

ACI 126.1R-97

Guide to a Recommended Format for the Identification of Concrete in a Materials Property Database

Reported by ACI Committee 126



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This guide is intended for use by those responsible for entering data into a concrete materials property database. It is the first of a series of related documents that present recommended formats for use in computerization of concrete materials property data for entry into databases. The guide addresses the complex problem of distinguishing one concrete from another by providing a logical scheme for systematically organizing and subdividing material characteristics and parameters to create a unique concrete identifier for use in a database. The organization and structure presented in this guide provide an extensive framework for cross-referencing concrete materials property and processing data and for integrating the reporting recommendations contained in the other ACI Committee 126 guides. ACI Committee 126 guides are consistent with the principles laid down in the guides that have been prepared by ASTM Committee E-49 on Computerization of Material and Chemical Property Data.

Keywords: concrete; concrete identifiers; database; database management; materials property database; recommended formats.

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CHAPTER 1—SCOPE

1.1—Introduction

A concrete materials property database is a collection of data files in which properties of concretes are organized and stored. Each data file is unique because it only contains properties, data, and information for one particular concrete. For example, ACI Committee 207 on Mass Concrete has developed such a collection. It contains data files for 30 concretes used in dams located throughout the world.

Accessing the data and information in a concrete materials property database may be difficult or impossible if the database management system poses constraints or if there are inconsistencies among data files. The need for a comprehensive data management strategy becomes apparent each time one of these difficulties is encountered. To efficiently report the property data that may be available for a particular concrete, a comprehensive set of guidelines for establishing unique concrete identification and for presenting constituent information, processing parameters, mechanical, thermal, physical, and other properties, and performance characteristics should be followed.

This guide is the first of a series of related documents being prepared by ACI Committee 126. The others will provide recommended formats for cements, aggregates, chemical admixtures, mineral admixtures, concrete processing, and concrete properties and performance. Figure 1.1 shows the

relationships among the guides and the concrete material identifiers. The recommended formats presented in the guides are intended for use in the computerization of data in a comprehensive concrete materials property database. These guides are consistent with the principles laid down in the guides that have been prepared by ASTM Committee E-49, Computerization of Material and Chemical Property Data. The organization of this guide for the identification of concrete in a materials property database was strongly influenced by ASTM E 1338 Standard Guide for the Identification of Metals and Alloys in Computerized Material Property Databases, and ASTM E 1309 Standard Guide for the Identification of Composite Materials in Computerized Material Property Databases.

1.2—Objective

This document is intended to serve as a guide for establishing the unique identity of each concrete in a concrete materials property database. Based on consensus recommendations for a multilevel material description and designation system (Westbrook and McCreight 1987), it provides for the reporting of essential data and information necessary for searching the database and for locating concretes with similar compositions and characteristics (Moniz 1993). This guide includes a classification system, guidelines for identifying and designating the supplier, composition, processing history, and mixture proportions of concrete, and recommendations for reporting fresh and reference concrete properties. Although compliance with the recommended formats is considered essential for efficient computerization of concrete properties, this guide is not intended to replace reporting requirements established in consensus standards or contractual agreements, nor is it intended to serve as a step-by-step manual for use in database management or in computer protocol development.

