

# GENERAL SPECIFICATION

G9 PRODUCT QUALITY

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DEPARTMENT of INFRASTRUCTURE, ENERGY and RESOURCES  
TASMANIA  
GENERAL SPECIFICATION  
G9 – Product Quality  
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## **G9.1 SCOPE**

This specification sets out the general requirements for the attainment and management of product quality. It covers the production, supply, testing, assessment and specification of compliance and records of test of products, either imported into the works by the Contractor or produced on site by the Contractor or Sub-Contractors under the Contractor's employment.

## **G9.2 OBJECTIVES**

This specification defines the principles by which product quality is to be achieved.

It aims in conjunction with other DIER general and standard specifications to ensure that:

- the Contractor and suppliers of products to the Contractor are operating under quality management plans that effectively monitor and control the production processes and which include review and audit processes.
- materials supplied to DIER contracts have been produced under controlled conditions using and producing products of known and acceptable quality and variability
- production is managed to minimise variability
- materials are stored and handled in a manner that is not detrimental to their immediate or long-term performance
- inspections, sampling and testing are undertaken in a systematic manner by appropriately qualified persons using reliably calibrated equipment.
- there is documented evidence, readily available to the Superintendent, which demonstrates that the specified requirements are met
- in the event that there is disagreement between the Contractor's and Superintendent's assessment of the quality of a product, there is a mechanism to resolve the disagreement.

## **G9.3 REFERENCES AND STANDARDS**

Quality Management shall be compatible with the provisions of all DIER standard specifications for Design, Construction and Maintenance and Australian Standards in particular:

### *Standard Specifications*

- G1 – General Provisions
- G2 – Contract Management Plan
- G3 – Traffic Management
- G10 – Construction Environmental Management Plan
- All other DIER specifications relevant to the project.

### *Australian Standards*

- AS NZ ISO 9001 Quality Management System – requirements
- AS NZ ISO 14001 Environmental Management Systems – Requirements with guidance for use
- AS/NZ4801 and 4804 Occupational Health and Safety Management Systems.

## **G9.4 DEFINITIONS**

*Assigned Characteristic Value:* "The value of a property, calculated from consecutive and most recent measurements of that property. It is used to determine compliance of the product with the specified value."

*Audit:* An independent review and examination of the records and activities to assess the adequacy of system controls, to ensure compliance with the recorded policies and operational procedures and to recommend necessary changes in controls, policies, procedures.

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*Characteristic Value:* "The statistical measure of a property for the purpose of determination of conformance. The term usually applies to a value calculated from one or more tests on a lot."

*Corrective Action:* "An action to eliminate the cause of a detected nonconformity."

*Hold Points:* "A point beyond which a work process shall not proceed without the Superintendent's written authorisation."

*Inspection:* "A conformity evaluation by observation and judgment accompanied as appropriate by measurement, testing or gauging."

*Lot:* "A single homogenous production unit produced by the same work process and brought to completion at the same time. The lot shall appear to be of consistent quality without obvious changes in attribute values, whether or not the attribute values are directly related to the particular property."

*Nonconformity:* "Non-fulfilment of a requirement."

*Oversize:* "A fraction of soil larger than the maximum size permitted by a particular test method."

*Quality:* "The degree to which a set of intended characteristics fulfils requirement."

*Quality Control Chart:* A statistical tool in the form of a graph (s), used in quality control to monitor trends in quality; to analyse and understand process variabilities, their causes and their effect on quality; to signal the need for corrective action.

*Reference Specimen:* "A sample of a particular material type, of known test properties, that is subsequently used to visually judge the quality and compliance of a product."

*Review:* "Activity undertaken to determine the suitably adequacy and effectiveness of the subject matter to achieve established objective".

*Witness Point:* "A point in the process where the Contractor shall give prior notice to the Superintendent and the option of attendance may be exercised by the Superintendent."

## **G9.5 QUALITY MANAGEMENT**

The following describes the general requirements of the management and processes to be adopted in the contract.

### **G9.5.1 Third Party Certification**

The Contractor and all product suppliers are required to be certified to operate under one or more of the following third party quality systems:

- AS NZ ISO 9001 Quality Management System – requirements
- AS NZ ISO 14001 Environmental Management Systems – Requirements with guidance for use
- AS/NZ4801 and 4804 Occupational Health and Safety Management Systems.

