRVDMEAS	Format of derived measure value. Choices are: Integer Floating Point Vector Floating Point Variable String
	DRVID	DRVDMEAS, DRVDNOTE, DRVDBASE, METHACQU, METHMEAS, TSTCONDI, TSTCONDR, TSTCONDS, TSTMEASI, TSTMEASR, TSTMEASV SUMMARY	Short label ID for a derived measurement. User selectable or computer generated.
	DRVNAME	DRVDMEAS	Long label for a derived measure. Used to generate a short label ID.
	DRVVECSC	DRVDMEAS	Indicates if derived measure is vector or scalar.
	DRVWIDTH	DRVDMEAS	Number of positions for derived measure value.
E	Derived measure	TSTCONDR	Oxygen consumption constant. A generic value for this is 13.1 kJ per gram of O_2. If the composition of the fuel is known (*e.g.*, CH_4 or PMMA), a more exact value can be used. For the Cone Calorimeter, the data acquisition program lets the operator specify the value to use from a menu at runtime. For instance, for PMMA, this value would be 12.98 kJ per gram of O_2. The data reduction program uses the value in this field by default.
	E-MAIL	ORGANISE, AFFILIAT	E-mail address.
FAX	FAXIMILE	ORGANISE, AFFILIAT	Facsimile number, including country code.
FILE	PROJECT	TEST	Reserved for a laboratory-specific identification of the test series to which the test belongs. This is typically a way to refer to the sponsorship of a test. In addition to FILE, some laboratories call this "Test Code," "Job Number," or "Test Reference."
FIRSTNAM	No longer used		
FLAMEOUT	Derived measure	TSTMEASI	Time to flameout. This is the time of the last flameout if more than one ignition/flameout has occurred. The remaining values are recorded in the comments.

FDMS 1.0	FDMS 2.0	FDMS 2.0 File	Description
FLASH	Derived measure	TSTMEASI	Time when flashover is observed in the room.
FLOW	Derived measure	TSTCONDR	Flow rate of a gas burner.
FLUX	Derived measure	TSTCONDR	Flux.
FRAME	Derived measure	TSTCONDS	Denotes if the edge frame was used (meaningful only for horizontal orientations).
FULLNAME	FULLNAME	PEOPLE	Composite name of an individual, *e.g.*, both first and last names. This is useful when it is necessary to reference a single field to get a complete name rather than separate first and last name fields. Separate fields are also included to provide easier sorting.
GRID	Derived measure	TSTCONDS	Denotes if the wire grid was used.
H2O60	Derived measure	TSTMEASR	Average H_2O yield over 60 seconds subsequent to ignition.
H2O180	Derived measure	TSTMEASR	Average H_2O yield over 180 seconds subsequent to ignition.
H2O300	Derived measure	TSTMEASR	Average H_2O yield over 300 seconds subsequent to ignition.
HBR	Derived measure	TSTMEASR	Similar to HCl, but for HBr.
HC60	Derived measure	TSTMEASR	Average Δh_c over 60 seconds subsequent to ignition.
HC180	Derived measure	TSTMEASR	Average Δh_c over 180 seconds subsequent to ignition.
HC300	Derived measure	TSTMEASR	Average Δh_c over 300 seconds subsequent to ignition.
HCL	Derived measure	TSTMEASR	The yield of HCl, as determined by batch analysis, typically by ion chromatography. Similar types of measurement as the SOOT field. These dimensionless quantities are determined using the raw data (grams of species), the ratio of mass flow rate through the solution to the main duct flow, and the mass of specimen loss during the test.
HCN	Derived measure	TSTMEASR	Similar to HCl, but for HCN.
HF	No longer used		See TUH.
IGNITOR	Derived measure	TSTCONDS	Choices are: S: Standard sand burner (170 mm x 170 mm) A: Alternative sand burner (305 mm x 305 mm) O: Other

