



### 1. Introduction

The AASHTO Accreditation Program (AAP) accredits laboratories for standard test methods, practices, and specifications provided by different standards development organizations such as AASHTO, ASTM, ISO/IEC, and certain state highway departments. Some quality management system (QMS) standards included in the scope of the AAP define criteria for supervisory and testing personnel certifications.

QMS standards vary in the level of detail they provide and the terminology used. This leaves laboratories, specifying agencies, and accreditation bodies with some level of uncertainty regarding the conformance criteria. To add consistency to the AAP's review of these criteria, this policy explains the AAP's conformance criteria for personnel certifications required by ASTM standards C1077, C1093, D3666, D3740, and E329.

AASHTO R 18 does not require personnel certifications, but if a laboratory desires to be accredited for the ASTM standards C1077, C1093, D3666, D3740, and E329, it must maintain certifications for its supervisory and testing personnel in conformance with the requirements of those standards and this policy.

Because AASHTO Accreditation is site-specific, the laboratory must request special consideration by the AASHTO re:source Administrative Task Group (ATG) to approve situations in which personnel are working at multiple locations. This is true even for those standards that specifically allow for one person to oversee multiple locations such as ASTM E329.

The AAP does not accept expired certifications of any kind. Even if no requirement for recertification is stated in the ASTM standard, expired certifications are not considered to be valid.

### 2. Terminology

There are terms used in this document that warrant additional explanation so that all readers understand the wording of the policy.

*Certificant* – an individual who holds a current certification that conforms to the requirements of the applicable QMS standard

*Certified* – holding a valid credential that recognizes the competency of the certificant through passing a formal examination

Discussion: If the standard requiring the certification does not specify national, regional, state, external, or third party, the certification can be created and administered internally so long as the creator of the examination is not the person taking the examination.

*External certification program* – a certification program created, administered, and graded through a controlled methodology by a third-party without influence by the certificant or the management of the certificant.

*Internal certification program* – a certification program created, administered, and graded through a controlled methodology by the management of the certificant or with influence from the management of the certificant

*Quality management system (QMS) standard* – any ASTM standard that defines the quality management system and may include accreditation requirements for the construction materials laboratories that are accredited by the AASHTO Accreditation Program (including C1077, C1093, C1222, D3666, D3740, and E329)

*Standard* – any standard practice, test method, specification, or inspection method that can be included in a certification program

*Trainee* – a person who is in the process of learning the duties of the position description and is unable to carry out those duties without direct supervision

### 3. Positions Identified in the Standards

The ASTM QMS standards require several key positions to maintain certifications or other credentials. This section identifies the most common positions identified in the standards along with the typical roles served by the person holding each position. It is understood that sometimes one person holds multiple positions or their position serves multiple roles.

Most laboratories do not identify their technical positions based on the definitions provided in the various ASTM specifications. This leads to industry-wide confusion regarding who exactly needs to be certified to conform to the requirements of the standards. It is not the AAP's intent to make the laboratory redefine the titles of their positions to conform to the terminology in the standards. Instead, the AAP's intention is to verify the personnel who must be certified by their operating capacities are certified in conformance to the standard requirements.

These are some of the individual position titles identified in ASTM QMS standards along with their roles and responsibilities:

- a. **Technical Director** – the person charged with overall responsibility for the technical operations of the laboratory. This person must have duties related to the laboratory operations that indicate responsibility. The Technical Director must have at least 5 years of relevant experience.
- b. **Laboratory Supervisor** – the person who supervises the technicians. This person often performs training and competency evaluations. The responsibilities may be the same as those of the Laboratory Manager or a Supervising Laboratory Technician. C1093 laboratory supervisors must have at least 5 years of testing experience with at least 2 years of masonry testing experience. C1077, D3666, D3740, and E329 laboratory supervisors must have at least 3 years of relevant experience.
- c. **Field Supervisor** – the person who supervises the field technicians. The responsibilities may be the same as those of the Laboratory Supervisor or Supervising Laboratory Technician when there are not many laboratory and field personnel. C1093 field supervisors must have at least 5 years of testing experience with at least 2 years of masonry testing experience. C1077, D3666, D3740, and E329 field supervisors must have at least 3 years of relevant experience.
- d. **Supervising Laboratory Technician** – the *technician* who also provides supervision or direction to the other laboratory technicians. A person who does not perform testing cannot be considered for this position. This is often the same person as the Laboratory Supervisor because that person supervises and occasionally performs testing.
- e. **Supervising Field Technician** – the *technician* who also provides supervision or direction to the other field technicians. A person who does not perform testing cannot be considered for this position. This

is often the same person as the Field Supervisor because that person supervises and occasionally performs testing.