Alternatively the Contractor may have achieved certification under the Civil Contractors Federation, "Civil Construction Management Code".

### **G9.5.2 Registered Laboratories**

All quality control tests undertaken by the Contractor shall be performed in Australia by laboratories currently registered with NATA for the Relevant Australian Test, and test reports shall be certified by a NATA accredited signatory.

### **G9.5.3 Inspection and Test Plan (ITP)**

The Contractor shall plan and carry out inspections, sampling and testing to verify that the work processes are effective and that all finished work complies with the specification.

All inspection, sampling and testing shall be undertaken in accordance with the documented ITP and the results recorded on the appropriate ITP form.

The ITP shall define:

- the persons and/or organisations with responsibility to undertake inspection, sampling and testing. This applies to routine materials, construction and environmental monitoring by the Contractor and the testing necessary to demonstrate compliance with the specification
- the person/s responsible for the oversight of the Contractor's product quality system and for final review of inspection/test results to confirm that all the required inspections, sampling and tests have been undertaken and reported and that compliance with the specification can be demonstrated
- the person/s responsible for the review of inspection/test results, the currency and compliance of test equipment and the determination of compliance
- the inspection, sampling and test procedures. In the event that the intended procedure is not an Australian, Austroads or other recognized standard procedure, a full description of the intended procedure is to be included
- the specified compliance/acceptance criteria
- the triggers for inspection, sampling and testing
- the frequency of inspections, sampling and testing
- the intended method of oversight and recording of testing undertaken by suppliers and other parties. This shall include the oversight of assigned values
- methods to be employed in the selection and identification of lots where lot testing applies
- statistical treatment including template quality control charts where quality control charts are specified
- processes to be adopted in the event of nonconformity including template non-conformance reports

### **G9.5.4 Inspection, Sampling and Testing**

Inspection, sampling and testing is to be undertaken in accordance with the defined procedures of the Contractor's and/or product supplier's third party quality system. Persons conducting the specific procedures shall be trained in the relevant quality scheme and shall have documented evidence of same.

All incoming products are to be inspected for compliance with respect to documentation and product quality requirements.

Unless specified otherwise (e.g. targeted testing), the sampling sites shall be selected on a random basis.

### **G9.5.5 Recording System**

A recording system shall be maintained to provide a traceable link between test data and the subsequent use of that data in the implementation of the requirements of the contract.

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The records shall be kept in an orderly manner to demonstrate that the works comply with the specification.

All test reports shall include the dates of sampling and submission to the laboratory, the name of the person who took the sample and its precise location.

The outcome of tests on all samples shall be reported and recorded. Where a sample is taken and not recorded, the record shall state the reasons for not conducting tests.

Incoming products shall be identified by a unique product number. The final destination of the product in the works shall be precisely defined.

During the currency of the contract all inspection records and test records, including quality control charts, are to be made available for inspection within twenty four (24) hours of the completion of the inspection, the test or the control chart as requested by the Superintendent.

#### **G9.5.6 Traceability**

The records shall meet the requirements of G9.5.5, ensuring that there is a traceable link between the test record and the final destination of the product within the works.

The location of samples taken from within the works shall be identified in accordance with the drawings in the terms of:

- chainage
- offset
- depth with respect to finished surface level.

Where lot testing is specified, the Contractor shall define and record the limits of each lot in terms of chainage and the depth interval below finished surface level.

For incoming products supported by Certificates of Compliance, the Contractor shall record details of the source of the product, the Certificate of Compliance, the batch number and date of manufacture.

All samples of soil (includes gravels and crushed rocks) destined for and/or taken from pavement, shall be placed in a robust, water tight bags, labelled inside and outside and securely sealed.

#### **G9.5.7 Proprietary Products and Processes**

The Contractor shall provide evidence that all proprietary products and processes used have demonstrated satisfactory field performance for a period of at least three (3) years.

Such evidence shall include full details of the products properties.

The evidence shall also show that the Contractor has been trained by product suppliers to install their proprietary products.

