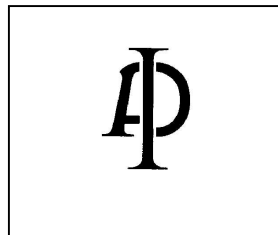


# API SPEC Q1 A REVIEW

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## INTRODUCTION TO API SPEC Q1

API Specification Q1 outlines the requirements for a quality system that facilitates the consistent and reliable manufacture of API products. An API License is issued only after a quality manual has been submitted and approved and an on-site audit has confirmed that the applicant adheres to the requirements of both Q1 and the appropriate API product specifications. Spec Q1 is consistent with ISO 9000 and API now offers dual registration. While it is necessary to have a valid API license to apply the API Monogram, a manufacturer can produce product which meets the API requirements without the license and mark the product only with the specification designation (for example "5CT" for casing). However, many users require the use of the monogram to ensure that API is auditing the manufacturer on a regular basis. The following is the API Monogram:



## AN OVERVIEW OF API SPEC Q1

API Spec Q1 has four main parts: Section 1 is the scope of the specification; Section 2 is the reference to ISO 8402 for definitions; Section 3 defines the terms unique to Specification Q1; and Section 4 defines the quality system.

Generally, Sections 1 through 4 are self-explanatory. Section 4 has 20 topics that will be discussed in greater detail. Please note that Thermatool Corp. does not represent the API and the following discussion is offered only as an introduction to the requirements. The API should be consulted for complete details.

## **SECTION 4**

### **4.1 MANAGERIAL RESPONSIBILITIES**

This section directs the corporate management to create a quality policy consistent with API Q1 and places the responsibility for proper implementation on management. Quality is not the responsibility of only the Quality Department. It must be understood and supported at all levels of the organization.

#### **4.1.2 ORGANIZATION**

Section 4.1.2.1 through 4.1.3 requires that the organizational responsibilities be defined and documented. Of paramount importance is the freedom of each individual to perform the duties of his or her job as defined by Spec Q1 and the corporate quality policy. For example, a production foreman cannot arbitrarily overturn the disposition of an inspector relating to a product rejected for failing to meet the API specifications. The authority to overturn a reject disposition must be defined in the quality program and must be consistent with the Q1 requirements.

This section also requires verification (inspection and test) activities be documented. This is readily accomplished with an "Inspection and Test Check List" that defines for every manufacturing station all tests and inspections, the correct procedures, the frequency of testing, the acceptance criteria, and procedures for rejection for every API product produced at each facility.

Section 4.1.2 also directs the corporate management to evaluate the quality system for effectiveness via internal and external audits and to document such reviews.

### **SECTION 4.2 QUALITY SYSTEM**

Sections 4.2.1 through 4.2.4 define the quality system required by Spec Q1. It requires the manufacturer to document his quality system (i.e., the Quality Manual). Control features must be created for ensuring that the proper instructions, drawings, etc., are issued. All controls, processes, equipment, and special training necessary to produce the product to the appropriate API specifications must be documented. Procedures, technology, and equipment must be reviewed and evaluated for applicability to and compatibility with the processes.

### **SECTION 4.3 ORDER REVIEW**

Section 4.3.1 through 4.3.3 specifies that the manufacturer review all orders for API products to ensure that the requirements are within the scope of the API specifications, that differences are resolved, that the manufacturer is capable of producing the product and that the review is documented. In short, to make sure that each order can be produced properly before accepting it.

### **SECTION 4.4 DESIGN REVIEW**

Section 4.4.1 through 4.4.6 discusses the process of reviewing a product design. In practice all products are already designed as detailed in the API specifications 5CT and 5L but this design refers to the design of the process that produces the product. For example, a design review of the forming process to produce API casing should include mill set up data, dimensions after each stand, line speed, mechanical properties of the finished product, etc. The design review will demonstrate that the process will produce the product if the equipment is set up and operated within specified design parameters.

The manufacturer must always document the actual set up and operating parameters for each production run to show that it complied with the process design. If the API specifications change (and they do every few years) or if your process changes in any way (new rolls, new welder, etc.) a new design review will be necessary and new documentation must be created to reflect the changes.

### **SECTION 4.5 DOCUMENT AND DATA CONTROL**

Section 4.5.1 through 4.5.2.2 reviews requirements for collection, storing, maintaining, and approval for issuing documentation such as quality records, specifications, drawings, prints, procedures, etc. This section requires that a control be established to assure that only the proper documents are issued and available for production. This can be a simple logbook that has a record of each manual and a place to enter a date when each change or revision has been made to the books.

