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# Standard Classification for
# Cost Estimate Classification System[1], [2]

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## 1. Scope

1.1 This classification provides a generic classification system for cost estimates and provides guidelines for applying the classification to cost estimates.

1.2 This classification maps the phases and stages of cost estimating to a generic maturity and quality matrix, keyed to a leveldegre of project definition, that can be applied across a wide variety of industries.

1.3 The Cost Estimate Classification System has been developed in a way that:

1.3.1 provides a common understanding of the concepts involved with classifying cost estimates;

1.3.2 defines and correlates the major characteristics used in classifying cost estimates, and;

1.3.3 uses the degree of project definition as the primary characteristic used to categorize estimate classes.

## 2. Referenced Documents

2.1 *ASTM Standards:*[3]

E631 Terminology of Building Constructions

E833 Terminology of Building Economics

E1804 Practice for Performing and Reporting Cost Analysis During the Design Phase of a Project

2.2 *Other Standards:*

ANSI Z94.2-1989 Industrial Engineering Terminology: Cost Engineering[4]

AACE International 17R-97 Recommended Practice No 17R-97: Cost Estimate Classification System[5]

AACE International 18R-97Recommended Practice: Cost Estimate Classification System: As Applied in Engineering, Procurement, and Construction for the Process Industries[5]

AACE International Recommended Practice No 18R-97: Cost Estimate Classification System: As Applied in Engineering, Procurement, and Construction for the Process Industries[5]

AACE International Recommended Practice No 56R-08: Cost Estimate Classification System – As Applied in Building and General Construction Industries[5]

## 3. Terminology

3.1 *Defintions*Definitions—For definitions of terms used in this practice, refer to Terminology E833 and Terminology E631.

## 4. Significance and Use

4.1 Use of this classification will improve communication among all the stakeholders involved with preparing, evaluating, and using cost estimates.

4.2 The various parties that use cost estimates often misinterpret the quality and value of the information available to prepare cost estimates, the various methods employed during the estimating process, the accuracy level expected from estimates, and the level of risk associated with estimates.

4.3 This classification applies the leveldegree of project definition as the primary characteristic for determining an estimate's classification.

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[1] This specification is under the jurisdiction of ASTM Committee E06 on Performance of Buildings and is the direct responsibility of Subcommittee E06.81 on Building Economics.

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[2] This classification is based on the Cost Estimate Classification System, Recommended Practice Document AACE International 17R–97.

[2] This classification is based on the AACE International Recommended Practices 17R–97, 18R-97, and 56R-09 pertaining to Cost Estimate Classification System.

[3] For referenced ASTM standards, visit the ASTM website, www.astm.org, or contact ASTM Customer Service at service@astm.org. For *Annual Book of ASTM Standards* volume information, refer to the standard's Document Summary page on the ASTM website.

[4] Available from American National Standards Institute (ANSI), 25 W. 43rd St., 4th Floor, New York, NY 10036, http://www.ansi.org.

[5] Available from the Association of the Advancement of Cost Engineering International (AACE International), 209 Prairie Avenue, Suite 100, Morgantown, WV 26501, USA.http://www.aacei.org.

4.4 Using this classification will help those involved with project estimates to avoid misinterpretation of the various classes of cost estimates and to avoid their misapplication and misrepresentation. Improving communications about estimate classifications reduces business costs and project cycle times by avoiding inappropriate business and financial decisions, actions, delays, or disputes caused by misunderstandings of cost estimates and what they are expected to represent.

4.5 ~~This classification is intended to be generic and so provide a system for the classification of cost estimates in any industry.~~

4.5 This classification is intended to be generic and so provide a system for the classification of cost estimates in any industry. There are also references to specific industries, for cost estimate classification as applied in: AACE International, Process Industry 18R-97, and AACE International, Building/General Construction Industry 56R-08.

4.6 Estimate classifications provide valuable additional reporting information when used as an adjunct to Practice E1804.

## 5. Basis of Classification

5.1 There are numerous characteristics that can be used to categorize cost estimate types. The most significant of these are degree of project definition, end usage of the estimate, estimating methodology, and the effort and time needed to prepare the estimate. The primary characteristic used in this guideline to define the classification category is the degree of project definition. The other characteristics are secondary.