- f. **Technician** – the person that performs testing in the laboratory or field (as applicable)

#### **4. Identifying the Personnel that Hold the Positions**

The AAP identifies personnel that hold the positions based on the information found on one or more of the following documents: the laboratory's organizational chart; test records; test reports; technician matrices; assessment worksheets; and on-site observations. The organizational chart is the primary source of information, but other documents and observations may be used to determine the true organizational structure of the laboratory.

ASTM D3666, D3740, and E329 indicate that a person may fill multiple positions with a company if they meet the qualification requirement for the highest-level position (Section 7.4 of D3666-16; Section 7.7 of D3740-19; and Section 6.3.6 of E329-20). C1077 does not permit the qualification for the highest-level position to satisfy the requirements for other positions; Section 7.5 of C1093-19 explicitly states that it is satisfactory for a person to fill one or more positions in an agency providing that person is qualified for each position. Therefore, if someone fills multiple positions at a laboratory, that person must hold all required credentials for each position when pursuing C1077 or C1093.

For example, a PE who manages the testing services and who also performs aggregate tests in the laboratory **does** qualify as a D3666 (Aggregate) and E329 (Aggregate) testing technician based on this license; however, this person **does not** qualify as a C1077 (Aggregate) testing technician based on this license. This person would also need to possess a current certification per Section 6.1.3 and 6.1.3.2 of C1077-17 for the laboratory to conform to C1077 (Aggregate).

If a laboratory is accredited for standards that require supervisory staff and technicians to maintain certifications, everyone holding the positions requiring certifications must conform to the requirements of the standard. It is not acceptable to only have a supervisor maintain certifications while the technicians are not certified. It is understood that temporary hires and summer help may be added during construction season, but the AAP requires all employees to hold the required certifications for the work that they perform.

##### **a. ORGANIZATIONAL CHARTS**

Laboratories must maintain an organizational chart that accurately reflects the names and position titles of those persons currently employed. The assessor will evaluate its accuracy through observations during the assessment. It is common for a laboratory to initially submit an organizational chart and certification documentation for review that result in a certification nonconformity. In most cases, the appropriate action for the laboratory to take is to begin working on obtaining the required certifications to resolve any nonconformities.

In some cases, after being notified of a nonconforming situation, laboratories attempt to simply submit a restructured organizational chart and explanation to resolve the nonconformity. If the laboratory did not originally accurately capture the true organizational structure of the laboratory, the updated organizational chart and the laboratory's explanation for any changes will be evaluated by the AAP. A determination will be made as to whether any such changes appear to be acceptable. Assessment observations are usually required to verify these types of claims.

## **b. TRAINEES**

It is not permissible to take the following actions or to provide the AAP with the following as evidence of conformance:

- Reclassify technicians as trainees
- Swap supervisory roles with non-supervisory personnel because one person holds a required certification while the other does not
- Make any other changes that do not accurately capture the laboratory's personnel hierarchy involved in the various testing services offered by the laboratory.

The AAP does not accredit a laboratory with only trainees as technicians or supervisors regardless of how the laboratory identifies the personnel. The laboratory must demonstrate conformance to the personnel qualification requirements for all involved personnel.

## **5. Evaluating Third-Party Certification Programs**

When a laboratory submits certifications that have not been vetted by the AAP, the AAP staff researches the content of the certification program to determine whether it conforms to the requirements of the ASTM standards, keying in on certain program components such as:

- What standards are included in each program?
- Are written examinations included?
- Are performance examinations included?
- What types of questions are included and how are they administered?
- Do the programs have expiration dates?
- Can we determine the status of a certification through the program administrator?

Where possible, the AAP reviews third-party certification programs using the same criteria used for internal certification programs (Section 8). If a program does not conform, AASHTO re:source provides the program administrator with a detailed explanation for this decision.

## **6. Third-Party Written and Performance Examination**

A supervisor or technician may pass a written examination but fail the performance examination or not have access to a performance examination at present. A similar situation can occur when a supervisor or technician passes the performance examination but either fails or does not have access to a written examination. When this occurs, the AASHTO Accreditation Program does not consider this an external certification because the certification program's minimum requirements were not met, and a certification was not issued.