### **SECTION 4.6 PURCHASING**

Section 4.6.1 through 4.6.4 covers purchasing of materials for use in the production of API monogrammed products. It specifies that the selection criteria be documented, that approved vendors and subcontractors be listed, that the manufacturer has approved their quality systems, and how the subcontractor or vendors product will be inspected. Again, all of this must be documented and records maintained.

Section 4.6.3 through 4.7 specifies the documentation that must accompany any purchase controlled by this section. This includes prints, specifications, drawings, etc. that must be subject to a control system that prevents incorrect documents from being issued. It also deals with documentation required for disposition of nonconforming purchased materials.

#### **SECTION 4.8 MATERIAL / PRODUCT IDENTIFICATION AND TRACEABILITY**

Section 4.8.1 through 4.8.3 establishes the requirement for identifying all specification-controlled materials through the manufacturing process. This means, for example, that a method must be established for maintaining the identity of a joint of pipe from skelp (heat number) throughout the entire process of production. This identity must allow for documentation of acceptance at every step in the process. It follows that all rejects must be similarly identified and documented. A code must be applied to each joint of pipe that can be traced to all control points (test stations) that shows that the joint in question was tested and that it was accepted or rejected.

#### **SECTION 4.9 PROCESS CONTROL**

Section 4.9.1 through 4.9.2.4 deals with the production processes that affect quality (that is, any feature controlled by an API specification). The parameters include the manner of production (e.g., seamless or ERW), use of equipment (e.g., who is qualified), working environment (e.g., lighting), quality plans (e.g., what specification is to be used), process control (e.g., weld temperature measurements), approvals (e.g., who initiates a production run), workmanship criteria (e.g., quality of painted markings), maintenance of equipment (e.g., maintenance intervals).

This section also discusses the use of production control documents such as work orders, process sheets, checklists, etc. Generally, it establishes the requirement for the complete documentation of each step in the process to 1) ensure that the product will be made and tested per applicable procedures and 2) that each piece of pipe can be proven to have been produced and inspected per applicable procedures.

Section 4.9.2 requires that any process that changes the properties of the product be identified as a special process. These processes usually require special methods to monitor them and often use continuous monitoring methods (e.g. weld temperature monitoring). The processes are often the subject of Statistical Process Control since the effect of the process may not be readily observable nor immediately measurable.

## **SECTION 4.10 INSPECTION AND TESTING**

Section 4.10 through 4.10.4 covers the requirements for inspection and testing of API products. It specifies that material not be issued for production until it has been approved for use, that subsequent processing not proceed until conformance has been established at previous stages, that qualified procedures be used, that personnel other than production personnel be used for final inspection, and that all documentation is verified as complete by an authorized person before the material is released for the next step in the process. Section 4.10.4 requires that records substantiate that the product has passed all required inspections.

## **SECTION 4.11 INSPECTION, MEASURING, AND TEST EQUIPMENT**

Section 4.11 establishes the requirement for a full documented control program for the calibration of all inspection and test equipment. The program must establish appropriate accuracy and precision limits, calibration procedures, calibration intervals, calibration methodology, qualification of calibration personnel, traceability of calibration equipment, calibration documentation, and corrective action procedures. Any piece of equipment used to test an API product is subject to this calibration requirement and includes hand inspection tools such as micrometers, tape measures, drift plugs, pressure gages, hardness tester blocks, and so forth.

## **SECTION 4.12 INSPECTION AND TEST STATUS**

Section 4.12.1 through 4.12.5 covers the requirements for status indicators. This simply means that the product must be marked or otherwise identified as to its current quality status. This may be something as simple as a color band or a number/letter combination that indicates, or is traceable to reports that indicate, whether a pipe has passed or failed a certain test. The ultimate status indicator is the API monogram that is used to indicate that all tests have been passed and the product meets all API requirements.

The application of the monogram can be applied only by the licensee at the licensed facility so you cannot subcontract the final inspection to a remote location. It must be done on site. In addition to the monogram, other information such as your license number, the date of production, size, grade, thread, etc., must be legibly applied to each pipe.

## **SECTION 4.14 CORRECTIVE ACTION**

Section 4.14 further develops the requirements for identification of nonconformances, evaluation and analysis of trend data, creation of a corrective action plan, evaluation of the corrective action plan and documentation of all action taken to prevent further nonconformances.

This applies to both internal nonconformances and those identified in the field by the customer.

#### **SECTION 4.15 HANDLING, CLEANING, PACKAGING, AND DELIVERY**

Section 4.15.1 through 4.15.4 covers how the product is to be moved, stored, stacked, cleaned, and delivered to the customer or distribution point. All procedures must be documented but fortunately, API covers these procedure in their RP's (Recommended Practices).