#### **G9.5.8 Design of Road Infrastructure**

Where the design of road infrastructure such as structures and proprietary products is required, such design shall be by a Chartered Professional Engineer member of Engineers Australia and the Design Certificate signed by a Registered Structural Engineer (NPER or equivalent).

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A copy of the Design Certificate shall be provided to the Superintendent prior to the commencement of construction of the structure.

**G9.5.9 Evidence of Compliance**

The Contractor shall demonstrate compliance with all the requirements of all DIER Standard Specifications that are related to the contract as a condition of payment.

The methods by which the Contractor will monitor and demonstrate compliance shall be detailed in the Contract Management Plan.

The performance of the Contractor shall be measured according to the following criteria:

- the procedures detailed in the Contract Management Plan
- provision of adequate resources both to manage and respond to actual events within the required response time
- provision of all reports generated during the contract
- Certificates of Compliance (CoC)
- details of products particularly proprietary products.

The results of all tests conducted during the contract shall also be provided as evidence of compliance.

CoC's shall be signed by the Contractor and/or the product supplier certifying that all products, prior to and after installation, meet the requirements of the relevant specification.

Where a proprietary product is used, evidence that it has been applied in accordance with the Manufacturer's instructions shall be provided.

Evidence of compliance for all products produced in Australia shall include all details and certificates from the product manufacturer.

Evidence of compliance for all products produced outside of Australia shall include test results conducted in Australia by a NATA registered laboratory.

**G9.6 QUALITY ELEMENT OF CONTRACT MANAGEMENT PLAN**

The Contractor shall detail the requirements of this specification in the Contract Management Plan in accordance with *Standard Specification G2 Contract Management Plan* and the specific CMP requirements in all other DIER Standard Specifications relevant to the contract.

The CMP shall show that the Contractor has considered and understood the requirements of the specification and has:

- obtained the required level of third party certification with respect to the Contractor's Quality System and with respect to testing services
- made provision to obtain the inspection, sampling and testing services necessary to meet the specified quantum and frequency
- described the Contractor's systems and procedures for the inspection of incoming products; for verification of the compliance of the products, including Certification of Compliance and the recording of product details. These procedures shall ensure that supporting test results and certificates are current and are relevant to the particular batch/product supplied.
- made provision to induct contract personnel (Contractors, Sub-Contractors and suppliers) into the quality requirements of the specification
- made adequate provision to control and monitor the progress and compliance of the works through the development and supply of inspection and test plans

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- described the Contractor's management and decision making structures and procedures and named the personnel responsible for particular decisions throughout the contract
- defined the methods and procedures that will be activated in the event of non-conformity including those directed towards the rectification of the non-conformity and those directed towards the prevention of the reoccurrence of the non-conformity
- developed a recording system that is logical, comprehensive and:
  - provides the required level of traceability as defined in this specification
  - is suitable to monitor and judge compliance
  - readily accessible to both the Contractor and Superintendent
- programmed into the works the specified hold and witness points
- established inspection and maintenance procedures to be adopted throughout the duration of construction and throughout the defects liability period
- made provision to systematically review the performance of the production processes and to conduct internal audits of the Quality element of the CMP
- made provision to oversight all inspection, sampling and test regimes including the calibration of test equipment and test records
- defined inspection and test regimes for incoming materials, including:
  - review of the supplier's test records and assigned values
  - review and analysis of test data supplied with the incoming materials, including control charts
- defined procedures to be adopted when there is a change in incoming materials and/or in the composition of the product
- defined the methods for the storage and handling of materials, both incoming and manufactured
- provided template control charts in accordance with the specification.

### **G9.7 NOMINATION OF MATERIALS**

The Contractor is required to provide evidence that a material or product nominated for use in the contract is likely to comply with the specified criteria. The particular evidence required is defined in the relevant general and/or standard or project specification and may include:

- a completed Nomination of Materials form
- test reports of products from the same source, produced to comply with the particular specification
- the assigned characteristic value(s) for the product
- certificates of Compliance. This shall supported by details of the product including suppliers name, material source (e.g. country of origin for products not produced in Australia), test conditions and criteria
- a representative sample
- product label information and the product data sheet
- details of all proprietary product to be used.