ASTM Quality Management System standards C1077 and D3740 allow for the use of internal written and performance examinations for all technical staff and E329 allows for the use of internal written and performance examinations for technicians. When a laboratory is seeking or working to maintain accreditation for one of the afore mentioned standards, the AASHTO Accreditation Program considers a passing written or performance examination from an approved external certification program as an approved internal written or performance evaluation.

## **7. Evaluating Internal Certification Programs**

A laboratory may choose to create its own written and performance examinations for conformance to ASTM C1077, C1093, D3740, and E329. ASTM E329 does not permit the use of internal certification programs for supervisory personnel, and ASTM D3666 does not permit the use of internal certification programs for any personnel. Where internal certifications are permitted, the AAP will evaluate the internal certification program based on conformance to the requirements of the standards and the rigor of the written examinations. This evaluation is accomplished through a committee review approach. In-house examinations submitted for conformance to ASTM D3740 must include standards for which the laboratory is accredited.

If a laboratory is using an internal certification program and the laboratory has been found to be out of conformance with the requirements of the AAP through the assessment reports or proficiency sample testing, the AAP reserves the right to disallow the use of internal examinations for that laboratory.

### **a. FEES**

Laboratories that submit internal written exams to meet the certification requirements from ASTM standards will be charged a review fee of \$100 per exam. One exam is considered to be the list of questions and answer key covering the required sections of one ASTM standard. Where applicable the section number and name of the section from the standard must be referenced on the answer key. The fee shall be paid by the laboratory prior to the first review.

### **b. REQUIRED SECTIONS**

The questions must effectively evaluate the examinee's knowledge of the important aspects of the standards.

ASTM C1077 indicates that the following sections of the applicable standards must be covered by the written examinations:

- the significance of the test or practice,
- sampling,
- specimen preparation,
- procedure,
- calculations, and
- reporting of results.

ASTM C1093 indicates that the following sections of the applicable standards must be covered by the written examinations:

- the significance of the test or practice,
- sampling,
- specimen preparation procedures,
- calculations, and
- reporting of results.

ASTM D3740 indicates that the following sections of the applicable standards must be covered by the written examinations:

- the significance of the test or inspection method,
- sampling,
- specimen preparation,

- procedure, and
- reporting of results.

ASTM E329 indicates that the following sections of the applicable standards must be covered by the written examinations:

- procedure, and
- other requirements as stated in underlying standards (C1077, C1093, and D3740).

Certain standards include required content in sections of the test method that are not named with the exact section designations used by ASTM C1077, C1093, or D3740. For example, there may be content that is relevant to a standard's procedure that is found in a section that is not titled "Procedure." In such cases, the required coverage of the written examinations is not limited to the content that is strictly titled as such in the standard, but that the required coverage extends to all the sections that include relevant content, regardless of how they are named within the individual test methods.

Some standards do not include relevant content for a specified section at all. For example, there may not be content that explains or pertains to the significance of a standard. In such cases, there is no requirement for this section to be included in an in-house exam.

#### **c. QUESTION DENSITY**

The scope of each question asked, and the number of questions being asked, are evaluated and compared with the amount of relevant material that needs to be covered. The laboratory is then notified of the need to add a certain number of questions to adequately cover a particular section of a standard. One question is not enough to test a technician's knowledge of a Significance and Use section that spans twelve subsections and notes; neither are two questions enough to adequately test the knowledge of a Procedure that spans two full pages of a standard. However, one question may be better or more comprehensive than another. Due to this unpredictable variation within the questions themselves, there is no objective minimum required number of questions assigned beforehand to the review of each written examination.

#### **d. TYPES OF QUESTIONS**

Examinations can include multiple choice, fill-in-the-blank, true or false, matching, short answer, and calculation questions. The AAP evaluates the questions and answers on their ability to assess the competency or knowledge of the examinee. If a question is judged to be too vague, overly simplistic, or incorrectly worded, it will be rejected.

#### **e. CALCULATIONS**

ASTM C1077 and C1093 require questions that cover the calculations of a standard. In evaluating examinations for conformance to this requirement, the AAP is looking for questions where mock data is supplied, and the technician is required to calculate the answer from this data. Although ASTM D3740 does not similarly require this, it is strongly recommended that such questions likewise be employed. This provides technicians with the opportunity to demonstrate their understanding of how the data they record feeds into the intermediate and final results of a test.

