



COMMON COMMODITY CODES

Texas A&M University

George Stukhart, Editor

**Source Document 92
May 1993**

© 1993 Construction Industry Institute™.

The University of Texas at Austin.

CII members may reproduce and distribute this work internally in any medium at no cost to internal recipients. CII members are permitted to revise and adapt this work for the internal use provided an informational copy is furnished to CII.

Available to non-members by purchase; however, no copies may be made or distributed and no modifications made without prior written permission from CII. Contact CII at <http://construction-institute.org/catalog.htm> to purchase copies. Volume discounts may be available.

All CII members, current students, and faculty at a college or university are eligible to purchase CII products at member prices. Faculty and students at a college or university may reproduce and distribute this work without modification for educational use.

Printed in the United States of America.

TABLE OF CONTENTS

<i>Chapter</i>	<i>Page</i>
Preface	v
Executive Summary	vii
1. Introduction	1
2. Definition: Common Commodity	2
3. Background Studies	3
The Universal Material Transfer Code	3
Standards: EDI and Bar Coding	4
The Construction Industry Action Group (CIAG)	5
4. Common Commodity Codes and Materials Management Systems	6
Definition: Common Commodity Code	6
A Company Piping Commodity Logic	7
Automated Data Transfer Between Organizations	7
5. The Survey	9
The Electronic Data Management Task Force Role	9
Organizations Surveyed	9
The Industry Bar Code Alliance	10
Petroleum Data Exchange	11
INTERMAT	13
NIST/STEP	13
6. Conclusions	16
7. Recommendations	18
Appendices	
A. Terminology	19
B. References Cited	21
C. List of Individuals and Organizations Contacted	22
D. INFOPAK	23
E. SPIN Groups Available from IBCA	34

PREFACE

This report is a source document of the Construction Industry Institute (CII) prepared by a subcommittee of the Electronic Data Management (EDM) Task Force. It is a survey of the major efforts being pursued by companies and industry organizations to define a coding structure for identifying piping common commodities. The subcommittee wrote the INFOPAK, contacted various organizations, compiled much of the data, and assisted in editing and reviewing the text. The members of the subcommittee are:

Robert F. Sullivan, Stone and Webster Engineering Corporation (Team Leader)

Richard F. Brzezinski, Houston Lighting and Power

Susan Denk, H.B.Zachry Co.

James G. Jacobi, Brown & Root Braun, Inc.

Charles J. Saly, Eichleay Holdings, Inc.

Dana Smith, U.S. Naval Facilities Engineering Command

George Stukhart, Texas A&M University

EXECUTIVE SUMMARY

Many construction companies employ computerized materials systems and use common commodity codes which are the building blocks of their internal materials system. The industry has long sought a set of common commodity codes that organizations could use to share materials requirements in a standard form. The Electronic Data Management Task, Force representing users of the construction industry, recognizes that the ability to share materials management and other data between trading partners having different systems is essential to the growth of electronic data transfer. Many advantages will result from the automated transfer and integration of data for common commodities among owners, engineers, contractors, and suppliers. The task force also recognizes that achieving such a standard would require considerable time and effort.

Standards are developed to meet user needs—they are not dictated by organizations that are responsible for standardization. Several organizations acknowledge the need for common commodity codes and are already working to achieve some degree of standardization in the exchange of data for pipe, valve, and fitting materials. These organizations represent other industries that have slightly different user needs. They are striving either to standardize descriptions for electronic data interchange, develop standard product numbers for bar coding, or develop models for the exchange of design data.

The task force believes that the construction industry will derive major benefits from code standards and that, as a first step, research on the efforts by other industries should be publicized. The task force also believes that the construction industry will eventually achieve a standard set of product descriptions that will serve construction needs and that the efforts of the Construction Industry Action Group (CIAG) will achieve this long-sought goal. The support of CII companies is essential to the success of this effort.

INTRODUCTION

One of the most difficult issues facing any materials management system is the standardized coding of common items. The construction industry has long been aware of this problem, but until recently there has been no concerted effort to resolve it. Each company uses its own materials commodity structure, which is the result of countless hours spent in meetings and study. Owners, designers, contractors, distributors, and manufacturers each have their own system, which can vary from project to project, or from one division of a company to another. The lack of a standard part identification almost resulted in disaster in World War II. Deming (1986) relates the story of the military's efforts to locate a part for a vital antiaircraft radar, flying a replacement from the factory to the site overseas, only to discover later that there were eight full bins of the part in the warehouse.

Greater awareness of this problem is due to two significant factors: (1) the availability of adequate information systems technology, and (2) the need to reduce materials management costs. Certain industry groups have recognized the problem of standard identification of materials and sought solutions for their own particular phase of the transfer of information to their customers or suppliers. Codes and code systems of these organizations are not a construction industry standard, but it is instructive to discuss the logic of their systems, particularly in the area of piping, since this is one of the most complex and important commodities in industrial construction.

