

APPENDIX C: GUIDELINES FOR PREPARING TECHNICAL SPECIFICATIONS

Technical specifications are written requirements for a project, including materials, products or services. Developing technical specifications requires specific expertise relevant to the subject area and should be accomplished by qualified individuals. Specifications are an integral part of the Scope of Work that is included in the procurement documents. Specifications cover a wide range of information that defines a project, including:

- type and quality of materials required for the project;
- definition of codes and standards applicable to the project;
- requirements for fabrication, application, installation and finishing;
- acceptable quality of workmanship; and
- descriptions and procedures for alternate materials, products or services, if necessary.

Organization of Specifications

It is important that specifications be arranged in an orderly and comprehensive format. The Construction Specifications Institute's (CSI) MasterFormat™¹ is the most widely used standard for organizing project specifications (see figure at right for example). MasterFormat™ organizes information by work results (materials and methods). If the specification is organized clearly and follows a defined procedure it is less likely that any important aspect of the project will be overlooked. It will also help the contractor, estimator, inspector, or other reviewers find information more readily.

Each section of the specifications has three separate parts:

Part 1 – General: Describes administrative and procedural requirements specific to this section of specifications.

Part 2 – Products: Describes, in detail, the materials, products, equipment, systems or assemblies to be used in the project.

Part 3 – Execution: Describes, in detail, any preparatory actions and how the products shall be incorporated into the project.

Types of Specifications

¹ <http://www.csinet.org/MasterFormat>

MasterFormat		 The Construction Specifications Institute
SECTION	TITLE	
23 80 00	Decentralized HVAC Equipment	
23 81 00	Decentralized Unitary HVAC Equipment	
23 81 13	Packaged Terminal Air-Conditioners	
23 81 16	Room Air-Conditioners	
23 81 19	Self-Contained Air-Conditioners	
23 81 19.13	Small Capacity Self-Contained Air-Conditioners	
23 81 19.16	Large Capacity Self-Contained Air-Conditioners	
23 81 23	Computer-Room Air-Conditioners	
23 81 26	Split System Air-Conditioners	
23 81 43	Air-Source Unitary Heat Pumps	
23 81 46	Water-Source Unitary Heat Pumps	
23 82 00	Convection Heating and Cooling Units	
23 82 13	Balance Heating and Cooling Units	
23 82 16	Air Coils	
23 82 19	Fan Coil Units	
23 82 23	Unit Ventilators	
23 82 26	Induction Units	
23 82 29	Radiators	
23 82 33	Convectors	
23 82 36	Finned Tube Radiation Heaters	
23 82 39	Unit Heaters	
23 82 39.13	Cabinet Unit Heaters	
23 82 39.16	Propeller Unit Heaters	
23 82 39.19	Wall and Ceiling Unit Heaters	

There are four types of specifications, including:

1. Performance;
2. Reference Standard;
3. Proprietary; and
4. Descriptive.

There is no definitive guidance as to when a particular type or method should be used. In some cases, different types or methods can be used in combination. Which type or combination of types of specifications can vary by project. If used in combination, it is important to avoid creating redundancy or contradictions.

Performance Specifications

Using this approach, the required end results are specified with a performance-based criterion. The contractor is free to choose the materials and methods that comply with the performance specification. They are generally used to ensure the use of the most efficient, state-of-the-art equipment to achieve the highest level of performance. They are also used to supplement other specification methods.

An example of this approach is listing the performance parameters for lamps for a lighting retrofit (e.g., “high-performance T8 lamps,” lumen output, color-rendering index, etc.) or a prescribed SEER rating for an HVAC package unit.

Advantages to using performance specifications:

- Only the end result or design intent is specified, giving the Contractor flexibility in selecting and applying products based on experience.
- They permit free competition.
- They can be applicable in all types and sizes of projects.
- Disadvantages to using performance specifications:
 - They can be time consuming to produce and may result in long, detailed specifications.
 - They are more difficult to enforce than other methods of specifying.
 - They may be too elaborate for simple or minor projects.

Reference Standard Specifications

Using this approach, reference is made to an established standard defined by an industry organization, association or government agency. Steps for preparing reference standard specifications are:

1. The standard must be recognized as authoritative by the industry (e.g., ENERGYSTAR, TITLE 24).
2. The standard must be available to all parties involved in the project.
3. The specifier must ensure that the standard applies to the project and does not present duplicate or conflicting information.

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4. Must ensure to establish the date of the most current standard.

Advantages to using reference standard specifications:

- The standard is usually widely known and accepted by the industry.
- Standards do not limit competition.
- Standards can minimize the complexity and length of specifications.

Disadvantages to using reference standard specifications:

- There may be no appropriate standard to reference.
- Standards generally refer to the minimum requirements, therefore, may not prescribe the most optimal solution.
- The standard may become obsolete or out-of-date, because of advances and changes in technology and the creation of new products.
- Standards require a lot of research and care in use.

Proprietary Specifications

Using this approach, the actual brand names, model numbers and other proprietary information is specified. An example would be calling for a specific manufacturer and cut sheets for a specific lamp and ballast retrofit.

There are two types of proprietary specifications, closed and open. The primary difference between the two types concerns substitutions:

1. Closed specifications generally prohibit substitutions. One or more products are specified, and no substitutions will be considered.
2. Open specifications permit substitutions. One or more products are specified, but other manufacturers will be considered. It is necessary to specify the process and criteria the alternate manufacturers will be judged by.

Advantages to using proprietary specifications:

- They allow for close control of product selection.
- The drawings can be more complete and more detailed because they can be prepared based on precise information from the selected manufacturer.
- The specification can be shorter.
- They simplify the bidding by narrowing competition and eliminating product pricing as a major variable.
- Disadvantages to using proprietary specifications:
- They may reduce competition.
- They may specify products the Contractor is not familiar with or has had little experience with.
- Care needs to be taken to assure no error is made when specifying model numbers or

product designations.

Descriptive Specifications

Using this approach, the exact properties of the materials and methods of installation are described in detail without using proprietary or manufacturer's names. Descriptive specifications are commonly used for products for which no standards exist, on projects where using proprietary names is restricted, and in situations where the specifier wants to exercise tight control over the specified work.

There are five steps for preparing descriptive specifications:

1. Research available products.
2. Research the important features required for the product.
3. Determine which features to describe in the specification and which features to show in the drawings.
4. Describe the important features.
5. Specify quality assurance measures (i.e. submittals, certifications, testing or inspection activities).

Advantages to using descriptive specifications:

- Descriptive specifications specify exactly what the design intends.
- They are applicable to all conditions, methods or situations of a project.
- They are applicable to all sizes and types of projects.
- They permit free competition because they do not restrict the use of specific products or manufacturers.

Disadvantages of descriptive specifications:

- They require the specifier to take special care in describing the design intent in order to achieve the desired results.
- Descriptive specifications tend to take up more space because they require more verbiage than other methods.
- They may be more time consuming to create and write than other methods.