#### **f. BEST PRACTICE**

In addition to covering all required sections, as applicable, there are other sections found in certain standards that should be covered by written examinations. Calculation questions for conformance to

ASTM D3740 requirements was already given as an example of how to apply this principle. ASTM D5255 and E2833 mention such aspects as (1) apparatus, (2) the principles underlying the standard, (3) the basis of some of the required calculations, and (4) common sources of error (see Section 9.2 of ASTM D5255-15 and Section 7.1.1 of ASTM E2833-12(2018)). Although it is not required for written examinations to cover this additional content, it is considered best practice to do so. Another example includes the Scope section found in many standards, which can include critical information. Examinations should also address calibration, standardization, check, or maintenance requirements where relevant to the testing technician. Examples include, but are not limited to, daily standardizations of nuclear density gauges, and the standardization of the bowl or flask for specific gravity testing.

#### **g. RE-EVALUATION OF APPROVED EXAMINATIONS**

Once approved, the AAP will not need to re-evaluate the examinations unless there is a major change made to (1) the ASTM QMS standards, (2) the standards required to be included, or (3) a relevant AAP policy, or it is found that the original review was in doubt.

If the AAP determines a re-evaluation is needed, the laboratory will be asked to submit the current examinations for review by a certain deadline. Failure to comply will result in withdrawal of accreditation for the affected standards.

A major change to an ASTM QMS standard is defined as a change in the required intervals for recertification or the required content in the written examinations. As an example, in 2012, ASTM D3740 redefined the contents of the examinations. In 2013, ASTM C1077 added the 5-year interval for recertification.

If a major change is made to one of the ASTM QMS standards, or to a relevant AAP policy, the AAP will grant laboratories one year to conform to the new requirements from the date of the standard or policy update.

A major change to a relevant standard would include changes to required sections of the standard. Examples include, but are not limited to, changes that (1) either directly or indirectly impact test results, (2) render portions of the standard's content obsolete, (3) impact the way that the technician performs the test, from sampling to the reporting of results, etc. The examinations themselves need to be updated within one year of the publication date of the updated standard, and technicians *may* also need to be recertified by means of these examinations within this one-year period, with variations to this recertification policy explained below.

For ASTM C1077, the newly revised examinations do not need to be administered until the current certification expires. The certification of all new candidates must utilize the most recent revision of the written examinations.

#### **h. EXAMINATION REVISION DATES AND EDITION DATES**

The examinations must include revision dates for both the examination and the applicable standards. The revision date for the written examination is the month, day, and year the examination was created or last revised. The revision date for the standard is the published date for the standard included in the examination, including any letters used to identify multiple updates that have occurred within the same year (ex. ASTM C31-19a). Notations used to signify updates to a standard that are only editorial in

nature do not need to be included in the revision date for the test standard. For example, ASTM D1557-12<sup>E1</sup> can be identified as simply D1557-12 on the laboratory's written examination.

#### **i. INDEPENDENT EVALUATORS**

The examinations must include the name(s) of the author(s) to ensure that the examinee is not the author of the written examination. Currently, there are no requirements regarding the independence of the evaluators except for the example provided below from ASTM C39. Anyone is permitted to administer the examinations; however, the author of the written examination cannot be the examinee. The administrator of the performance examination cannot be the examinee. The laboratory must ensure that the exams are administered in a controlled and objective manner to effectively evaluate knowledge even though the examiner may not be truly independent.

From ASTM C39: "The individual who tests concrete cylinders for acceptance testing shall meet the concrete laboratory technician requirements of ASTM C1077, including an examination requiring performance demonstration that is evaluated by an independent examiner."

### **8. The CERT Committee Review Process**

Prior to an assessment or upon request, the AAP's Certification Examination Review Team (CERT) reviews the examinations and sends feedback to the laboratory. If the examinations do not conform to the requirements of the standards or AAP, the specific reasons for a lack of conformance are communicated to the laboratory.

Prior to the assessment, the laboratory must submit PDF files of the examinations through the pre-assessment review portal on the AASHTO re:source website. A preliminary review is completed, which includes an objective determination of which parts of the examination each question covers, a determination regarding conformance to stated requirements, and a subjective determination regarding the rigor of the examination.

The preliminary review is discussed in a committee meeting. The results of the discussion and marked up version of the examinations will be prepared by the coordinator of each meeting. The coordinator will attach the summary of the evaluation as a PDF to the written examination.

### **9. Intervals for Recertification**

ASTM C1077 and C1093 have a defined maximum interval for recertification of 5 years. ASTM D3740 has defined a maximum interval for re-evaluation using hands-on test demonstrations, but they have not defined a maximum interval for the written examinations.