Standard codes are valuable for the transfer of information between any two partners, whether in commercial transactions using manual entry of data or using electronic means. Electronic data interchange (EDI), graphical design, and bar coding rely completely on standards for the exchange of data between entities.

The objective here is to report on the state of commodity code standardization in the construction industry and affiliated industries. Several efforts will be presented. This report is the result of research by the Commodity Code Subcommittee of the CII Electronic Data Management Task Force. Due to the complexity of this subject, it is not the intent of this paper to recommend a specific common commodity standard. Rather the object is to discuss the several schemes being developed in sufficient detail to permit follow-on efforts to adopt some general guidelines for common commodity code standards.

DEFINITION: COMMON COMMODITY

The construction industry today utilizes many common commodities in the construction of facilities. These common commodities are often referred to as bulk materials and are used in the installation of piping, electrical, instrumentation, civil, structural, and other systems, manufactured to certain industry standards. The commonality exists because the same product may be manufactured and distributed through separate organizations, each of which probably assigns a certain word description and alphanumeric code. Nevertheless, the item's form, specification and function does not vary from one manufacturer, or distributor to another.

Definition:

A common commodity is a component which is generic in use and whose manufacture is usually governed by industry dimensional and material standards.

An example of a common commodity in piping materials is a weld neck flange or a length of pipe or a butt-welded concentric reducer. Other examples of common commodities can be electrical conduit and conduit fittings such as elbows, tees and seal fittings. These are common components, although manufacturers produce these products with some variation in dimensions and material. The manufacture of these items is governed by dimensional standards such as American National Standards Institute (ANSI), Manufacturers Standardization Society (MSS), American Petroleum Institute (API), and American Society for Testing Materials (ASTM). In the future international standards organizations may govern the exchangeability of purchasing data around the world.

BACKGROUND STUDIES

The Universal Material Transfer Code

In 1986 the CII Materials Management Task Force initiated an effort to determine the feasibility of developing a Universal Material Transfer Code (UMTC). Such a code would permit companies to derive software that could interpret from their internal codes to the UMTC or vice versa. Alternatively companies could adopt the UMTC for their own use. The plan was to set up a central clearinghouse or association to provide a source for creation and maintenance of industry-wide transfer codes.

The authors of this concept envisioned a ten digit alpha/numeric code for piping such as the following: (examples are shown in parentheses)

A B C D E F G H I J, where

A	=	Prime Account (5 = piping)
B	=	Commodity Class (D = fittings)
C	=	Type (H = reducer concentric)
D	=	Material (K = ASTM-A-234 5 Cr 1/2 Mo)
E	=	Rating/Spec (S = Open)
F	=	Trim/Wall Thickness (F = Sched 40)
G	=	End Facing/Bore/Schedule (B = Miter Welded)
H	=	Service (0 = Open - Std Wall Thickness)
I	=	Code Number (1 = Alloy WPB)
J	=	Memo Flag (0 = None)

The memo flag would indicate that there is an attached memo for special instructions. It was believed that this flag would reduce the total number of codes, many of which are introduced due to certain minor variations.

A three-phase operation was envisioned: research, development, and implementation. Unfortunately the program never got beyond the initial research, but it is enlightening to reveal the results of this research. A questionnaire was sent to owners, engineers, contractors, and suppliers. It was designed to determine the type of codes used by a cross-section of the industry and confirm the attributes of the proposed UMTC system. Approximately 115 questionnaires were sent out by the CII, about 55 to suppliers, the remainder to CII companies. There were 54 responses, 16 from suppliers, the remainder from CII members. Forty respondents had some type of coding system, 30 for piping. Alphanumeric systems were most widely used (70%); piping codes were identified on about 90% of purchase orders, and 75% of materials tracking systems. The number of digits used for piping codes varied from 10 to 42, with 10 or 11 the most frequent response.

As stated earlier, the Universal Material Transfer Code study was discontinued following the research phase. The results are illustrative, however. Many companies (47.6%) would consider adopting such a code, and 53% said such a code would be useful.

Standards: EDI and Bar Coding

Standards simplify the exchange of recurring data, allow the purchase of fewer items in larger quantities, reduce inventory, and improve the identification of materials in the field. Millions or even billions of dollars are saved by companies throughout the U.S. due to standardization. Standards typically result from expanding applications of technology. As a technology becomes profitable and there is a demonstrated need for much wider use of the technology, standards become a key to increased profitability (Bayha 91) This is the case with EDI, CAD, bar code, and many other technologies used in the construction industry. A common commodity code is intrinsic to the use of the standards of any of these technologies.

It is apparent that there would be many advantages to be gained if it were possible for companies to share materials management and other data electronically across their different systems. This opportunity has been created by the advent of Electronic Data Interchange (EDI) and its growing impact in the industry. ANSI has published the X-12 EDI Standards for electronically transmitting purchase orders, shipping notices/manifests, requests for quotation, and many other business documents. They are currently working with industry to create additional transaction standards. EDI technology is an important step in breaking down the barriers to automated material

data transfer. More information on EDI and its uses in construction can be found in CII Source Document 57 (Bell and Gibson 1990)

There are also U.S. bar code standards being developed by the ANSI MH10.8 Committee for bar code labels on the shipment of unit loads and transport packages. These standards will result in labels for containers that will require the identification of products by supplier and customer. The ANSI bar code standards are the result of work by two organizations, FACT, the Federation of Automated Coding Technologies and the Uniform Code Council, which controls the Uniform Product Code or UPC. The latter is the code seen on most retail products. More information on these codes can be found in CII Source Document 70 (Stukhart and Nomani 1991).