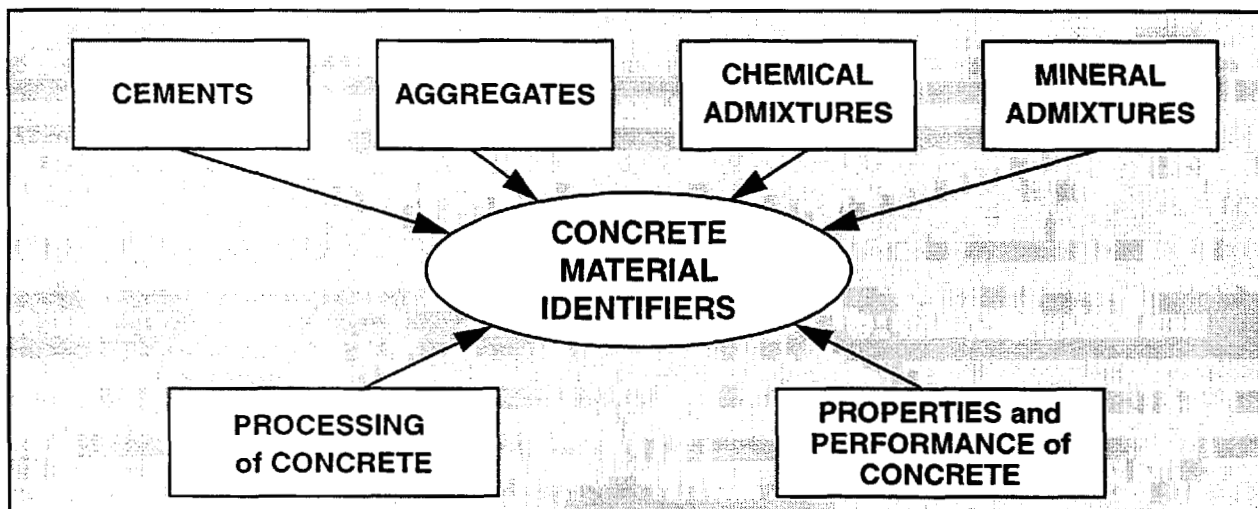


Fig. 1.1—Relationships among the guides to recommended formats for concrete materials property data and concrete material identifiers

CHAPTER 2—TERMINOLOGY

2.1—Terms specific to concrete

Concrete is defined by ACI Committee 116 on Cement and Concrete Terminology as a composite material that consists essentially of a binding medium within which are embedded particles or fragments of aggregate. Other concrete-related terms used in this guide are defined in reference documents listed in Chapter 7.

2.2—Terms used in this guide

Terms used to describe the components of a concrete materials property database are presented in this section. The relationships among the components are shown in Fig. 2.2. A database consists of data files that are, internally, composed of data segments and data elements.

2.2.1 Concrete materials property database—a collection of data files in which properties of concretes are organized and stored.

2.2.2 Data file—a complete concrete materials property database entry or record that contains properties, data, and information for one particular concrete.

2.2.3 Data segment—a category of information that is used to subdivide and designate sets of related data elements. Certain data segments may be used a number of times to report constituent information and properties for a particular concrete.

2.2.4 Data element—an individual piece of information used in describing a material or in recording test results; for example, a variable name or test parameter. Each data element in this guide is represented by a data element number, data element name, data element type, and data element format.

Certain data elements, which are included in this guide because they are essential for unique concrete identification, are functional parts of other ACI Committee 126 guides. Entries for these particular data elements may be recorded at various locations throughout a data file.

2.2.5 Data element number—a four- or six-digit number used to denote an individual data element. These num-

bers represent the entire set of information in a particular data element. Data element numbers are considered a functional part of the guide and may be used for data element reference.

The first digit in the data element number is used as a cross reference to other ACI Committee 126 guides. Data element numbers that include an “X” are part of other ACI Committee 126 guides. For example, 5XXX.XX denotes a data element number from the properties and performance guide, 6XXX.XX denotes a data element number from the processing guide, and X001.XX denotes a data element number from one of the cement, aggregate, chemical admixture, mineral admixture, or other constituent guides. The two digits following the decimal point can be used to distinguish sets of entries having the same four-digit data element number from each other. The assigned ranges of data element numbers are presented in Table 2.2.

2.2.6 Data element name—a descriptive term or title that designates the type of information or data to be reported in the data element.

2.2.7 Data element type—a designation that reflects the significance of the data element entry. All data element entries are considered either essential or desirable for identification purposes. Data elements are considered essential if they are required to make a meaningful comparison of property data from different sources. A comparison of data from different sources may still be possible if essential information is omitted, but the value of the comparison may be greatly reduced.

2.2.8 Data element format—the presentation style used to report information or data. Alphanumeric, floating point, and special entry formats are specified in this guide for use in reporting information, unit designations, numerical values, and text. Details concerning the YYYYMMDD (year:month:date) format are presented in Subsection 6.6.1.