FDMS 1.0	FDMS 2.0	FDMS 2.0 File	Description
IGNTYPE	Derived measure	TSTCONDS	Choices are: N: NORDTEST crib, 126 g W: NBS wastebasket burner, 50 kW methane T: FRS T-head burner, 25 kW propane 1: BSI Source #1, butane burner 2: BSI Source #2, butane burner 3: BSI Source #3, butane burner 4: BSI Source #4, 8.5 g crib (1.0 kW) 5: BSI Source #5, 17 g crib (1.9 kW) 6: BSI Source #6, 60 g crib (3.5 kW) 7: BSI Source #7, 126 g crib (7.0 kW) O: Other (the letter O, not zero)
INERTIA	Derived measure	TSTMEASR	Thermal inertia.
INITIAL	No longer used		
INSTRID	INSTRID	INSTRUM, INSTRBAS, INSTRNOT, CALIB, CALIBNOT, TSTINSTR	Short Label ID for the instrument type at the central database or the specific laboratory instrument for local site installations. User selectable or computer generated.
	INSTRMAN	INSTRBAS	INSTRID from INSTRUM table for a composite instrument.
INSTRNO	INSTRID	TSTINSTR	INSTRID number from the INSTRUM table to provide unique identification for the test apparatus. Laboratories may have more than one of a given type of fire test apparatus.
	INSTRSUB	INSTRBAS	INSTRID from INSTRUM table for a component instrument.
	INSTRTYP	INSTRUM	INSTRID for a general instrument type description entry.
INTERVAL	INTERVAL	TSTINSTR	Time interval between two consecutive scans.
	ISTART	SUMMARY	Initial time point for a parameterized curve.
LABID	LABID	TEST	ORGID number from the ORGANISE table for the laboratory where the test was conducted.
	LAST_UPD	ORGANISE, PEOPLE, AFFILIAT, PRODUCT, DRVDMEAS, METHOD, DOCUMENT, TEST, INSTRUM	When several sources of information are available, it may not be clear which information is the most current. This field is updated only when it is known that the information in the record is current and correct. If **any** information being entered is uncertain, this field should be left blank. Such a version of the record is preferentially discarded when a verified record becomes available.
LASTNAME	No longer used		

FDMS 1.0	FDMS 2.0	FDMS 2.0 File	Description
	LAYERID	PRODBASE	Indicator of the layer of a component in a composite product.
LOCATION	Derived measure	TSTCONDS	Location of the specimen. Choices are: Corner of room Wall center Other
MAINMAT	PRODMAIN	PRODBASE	Generic name for the main material (*e.g.*, rigid polyurethane foam) composing a product.
MAINUSE	MAINUSE	PRODUCT	Main area in which the product is used. Choices are: AS: Adhesives/Sealants BS: Building Structure BF: Building Fabric CI: Cable Insulation CT: Clothing/Textiles DO: Decor/Ornament FC: Film/Coating FF: Furnishings MA: Marine MD: Medical/Dental MI: Military PC: Packaging/Containers SL: Sports/Leisure SU: Service/Utilities TI: Thermal Insulation TR: Transport
MAKER	No longer used		
MAKERID	MAKERID	INSTRUM	ORGID number from the ORGANISE table for the company manufacturing this instrument.
MANUFACT	No longer used		
MANUFID	MANUFID	PRODSUPP	ORGID number from the ORGANISE table for the company manufacturing this product.
MASSF	Derived measure	TSTMEASR	Specimen mass at the end of the test.
MASSI	Derived measure	TSTMEASR	Specimen mass before the start of the test.
MASSLOSS	Derived measure	TSTMEASR	Specimen mass loss during the test.
MAXEXT	Derived measure	TSTMEASR	Maximum value of the smoke extinction area flow rate.
MAXMDOT	Derived measure	TSTMEASR	Peak mass loss rate $\dot{m}''$. The mass loss rate data is a numerically obtained multi-point estimate of the derivative of the mass loss. Consequently, this value has been smoothed to some extent.
MAXQDOT	Derived measure	TSTMEASR	Peak rate of heat release $\dot{q}''$. For some materials (*e.g.*, charring materials), rate of heat release curves have more than one peak. This entry represents the highest value peak for the entire test.

FDMS 1.0	FDMS 2.0	FDMS 2.0 File	Description
MAXSIGMA	Derived measure	TSTMEASR	Peak specific smoke extinction area σ_m. As the raw σ_m records the actual turbulent fluctuations in the duct velocity, the instantaneous values of the extinction coefficient k have quite a bit of fluctuation. Therefore, the computed specific extinction area makes use of a smoothing algorithm.
MAXTIME	Derived measure	TSTMEASI	Time (s) to the peak rate of heat release in MAXQDOT field.
MDOT60	Derived measure	TSTMEASR	Average mass loss rate $\dot{m}''$ over 60 seconds subsequent to ignition.
MDOT180	Derived measure	TSTMEASR	Average mass loss rate $\dot{m}''$ over 180 seconds subsequent to ignition.
MDOT300	Derived measure	TSTMEASR	Average mass loss rate $\dot{m}''$ over 300 seconds subsequent to ignition.
	MEASCOND	METHMEAS	Indicates if derived measure is a setup condition or a test result measure. Choices are condition or measure.
	METHID	METHOD, METHACQU, METHMEAS, METHDOC, METHNOTE, TEST	Short label ID for a test method. User selectable or computer generated.
	METHNAME	METHOD	Long label for a test method. Used to generate a short label ID.
	METHTYPE	METHOD	Type of the test method described. Choices are: Bench-scale Intermediate-scale Real-scale Model
MORPHONE	MORPHONE	ORGANISE, AFFILIAT	Telephone extension or an alternative telephone number for an individual.
MOUNT1	Derived measure MOUNT	TSTCONDS	Specifies the means of mounting. For example, "Glued with Brand X glue, 2 cm diameter globs, spaced at 30 cm."
MOUNT2			Continuation of MOUNT1.
NEXTDATE	No longer used		
	NICKNAME	PEOPLE	Additional first name person is known by.