The test reports supplied shall be the most recent reports undertaken on products produced to comply with the particular DIER Standard Specification, whether or not the product was supplied to a DIER contract. No test report on the particular product made between the earliest and most recent report dates can be excluded.

Unless, specifically approved by the Superintendent or allowed in the specification:

- the report date on at least one test report is not more than six (6) months from the date of submission of the evidence
- the report date on all (but one) of all remaining reports shall not be more than twenty-four (24) months before the date of submission of the evidence.



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The assigned Characteristic value(s) shall be calculated in accordance with the method described in the relevant general or standard specification. The calculation shall be based on the most recent tests on products produced to the relevant DIER specification, whether or not the product was supplied to a DIER contract.

The representative sample of quarried products (e.g. Ref *G7, R40, R51*) shall be provided in tightly sealed bags, individually no heavier than 25kgs. The bags shall be made of robust materials that will prevent the loss of any of the sample. The bags shall be clearly labelled, both internally and externally.

The minimum requirements for the labelling are:

- the name of the sample (e.g. Base Class B)
- the name of the supplier
- the location of the source of the sample
- date of sampling.

### **G9.8 PRODUCTION CONTROL PLANS**

The Contractor and the Contractor's suppliers are required to operate under documented Production Control Plans. The plans shall include Inspection and Test Plans consistent with the requirements of this specification.

The Production Control Plans shall be directed towards the effective and efficient management of production processes. Oversight and analysis of the recorded inspection and test information and of trends in quality would form part of the plan.

The plans shall outline the inspection process, the personnel responsible for inspections and testing and those responsible for the monitoring and analysis of the inspection and test results as well as those responsible for the auditing of the plan and for the initiation of corrective action.

The plans shall ensure that:

- all incoming products are inspected and that their compliance with the specification is established
- materials are handled and stored in a manner that will not lead to deterioration
- sufficient and appropriate inspections and control tests are undertaken to ensure that the materials supplied meet the specified requirements
- inspections and testing are taken at regular and defined intervals in a systematic way, using equipment with valid and current calibrations
- reference specimens are manufactured, collected and maintained so that they are protected from deterioration and contamination
- the results of all inspections and control tests are recorded, monitored and examined for trends in product quality and variability
- product variability is monitored and minimized.

### **G9.9 CONTROL CHARTS**

The Contractor and suppliers to the Contractor shall maintain and monitor control charts as required by the general and standard specifications.

The minimum requirements for the charts are:

- all individual test results are included and identified by a unique sample number, test number or test report identification and a date that can be used to tie the sample and test result to the date of production of the product
- the test results are plotted in chronological order

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- the chart includes at least one set of control/compliance levels (e.g. mean or single sample limits).

Test results shall be entered on charts within three (3) working days of receipt of the test results.

For the purpose of the control charts, test results included in the charts remain current for two (2) years.

### **G9.10 SUPERINTENDENT'S AUDIT AND NON CONFORMANCE**

The Superintendent may carry out at any time an audit of the Contractor's Systems. Such audits may include system or product compliance audits and may require access by the Superintendent to the Contractor's offices, factories or site works.

Where the Superintendent's audit indicates non-conformance in a process or procedure, the Contractor shall submit a proposal for remedial action, for approval of the Superintendent.

Where the Superintendent's audit detects a non-conformance in a test or measurement which would lead to failure of a lot or batch to satisfy specified requirements for acceptance, the Contractor shall either:

- accept the Superintendent's tests or measurements and submit a proposal for remedial action for approval by the Superintendent or
- carry and repeat tests or measurements. The analysis of the test data and the method of judging compliance shall be in accordance with this specification.

In the event that the Contractor elects not to accept the Superintendent's tests or measurement and elects to carry out further tests, the Contractor shall submit a proposal for this further testing.

The proposal shall:

- identify and provide details of the discrepancy between the Contractor's and Superintendent's measurements or test results
- provide analysis/argument as to the likely cause(s) of the discrepancy, including the justification for the proposed further testing
- define the type, number and location of the further testing and the proposed method of judging compliance. Unless the Contractor can provide cogent argument that a particular result or set of results is in error or is a statistical outlier, compliance shall be based on all test results, (Contractor's and Superintendent's) made on the particular product or lot.



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