5.2 The discrete ~~levels~~ degrees of project definition used for classifying estimates correspond to the typical phases and gates of evaluation, authorization, and execution often used by project stakeholders during a project life cycle.

5.3 Five cost estimate classes have been established. While the ~~level~~ degree of project definition is a continuous spectrum, it has been determined from benchmarking industry practices that three to five discrete categories are commonly used. Five categories are established in this standard classification as it is easier to simplify by combining categories than it is to arbitrarily split a standard.

5.4 In ~~Fig.~~ Table 1 these estimate class designations are labeled Class 1, 2, 3, 4, and 5. A Class 5 estimate is based upon the lowest ~~level~~ degree of project definition, and a Class 1 estimate is closest to full project definition and maturity. This countdown approach considers that estimating is an iterative process whereby successive estimates are prepared until a final estimate closes the process.

5.5 The five estimate classes are presented in ~~Fig.~~ Table 1 in relationship to the identified characteristics. It is important to understand that it is only the ~~level~~ degree of project definition that determines the estimate class. The other four characteristics are secondary characteristics that are generally correlated with the ~~level~~ degree of project definition.

5.6 This generic matrix and guideline provides a high-level estimate classification system that is non-industry specific. The accuracy ranges identified in ~~Fig.~~ Table 1 are indicated as index values so that they may be applied generically to just about any particular industry. A more detailed explanation of these index values, including two examples of their possible ranges, can be found in Appendix X1.

## 6. Determination of the Cost Estimate Class

6.1 The cost estimator makes the determination of the estimate class based upon the degree of project definition (design % complete). While the determination of the estimate class is somewhat subjective, the design input data, completeness and quality of the design deliverables serve to make the determination more objective.

## 7. Estimate Characteristics

~~6.1 The~~ 7.1 The following are brief discussions of the various estimate characteristics used in the estimate classification matrix, ~~Fig.~~ Table 1. For the secondary characteristics, the overall trend of how each characteristic varies with the degree of project

**TABLE 1 Generic Cost Estimate Classification Matrix**

| ESTIMATED CLASS | Primary Characteristic | Secondary Characteristic | | | |
|---|---|---|---|---|---|
| | DEGREE OF PROJECTION DEFINITION | END USAGE | METHODOLOGY | EXPECTED ACCURACY RANGE | PREPARATION EFFORT |
| | Expressed as % of complete definition | Typical purpose of estimate | Typical estimating method | Typical ± range relative to index of 1 (that is, Class 1 estimate)[A] | Typical degree of effort relative to least cost index of 1[B] |
| Class 5 | 0 % to 2 % | Screening or feasibility | Stochastic (factors or models, or both) or judgment | 4 to 20 | 1 |
| Class 4 | 1 % to 15 % | Concept study or feasibility | Primarily stochastic | 3 to 12 | 2 to 4 |
| Class 3 | 10 % to 40 % | Budget authorization or control | Mixed but primarily stochastic | 2 to 6 | 3 to 10 |
| Class 2 | 30 % to 70 % | Control or bid/tender | Primarily deterministic | 1 to 3 | 5 to 20 |
| Class 1 | 70 % to 100 % | Check estimate or bid/tender | Deterministic | 1 | 10 to 100 |

[A] If the expected accuracy range index value of "1" represents +10/-5 %, then an index value of "10" represents +100/-50 %.
[B] If the preparation effort index value of "1" represents 0.005 % of project costs, then an index value of "100" represents 0.5 %.

definition (the primary characteristic) is provided.

6.2 7.2 *~~Level~~Degree of Project Definition (Primary Characteristic):*

~~6~~7.2.1 This characteristic is based upon the level of completion of project definition (roughly corresponding to the percentage completion of architectural/engineering detail and design). The ~~level~~degree of project definition defines maturity, or the extent and types, of input information available to the estimating process. Such inputs include project scope definition, requirements documents, specifications, project plans, drawings, calculations, knowledge and experience gained from past projects, reconnaissance data, and other information that must be used, and developed, to define the project. Each industry will have a typical set of deliverables that are used to support the type of estimates used in that industry. The set of deliverables becomes more definitive and complete as the ~~level~~degree of project definition (such as architecture and engineering) progresses.