FDMS 1.0	FDMS 2.0	FDMS 2.0 File	Description
	NOTE	ORGNOTES, PERNOTES, AFFNOTES, PRODNOTE, DRVDNOTE, METHNOTE, DOCNOTE, TESTNOTE, INSTRNOT, CALIBNOT	Comments or notes for the associated main files.
NOTES1	NOTE	INSTRNOT	Special comments about the current or past use of this instrument. For example, "All data recorded between date X and Y are suspect."
NOTES2	NOTE	INSTRNOT	Additional instrument comments.
NOTES3	NOTE	INSTRNOT	Additional instrument comments.
NOTES4	NOTE	INSTRNOT	Additional instrument comments.
NOTES5	NOTE	INSTRNOT	Additional instrument comments.
OFFICER	No longer used		
OFFID	OFFID	TEST, CALIB	PERSONID number from the PEOPLE table for the laboratory officer responsible for a test. For CALIB, the individual who has signature authority to issue a calibration report.
OPERATOR	No longer used		
OPERID	OPERID	TEST, CALIB	PERSONID number from the PEOPLE table for the individual who performed the test. For CALIB, the individual who actually performed the calibration.
ORGANISE	ORGANISE	ORGANISE	Name of the organization (*e.g.*, National Institute of Standards and Technology).
ORGDATE	LAST_UPD	ORGANISE	When several sources of information are available for the same organization, it may not be clear which information is the most current. This field is updated only when it is known that the information in the record is current and correct. If any information being entered into an ORGANISE record is uncertain, this field should be left blank. Such a version of the record is preferentially discarded when a verified record becomes available.
ORGID	ORGID	ORGANISE, ORGNOTES, AFFILIAT, AFFNOTES	Assigned to uniquely identify the organization. User selectable or computer generated.

FDMS 1.0	FDMS 2.0	FDMS 2.0 File	Description
	ORGTYPE	ORGANISE	Type of organization. Choices are: AR: Architect CN: Consulting CS: Codes and Standards ED: Education EG: Engineering FO: Forensics FR: Fire Research FS: Fire Service GO: Government HC: Health Care IN: Insurance MA: Manufacturing RM: Risk Management TA: Trade Association TS: Testing UT: Utility
ORIENT	Derived measure	TSTCONDS	Specimen orientation, horizontal or vertical.
OXYGEN	Derived measure	TSTCONDR	Nominal value of the oxygen concentration in the enclosure around the heater and sample. The purpose is to enable quick searching of the database. For tests run at non-ambient oxygen concentration, the user may have installed a second oxygen meter to monitor the concentration of the inflow. Such data are recorded in a vector data channel. A typical value is 20.95%.
	PDEGREE	SUMMARY, CALIB	Degree of the polynomial for parameterized curve.
PERDATE	LAST_UPD	PEOPLE	When several sources of information are available for the same individual, it may not be clear which information is the most current. This field is updated only when it is known that the information in the record is current and correct. If any information being entered into a PEOPLE record is uncertain, this field should be left blank. Such a version of the record is preferentially discarded when a verified record becomes available.
PERSONID	PERSONID	PEOPLE, PERNOTES, AFFILIAT, AFFNOTES	Assigned to uniquely identify an individual. This is necessary to distinguish two people with the same name. User selectable or computer generated.
PHI	Derived measure	TSTMEASR	Flame heating parameter.
PHONE	PHONE	ORGANISE, AFFILIAT	Telephone, including country code.
PILOT	Derived measure	TSTCONDS	Indicates if ignition was piloted.
	POSITION	AFFILIAT	Position in which the individual is affiliated with an organization.