If an interval is specified for recertification, those recertifications must include a formal evaluation by the certification body. For a certification body that only includes a written examination and confirmation by the supervisor of the applicant that the applicant is competent to perform the testing included in the certification (ex. NICET), a written examination must be conducted at the specified interval. The laboratory personnel may retest through that program even if the program does not specifically require retesting at the specified interval. The dates of retesting must be confirmed by the AAP before the certification can be accepted.

For internal certifications, the laboratory can define their internal intervals for recertification if they conform to the requirements of the ASTM QMS standards.



## 10. Accreditation Requirements for Underlying Standards

The AAP can only consider granting accreditation for ASTM C1077, C1093, C1222, D3666, D3740, and E329 and corresponding material types if the laboratory is accredited for the required standards. The following list shows those requirements as of the revision date on this document:

- a. C1077 (Concrete): C31, C39, C138, C143, C172, C173 or C231, C617 or C1231, C1064
- b. C1077 (Aggregate): C117, C127, C128, C136
- c. C1093: at least one ASTM standard in the masonry scope of testing
- d. C1222: at least one ASTM standard in the cement scope of testing
- e. D3666: at least three standards in the scope of testing
- f. D3740: at least five ASTM standards from Volumes 4.08 and 4.09
- g. E329: all standards required in the underlying ASTM requirement above (ex. C1077's required standards) - if there are none, at least one ASTM standard in the scope of testing listed

## 11. Required Standards for Certification

The following ASTM Quality Management System standards require the following for certification:

- a. C1077 (Concrete): C31, C39, C138, C143, C172, C173, C231, C617 or C1231, C1064
  - b. C1077 (Aggregate): C117, C127, C128, C136
  - c. C1093: C140, C270, C780, C1019, C1314, C1552
    - i. Certifications are only required for standards in the laboratory's scope of testing
  - d. C1222: no certification requirement
  - e. D3666: at least one test standard in the laboratory's scope of testing
  - f. D3740: at least five ASTM standards from Volumes 4.08 and 4.09
    - i. In-house examinations must include ASTM standards for which the laboratory is accredited
- E329: all standards required in the underlying ASTM requirements above (ex. C1077's required standards) - if there are none, at least one ASTM standard in the scope of testing listed

## 12. AASHTO and State Standards in Certification Programs

Some certification programs include AASHTO or state standards instead of ASTM standards. This is acceptable for ASTM D3666, and it may be acceptable in other standards if the state or AASHTO standards closely resemble the ASTM standards.

## 13. NICET Considerations

NICET has issued certifications in the past that include hot mix asphalt, concrete, and soil based on cross-over aggregate work elements. The AAP needs to verify the certified person has passed the applicable work elements that correlate to the standards listed in section 10 that are required for conformance to the ASTM standard before allowing accreditation to be granted or continue.

## Summary of Changes

Rev 3: It was noted that D3740 does not require calculations. That is a recommendation that we offer, but it is not a requirement.

Rev 4: We established internal re-evaluation policies for internal programs if the laboratory does not establish their own.

Rev 5: The document was reworded so that it can be viewed externally rather than having it be written like an in-house procedure. Additional information was added to clarify the requirements of some of the standards.

Rev 6: The language about recertification was strengthened to clearly define how we will handle life-time certifications in the context of C1077's 5-year requirement.

Rev 7: the language about intervals was modified to provide more explicit information.

Rev 8: additional examination requirements were added similar to those already existing in C1077 and D3740 so that we may provide more consistent reviews for internal examinations presented for E329 scopes that are not already addressed in underlying standards. Revision dates of the written examinations and the test methods being used for evaluation were also added to the requirements for examinations. More details were added regarding test method requirements and details of the CERT review process. Various editorial comments and revisions were made.

Rev 9: Format of document was updated.

Rev 10: Format of document was updated.

Rev 11/1/2018: Expanded trainee information (terminology and explanation in 5a).

Rev 7/1/2019: New fees added for review of internal exams.

Rev 13 (11/18/2019): New fee section added to policy (Section 2)

Rev 14 (10/16/2020): Added certification requirements from C1093-19; added personnel experience requirements; clarified accreditation requirements for underlying standards and the required standards for certification; deleted the terminology of test method and added terminology for standard; updated the term test method to standard throughout the document.

Rev 15 (9/14/2021): Added statement to section 6A indicating that labs must record the section number and name of the section from the standard on the answer key

Rev 16 (3/10/2022): Added section 6 (Third-Party Written and Performance Examination) to clarify when portions of an external certification would be accepted as an internal certification. Added statement to section 7i indicating that all written examinations must include the name of the author.