6.3 7.3 *End Usage (Secondary Characteristic):*

~~6.3.1The~~7.3.1 The various classes (or phases) of cost estimates prepared for a project typically have different end uses or purposes. As the ~~level~~degree of project definition increases, the end usage of an estimate typically progresses from strategic evaluation and feasibility studies to funding authorization and budgeting, to project control.

6.47.4 *Estimating Methodology (Secondary Characteristic)*

~~6.4.1Estimating methodologies fall into two broad categories: stochastic and deterministic. In stochastic methods, the independent variable(s) used in the cost estimating algorithms are generally something other than a direct measure of the units of the item being estimated. The cost estimating relationships used in stochastic methods often are somewhat subject to conjecture. With deterministic methods, the independent variable(s) are a more definitive measure of the item being estimated. A deterministic methodology is not subject to significant conjecture. As the level of project definition increases, the estimating methodology progresses from stochastic to deterministic methods.~~

~~6.5Expected Accuracy Range (Secondary Characteristic)~~

~~6.5.1Estimate accuracy range is an indication of the degree to which the final cost outcome for a given project could vary from the estimated cost. Accuracy is traditionally expressed as a ± percentage range around the point estimate, after application of contingency, with a stated level of confidence that the actual cost outcome would fall within this range (± measures are a useful simplification, given that actual cost outcomes have different frequency distributions for different types of projects). As the level of project definition increases, the expected accuracy of the estimate tends to improve, as indicated by a narrower ± range. Additionally, industry experience shows that a percentage range should also vary with the cost magnitude of the project. Typically a range will narrow as the cost magnitude increases, for example a 10% range on 100000 job may be unrealistically narrow, whereas a 10% range for a $100000000 job may be considered absurdly wide.~~

7.4.1 Estimating methodologies fall into two broad categories: stochastic and deterministic. In stochastic methods, the independent variable(s) used in the cost estimating algorithms are generally something other than a direct measure of the units of the item being estimated. The cost estimating relationships used in stochastic methods are often based on factors, metrics, models, etc. With deterministic methods, the independent variable(s) are more or less a definitive measure of the item being estimated (can include, detailed takeoff, quotes, bids, etc.). A deterministic methodology reduces the level of conjecture inherent in an estimate. As the degree of project definition increases, the estimating methodology tends to progress from stochastic to deterministic methods.

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7.5.1.1 Level of non-familiar technology in the project.

7.5.1.2 Complexity of the project.

7.5.1.3 Quality of reference cost estimating data.

7.5.1.4 Quality of assumptions used in preparing the estimate.

7.5.1.5 Experience and skill level of the estimator.

7.5.1.6 Estimating techniques employed.

7.5.1.7 Time and level of effort budgeted to prepare the estimate.

Note ~~1—In Fig. 1~~ 1—In Table 1, the values in the accuracy range column do not represent plus or minus percentages, but instead represent an index value relative to a best range index value of 1. If, for a particular industry, a Class 1 estimate has an accuracy range of +10/-5 percent, then a Class 5 estimate in that same industry may have an accuracy range of +100/-50 percent.

Note 2—Appendix A provides an illustrative example of estimate accuracy ranges for two particular industries.

6.67.6 *Effort to Prepare Estimate (Secondary Characteristic)*:

~~6.6.1The~~7.6.1 The level of effort needed to prepare a given estimate is an indication of the cost, time, and resources required. The cost measure of that effort is typically expressed as a percentage of the total project costs for a given project size. As the ~~level~~degree of project definition increases, the amount of effort to prepare an estimate increases, as does its cost relative to the total project cost. The effort to develop the project deliverables is not included in these effort metrics; they only cover the cost to prepare the cost estimate itself.

## ~~7.~~8. **Relationships and Variations of Estimate Characteristics: Discussion**

~~7.1There~~8.1 There are a myriad of complex relationships that may be exhibited among the estimate characteristics within the estimate classifications. The overall trend of how the secondary characteristics vary with the ~~level~~degree of project definition was provided above. This section explores those trends in more detail. Typically, there are commonalties in the secondary characteristics between one estimate and the next, but in any given situation there may be wide variations in usage, methodology, accuracy, and effort.

~~7.1.1The~~8.1.1 The level of project definition is the driver of the other characteristics. Typically, all of the secondary characteristics have the level of project definition as a primary determinant. While the other characteristics are important to categorization, they lack complete consensus. For example, one estimator's bid might be another's budget. Characteristics such