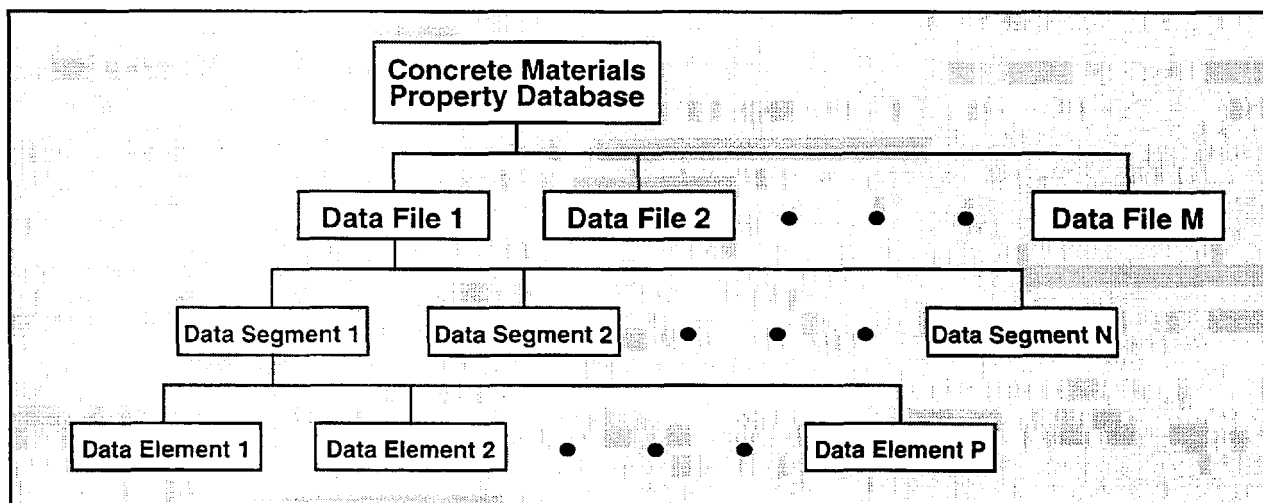


Fig. 2.2—Relationships among components of a concrete materials property database



Documents

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Table 2.2—Data element number range designations

Data element number range	ACI Committee 126 Task Group	Guide subject
1000-1999	1	Cement
2000-2999	2	Aggregates
3000-3999	3	Chemical admixtures
4000-4999	4	Mineral admixtures
5000-5999	5	Properties and performance
6000-6999	6	Processing
7000-7999	7	Material identifiers
8000-8999	8	Other solid constituents
9000-9999	9	Other liquid constituents

CHAPTER 3—SIGNIFICANCE AND USE

3.1—Significance of this guide

Concretes are often identified using names such as *Mixture A*, *Lightweight Concrete*, or *3000 psi Concrete*. ACI Committee 207 on Mass Concrete used names like these to report properties for the 30 concretes in its collection. Use of names in this way is of limited usefulness unless sufficient additional data and information about the constituents, mixture proportions, processing history, and properties of the fresh and hardened concrete are provided to establish differences among the concretes.

The recommended formats presented in this guide were developed to address the complex problem of distinguishing one concrete from another by providing a logical scheme for systematically organizing and subdividing material characteristics and parameters to create a unique concrete identifier.

3.2—Uses for this guide

This guide is intended for use by those responsible for entering data into a concrete materials property database or preparing tables of concrete properties and information for use by others. It should be of particular use to those who might wish to share data with others, either within an organization or between organizations. When necessary, users of this guide may expand the number of data segments or create different data elements so that additional concrete identification parameters can be included.

CHAPTER 4—GUIDE FOR THE IDENTIFICATION OF CONCRETE

Guidelines for the identification of a concrete in a materials property database are presented in Table 4. This guide includes seven data segments that are subdivided into separate data elements. Each data element is represented by a data element number, data element name, data element type, and data element format. Definitions for these terms are provided in Section 2.2.

The data element numbers shown in Table 4 represent the entire set of information in a particular data element and are considered a functional part of this guide. Data elements represented by data element numbers less than 7000 or equal to or greater than 8000 are included in this guide for completeness even though they are defined in other ACI Committee 126 guides.

CHAPTER 5—DATA SEGMENTS

5.1—Introduction

The seven data segments presented in Table 4 represent categories of information that are necessary for the identification of a concrete. Each data segment is identified and defined in the following section.