The Construction Industry Action Group (CIAG)

The CIAG was formed by CII in early 1992 to implement the EDI recommendations of the EDM Task Force. Several user groups have been formed to promote the use and standardization of various capabilities related to EDI. The most active of these is the Commodity Codes Group, formed in August 1992. This group has met every month with the goal of establishing industry-wide standard materials identification formats resulting in common codes. They have decided to investigate the following "domains": Piping, electrical, instruments, civil, and structural. Piping is the first priority; major participants in this phase of the study are representatives of PIDX, ASA-IPD/IBCA Data Center, INTERMAT, and several owner and contractor companies. This group has agreed to use the "noun/attribute" format and has a goal of producing recommendations by January 1993.

COMMON COMMODITY CODES AND MATERIALS MANAGEMENT SYSTEMS

Definition: Common Commodity Code

Coding is *the organization of related data in a logical, uniform, and systematic order*. A code can be a word or symbol having some uniform meaning and arrangement, such that it communicates specific information. This definition is adapted from Hyde (1981); however, Hyde uses only symbols in a code. Since several organizations surveyed in this study use words in their codes, we shall not limit the definition of *code* to symbols. We are precluded from considering alphanumeric symbols that have no meaning, the so-called “license plate” which is a unique but non-significant number at least until identified in a database.

Most major constructors and owners have computerized material management/control systems. These systems are used to track and procure common commodities and other materials for their respective organizations. Depending on their application, these systems can track material through different functions, such as material takeoff, requisitioning, purchasing, receiving, storage, and issue. They are used in the industry at varying levels of sophistication. Some organizations track materials from material takeoff through installation; others may only track materials from procurement through issuance.

A typical materials management system may start with bills of materials for drawings and then summarize these material requirements by commodity to generate purchase requisitions. The system would then assign the requisitions to purchase orders and record the material vendors, purchase order numbers, delivery date, receiving status. Today's materials management systems most often use a common commodity code to attach descriptive information to components. These codes allow the systems to summarize common commodities and are the basic building blocks of any materials system. For this reason, common commodity codes are important to the organizations that employ materials management systems.

Definition:

A common commodity code is a unique identifier for a common commodity component.

A Company Piping Commodity Logic

To illustrate the use of a company commodity code structure that identifies piping components the following system is described. This is the sixteen-digit alphanumeric code used by Stone and Webster in their piping catalog. The code uses the logic:

<u>Characters</u>	<u>Data Field</u>	<u>Definition</u>
1 and 2	Metallurgy	Material type, e.g. carbon steel 304 L stainless
3 and 4	Component Class	Class of components, e.g. butt weld fittings, pipe, nipples
5 and 6	Component Type	Component class type, e.g. tee, reducer, and specific material metallurgy, such as class or grade.
7 and 8	Wall Thickness Code	Wall thickness or schedule, e.g. 7 = 40. Each digit represents a size.
9 - 12	Size Code	Nominal outside diameter of pipe.
13 - 16	Size 2 Code	Same, for second size, such as reducing flange, if applicable.

An example of such a code is CB 30 26 48 0600 0212, where CB is Carbon steel, 30 is Seamless ANSI B16.11 butt welding fittings, 26 = Concentric Reducer, ASTM A 234 WPB, 4 is Schedule 40, 8 is Schedule 80.

Automated Material Data Transfer Between Organizations

Internal commodity codes are used by owners, suppliers, engineers, and contractors. They are generally in-house developed coding systems. Their coding structure is usually intelligent so that commodities are grouped in a logical sequence in the various documents that are generated by a materials management system. Each organization has developed its own commodity codes and is generally reluctant to change them. Therefore, there are no standard commodity codes existing in the industry today. This lack of a standard creates a serious barrier to the automated transfer and effective use of materials management data electronically between different business organizations.

The essential step in this process is the establishment of standard common commodity codes to facilitate the integration of materials management data. Many advantages would result from the automated transfer and integration of data for common commodities among owners, engineers, suppliers, and contractors. For instance, it would speed up the procurement process by allowing direct links among engineer, supplier, and contractor materials management systems. Engineering material requirements for a given project could be checked automatically against a supplier's inventory for availability and price. Expediting information could be exchanged among suppliers, engineers, and contractors. Also, engineers could transfer bills of material, purchase requisitions, and material requirements data to contractors for use in their materials management systems. These transactions would be facilitated by the use of standardized common commodity codes in conjunction with EDI transaction sets. These techniques would improve productivity in our industry, saving time and money.