FDMS 1.0	FDMS 2.0	FDMS 2.0 File	Description
POSTCODE	POSTCODE	ORGANISE, AFFILIAT	Postal code (Zip code for USA).
PRDATE	LAST_UPD	PEOPLE	When several sources of information are available for the same product, it may not be clear which information is the most current. This field is updated only when it is known that the information in the record is current and correct. If any information being entered into a PRODUCT record is uncertain, this field should be left blank. Such a version of the record is preferentially discarded when a verified record becomes available.
PRIVATE	PRIVATE	ORGANISE, PEOPLE, AFFILIAT, PRODUCT, DRVDMEAS, METHOD, DOCUMENT, TEST, INSTRUM	Allows a laboratory to define the level of access by other organizations to test results in the database. Choices are: • Allow the data to be exported without allowing modifications. • Purge any test information which might identify the manufacturer before allowing export. • Do not allow export under any circumstances.
	PROCOND	PRODUCT	Conductivity of the product.
PRODENSI	PRODENSI	PRODUCT	Density of the product.
PRODESC1	NOTE	PRODNOTE	Product description.
PRODESC2	NOTE	PRODNOTE	Continuation of product description.
PRODESC3	NOTE	PRODNOTE	Continuation of product description.
PRODESC4	NOTE	PRODNOTE	Continuation of product description.
PRODESC5	NOTE	PRODNOTE	Continuation of product description.
PRODID	PRODID	PRODUCT, PRODNOTE, PRODSUPP, TESTPROD	Assigned to uniquely identify the test product. This is necessary since many products have similar names which are difficult to distinguish.
PRODID1	PRODMAIN	PRODBASE	PRODID value from PRODUCT table for the main product composing the sample.
PRODID2	PRODSUB	PRODBASE	PRODID value from PRODUCT table for the secondary product composing the sample.
	PRODMAIN	PRODBASE	PRODID value from PRODUCT table for the main product composing the sample.
PRODNAME	PRODNAME	PRODUCT	Commercial name of the test product.
	PRODSUB	PRODBASE	PRODID value from PRODUCT table for the secondary product composing the sample.
PRODUCT1	No longer used		

FDMS 1.0	FDMS 2.0	FDMS 2.0 File	Description
PRODUCT2	No longer used		
	PROEMISS	PRODUCT	Product emissivity.
	PROSHEAT	PRODUCT	Product specific heat.
PROTHICK	PROTHICK	PRODUCT	Product thickness.
QDOT60	Derived measure	TSTMEASR	Average rate of heat release $\dot{q}''$ over 60 seconds subsequent to ignition.
QDOT180	Derived measure	TSTMEASR	Average rate of heat release $\dot{q}''$ over 180 seconds subsequent to ignition.
QDOT300	Derived measure	TSTMEASR	Average rate of heat release $\dot{q}''$ over 300 seconds subsequent to ignition.
QIG	Derived measure	TSTMEASR	Minimum flux for ignition.
QSMIN	Derived measure	TSTMEASR	Minimum flux for spread.
RECEIVED	RECEIVED	TEST	Date test results were received.
REGION	REGION	ORGANISE, AFFILIAT	State for USA, county for UK, etc.
REPDATE	REPDATE	TEST	Date the test was reported.
RHCOND	Derived measure	TSTCONDR	Relative humidity for specimen conditioning (%). This is important if, for example, the specimens were oven-dried at RH=0.
RHTEST	Derived measure	TSTCONDR	Relative humidity of the supply air for conducting the test (%). In the case of special, controlled atmospheres, this can be user selected.
SCANS	SCANS	TSTINSTR	Total number of scans for the test. For Cone Calorimeter, value is entered by CONERUN.
	SEQNO	ORGNOTES, PERNOTES, AFFNOTES, PRODNOTE, DRVDNOTE, METHNOTE, DOCNOTE, TESTNOTE, INSTRNOT, CALIBNOT	Sequence for the comment or note.
SERIAL	SERIAL	INSTRUM	Identical to the header line "SERIAL NAME" imported as part of the raw data.
SIGMA60	Derived measure	TSTMEASR	Average σ_m over 60 seconds subsequent to ignition.
SIGMA180	Derived measure	TSTMEASR	Average σ_m over 180 seconds subsequent to ignition.
SIGMA300	Derived measure	TSTMEASR	Average σ_m over 300 seconds subsequent to ignition.