5.2—Data segment definitions

5.2.1 Concrete designation—The concrete designation data segment is used to report identifiers for each concrete in a concrete materials property database. These identifiers are based on a multilevel classification system that uses established terms and designations to categorize the concrete. This data segment is represented by eight data elements.

5.2.2 Concrete supplier—The concrete supplier data segment is used to report the origin of the concrete. This data segment is represented by four data elements that are part of the processing guide.

5.2.3 Constituent designation—The constituent designation data segment is used to identify a constituent in a concrete mixture. This data segment, which is repeated for each constituent used in the concrete, is represented by ten data elements that are defined in the cement, aggregate, chemical admixture, mineral admixture, other solid constituent, and other liquid constituent guides. Recommended formats for reporting data about the constituents used in the concrete are provided in these guides.

5.2.4 Concrete mixture proportions—The concrete mixture proportions data segment is used to report the amount of each constituent in a given volume of concrete. This data segment is represented by four data elements that are part of the processing guide. Because this data segment is used repeatedly, entries in this data segment should be consistent with corresponding entries in the constituent designation data segment.

5.2.5 Concrete processing—The concrete processing data segment is used to report information related to batching, mixing, transporting, placing, consolidating, finishing, and curing of concrete. This data segment is represented by eight data elements that are part of the processing guide.

5.2.6 Fresh concrete property—The fresh concrete property data segment is used to report various properties of freshly mixed concrete. These properties may be obtained from a test conducted on the fresh concrete or determined by calculation from the mixture proportions or related information such as the water-cement ratio, water-cementitious material ratio, or cement factor. This data segment, which is used repeatedly for each fresh concrete property, is represented by nine data elements that are part of the properties and performance guide.

5.2.7 Reference property—The reference property data segment is used to report any concrete property that is con-

Table 4—Guide for the identification of concrete in a materials property database

Data Elements for CONCRETE DESIGNATION Data Segment*

Number†	Name	Type‡	Format
7001	Material class	Essential	Alphanumeric string
7002	Binder type	Essential	Alphanumeric string
7003	Concrete category	Essential	Alphanumeric string
7004	Concrete group	Desirable	Alphanumeric string
7005	Processing group	Desirable	Alphanumeric string
7006	Concrete identification number	Desirable	Alphanumeric string
7007	Common name	Essential	Alphanumeric string
7008	Concrete designation notes	Desirable	Alphanumeric string

Data Elements for CONCRETE SUPPLIER Data Segment*

Number†	Name	Type‡	Format
6XXX	Concrete supplier name	Essential	Alphanumeric string
6XXX	Concrete supplier address	Essential	Alphanumeric string
6XXX	Concrete supplier plant location	Desirable	Alphanumeric string
6XXX	Concrete supplier's identification number	Desirable	Alphanumeric string

Data Elements for CONSTITUENT DESIGNATION Data Segment*

Number†	Name	Type‡	Format
X001.XX	Constituent class	Essential	Alphanumeric string
X002.XX	Constituent common name	Essential	Alphanumeric string
X003.XX	Constituent producer name	Essential	Alphanumeric string
X004.XX	Constituent producer plant location	Essential	Alphanumeric string
X005.XX	Constituent producer's identification number	Essential	Alphanumeric string
X006.XX	Constituent standards organization	Desirable	Alphanumeric string
X007.XX	Constituent specification number	Desirable	Alphanumeric string
X008.XX	Constituent specification version	Desirable	Alphanumeric string
X009.XX	Constituent specification designation	Desirable	Alphanumeric string
X010.XX	Constituent notes	Desirable	Alphanumeric string

Data Elements for CONCRETE MIXTURE PROPORTIONS Data Segment*

Number†	Name	Type‡	Format
6XXX.XX	Constituent quantity per unit volume of concrete	Essential	Floating point
6XXX.XX	Constituent quantity per unit volume (customary units designation)	Essential	Alphanumeric string
6XXX.XX	Constituent quantity per unit volume (SI units designation)	Essential	Alphanumeric string
6XXX.XX	Customary to SI units conversion factor	Essential	Floating point

* Repeat the data elements in this data segment for each constituent in the concrete mixture

† Data element numbers represent entire set of information in a particular data element and are considered a functional part of the guide.

‡ All data elements are considered desirable. Essential data elements are important for unique identification.