#### **SECTION 4.16 QUALITY RECORDS**

Section 4.16.1 through 4.16.4 discussed the features required for initiation, identification, collection, indexing, filing, storage, maintenance, retention, and disposition of quality records. All quality records must be legible and retrievable so they must be protected from deterioration. Records may be on paper or on electronic media. Since the purpose of record retention is to demonstrate conformance to the specification, all records relating to test, inspection, etc., must be maintained.

#### **SECTION 4.17 INTERNAL QUALITY AUDITS**

Section 4.17.1 through 4.17.5 specifies the establishment of an internal audit procedure that is to be conducted at least once per year. This feature is designed to evaluate conformance to the specified API requirements and is to be conducted by persons who do not have direct Quality responsibility. The results of the audit and any corrective action must be documented.

#### **SECTION 4.18 TRAINING, INDOCTRINATION AND QUALIFICATION**

Section 4.18.1 through 4.18.3 establishes the requirement for proper training of all personnel in the proper methods and procedures detailed in the quality plan. All training must be specified for each applicable job, the qualifications for the job defined, and records of training maintained.

#### **SECTION 4.19 SERVICING**

Section 4.19 requires that any product that requires servicing have documented procedures for performing the service and for verifying that the service meets the specified requirements.

#### **SECTION 4.20 STATISTICAL TECHNIQUES**

Section 4.20 states that some API specifications require Statistical Methods of controlling the product or process and where applicable, these methods must be defined and controlled by the quality plan.

## **SUMMARY**

As a manufacturer, you may produce product that meets all of the requirements of any of the API specifications without obtaining an API license. However, these products cannot be marked with the API monogram unless you possess a valid API license. The license cannot be purchased from another facility nor is it included when you buy equipment from a licensed facility.

If you apply for an API license, you must submit a Quality Manual for approval by API. This manual must include your plan to control and document each of the 20 elements in Section 4 as previously discussed. The Quality Manual should not include the details of your program such as actual work procedures, names of individuals, etc. Include only statements of a general nature that indicate that the management has implemented a control method for each item. An example would be as follows:

### **SECTION 4.17 INTERNAL QUALITY AUDITS**

4.17.1 Quality audits will be performed once per year at the close of the corporate fiscal year. In addition, at least two unscheduled audits will be performed on a random basis. Each audit will be fully documented by the auditor on the forms provided. The auditor will evaluate each item of the quality system for effectiveness and compliance to the approved Quality Manual.

4.17.2 Audits will be performed on all elements of the quality plan as appropriate within each manufacturing area.

4.17.3 The audits and follow up procedures will be performed in compliance with the procedures written in Section 4.17 of the Quality Procedures Manual for Internal Audits.

4.17.4 Qualified personnel from the Engineering Department shall conduct the audits. Results of the audit will be documented and distributed to all audited department managers.

4.17.5 The department managers of each audited area will take timely corrective action on the deficiencies reported by the audit. Corrective action shall be documented and include measures to minimize recurrence of the problems. The results of each audit and the corrective action reports shall be reviewed by the Quality Manager to verify implementation.

You will note that the wording of the Quality Policy Manual closely follows that of the API Spec Q1. When the policy manual is written, every sentence of every section in Q1 must be addressed.

Also note that no specifics have been included in the Policy Manual. It includes only general statements of what shall be done not how it is done. How these tasks are to be done is the subject of the Quality Procedures Manual. The Procedures Manual should be organized with the same sections as the Policy Manual but include specific procedures detailing how each task is to be performed. Again, every sentence of every section must be addressed with a workable procedure. Each procedure should include:

- a procedure number,
- a revision number or letter,
- a date of issue,
- approval by the Quality Manager,
- details of methodology,
- type of equipment used,
- references to calibration procedures,
- reference to personnel qualification,
- what forms or documents to use,
- what to do with the documents after the task is complete,
- what to do in the event of acceptance or failure,

Many companies choose to hire a qualified consultant to assist them in writing the manuals and implementing the quality plan. Since the API Q1 closely follows ISO 9000, it is possible to qualify for registration for both certifications at once. Contact API directly for the details.

It should be clearly understood that getting the license is the beginning of the quality activity not the end. You must be prepared to execute every detail of the quality plan every day of production. The API audits will quickly identify any attempts to circumvent compliance so if you desire to maintain your license, maintain your quality program.

When choosing an individual for the position of Quality Manager, a graduate engineer is usually the best choice. It is preferable that the engineer also be accredited as a Certified Quality Engineer but not mandatory.

Finally, it is absolutely imperative that the Management supports the activities of the Quality Manager and that the Quality Manager and the Plant Manager be at equal staff level to ensure an equal voice to management.