FDMS 1.0	FDMS 2.0	FDMS 2.0 File	Description
SOOT	Derived measure	TSTMEASR	Mass of the soot deposited on the soot filter during the test divided by the mass of specimen loss during the test.
SPCONTID	SPCONTID	TEST	PERSONID number from the PEOPLE table for the contact person at the sponsoring organization.
	SPDATE	TESTPROD	Supply date for test product.
SPDATE1	SPDATE	TESTPROD	Supply date for product 1.
SPDATE2	SPDATE	TESTPROD	Supply date for product 2.
SPONCONT	No longer used		
SPONID	SPONID	TEST	ORGID number from the ORGANISE table for the sponsoring organization.
SPONSOR	No longer used		
	STDDATE	DOCUMENT	Date document was accepted as standard.
	STDORG	DOCUMENT	ORGID number from the ORGANISE table for the document standards organization.
SUMEXT	Derived measure	TSTMEASR	Total smoke extinction area released during the entire test.
	SUMFLAG	TEST	Logical indicator for vector values stored as observed values in TSTMEASV or parameterized curve in SUMMARY.
SURFDENS	Derived measure	TSTCONDR	When thin textiles, papers, etc., are covering some standard substrate in a ROOM test, it is most appropriate to describe them by their surface density.
TELEX	TELEX	ORGANISE, AFFILIAT	Telex number.
TEMPCOND	Derived measure	TSTCONDR	Temperature for specimen conditioning.
TEMPTEST	Derived measure	TSTCONDR	Temperature of the supply air for conducting the test.
TEST	TESTNO	TEST	Serial test number assigned. It is specific to the laboratory and to an instrument. For the Cone Calorimeter, it is assigned by the CONERUN software.
TESTDATE	TESTDATE	TEST	Date the original test was run.

FDMS 1.0	FDMS 2.0	FDMS 2.0 File	Description
	TESTID	TEST, TSTINSTR, TESTPROD, TSTMEASI, TSTMEASR, TSTMEASV, TSTCONDI, TSTCONDR, TSTCONDS, TESTNOTE, SUMMARY	An internal integer assignment to reduce storage requirements for a unique test identifier. A unique identifier is determined by LABID, TESTDATE, INSTRNO, and TESTNO. This assignment requires less storage space.
	TESTIID	TSTINSTR, TSTMEASI, TSTMEASR, TSTMEASV, SUMMARY	A similar assignment to TESTID except that assignment is based on instrument and position so that the same instrument can be used to measure a value at several positions within the test environment.
THICK	THICK	TESTPROD	Specimen thickness.
TIG	Derived measure	TSTMEASR	Minimum temperature for ignition.
TIGN	Derived measure	TSTMEASR	Time to ignition, defined as sustained flaming. This is the time of first ignition if more than one ignition/flameout has occurred. The remaining values are recorded with the comments.
TOTLHEAT	Derived measure	TSTMEASR	Total heat released during the entire test.
TSMIN	Derived measure	TSTMEASR	Minimum temperature for spread.
TSTAR	Derived measure	TSTMEASR	Characteristic equilibrium or thermal steady state time.
TUH	Derived measure	TSTMEASR	Similar to HCl, but for total unburned fuel. The HF field originally allocated to hydrogen fluoride measurements was reallocated to total unburned hydrocarbons, TUH, to conform to current usage in laboratories.
USER1$	No longer used		
USER2$	No longer used		
USER3$	No longer used		
USERNUM1	No longer used		
USERNUM2	No longer used		
USERNUM3	No longer used		

FDMS 1.0	FDMS 2.0	FDMS 2.0 File	Description
	VALUE	TSTMEASI, TSTMEASR, TSTMEASV, TSTCONDI, TSTCONDR, TSTCONDS	Value of the test measure or condition.
VERSION	No longer used		FDMS version number. Required to identify the correct version of the data reduction routines.
	XPOS	TSTINSTR	X position of a fire test instrument.
	YPOS	TSTINSTR	Y position of a fire test instrument.
	ZONE	TSTINSTR	Zone description of a fire test instrument, *e.g.*, stack, ceiling, floor, etc.
	ZPOS	TSTINSTR	Z position of a fire test instrument.
ZNUMBER	TESTID	TEST	Mechanism by which the DOS vector data file is associated with a specific test. The name of the DOS file is the ZNUMBER with a prefix of "Z".

7. References

[1] Babrauskas, V., Peacock, R.D., Janssens, M., and Batho, N.E., Standardizing the Exchange of Fire Data - The FDMS, *Fire and Materials* **15**, 85-92 (1991).

[2] FDMS 1.0 version software distributed by Fire Research Station, Borehamwood, Herts, WD6 2BL, England, attn: S.A. Ames.

[3] Portier, R.W., A Programmer's Reference Guide to FDMS File Formats, National Institute of Standards and Technology, NISTIR 5162 (1993)

[4] Dark Star Research Ltd., Penley, Clwyd, England.

[5] Babrauskas, V., Janssens, M., Peacock, R.D., and Batho, N.E., Technical Documentation and User's Guide for FDMS, A Fire Data Management System, unpublished (1990).

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Periodical

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