

CSi Technical Guidance

Planning, Conducting, Witnessing and Certifying Safety Glazing Materials to AS/NZS 2208:2023

(Incorporating Amendments 1 & 2:2025)

A Practical Guide for Manufacturers, Testing Laboratories and Regulators



This publication is provided as technical guidance only. It does not replace AS/NZS 2208, applicable Standards, legislation, accreditation requirements, certification scheme rules or professional engineering advice. Users remain responsible for ensuring compliance with all applicable regulatory, accreditation and certification requirements.

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Distribution and Use

This guidance may be issued to CSi personnel, prospective clients, certified clients, manufacturers, laboratories and other interested parties. It may be used to support product-development planning, test-facility preparation, client education and the preparation of evidence for product certification. It must not be represented as a substitute for the controlled text of AS/NZS 2208 or as approval of a specific glazing construction.

Publication Notice

Scope of this Publication

This publication provides practical guidance for manufacturers, testing laboratories, certification bodies, regulators and other interested parties undertaking testing and conformity assessment of products.

It has been developed from Certification Solutions International's experience in accredited product certification, factory inspections, witness testing and conformity assessment.

This publication explains recognised industry practice but does not replace applicable legislation, Standards, accreditation requirements or certification scheme rules.

Intended Audience

This publication has been prepared for:

- Manufacturers
- Glass processors
- Product certification clients
- Testing laboratories
- Regulatory authorities
- Engineers
- Building surveyors
- Technical managers
- Factory quality personnel
- Importers and distributors

Relationship to Product Certification

Successful testing does not, by itself, constitute product certification.

Product certification requires the evaluation of manufacturing controls, quality management, traceability, surveillance, product testing and ongoing conformity assessment in accordance with the applicable certification scheme and ISO/IEC 17065.

Testing forms only one component of the certification process.

Relationship to Building Regulations

Compliance with AS/NZS 2208 alone does not necessarily demonstrate compliance with the National Construction Code (Australia), the New Zealand Building Code or other applicable statutory requirements.

Product suitability should always be assessed against the applicable Building Code, referenced Standards and project-specific design requirements.

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Always verify the current Issue and Revision recorded in CDA_010 – Master Document Control List before use.

Abbreviations

Abbreviation	Meaning
CSI	Certification Solutions International Pty Ltd
NATA	National Association of Testing Authorities
ISO	International Organization for Standardization
IEC	International Electrotechnical Commission
AS	Australian Standard
NZS	New Zealand Standard
AS/NZS	Joint Australian/New Zealand Standard
QC	Quality Control
QA	Quality Assurance
PPE	Personal Protective Equipment

Foreword

Certification Solutions International Pty Ltd has developed this Technical Guidance publication to assist manufacturers, testing laboratories and certification clients in understanding the practical implementation of AS/NZS 2208.

Although AS/NZS 2208 specifies the technical requirements applicable to safety glazing materials, it does not explain how manufacturers should establish testing facilities, prepare representative specimens, document testing or integrate testing into an accredited product certification programme.

This publication has been prepared from practical experience gained during factory inspections, witness testing, product certification and conformity assessment activities undertaken throughout Australia, New Zealand and international manufacturing facilities.

The objective of this publication is to improve the quality, repeatability and consistency of safety glazing testing while reducing invalid testing, product failures and certification delays.

It is intended to assist manufacturers in developing robust testing systems capable of consistently demonstrating product conformity while supporting accredited third-party product certification.

Throughout this publication, recommendations identified as **CSi Recommendations** represent recognised industry best practice developed through Certification Solutions International's experience in product certification, factory inspections and witness testing. Although these recommendations may exceed the minimum requirements of AS/NZS 2208, their implementation is encouraged to improve product conformity, test repeatability and certification outcomes.

The guidance provided throughout this publication represents recognised industry practice developed by Certification Solutions International and should be read together with the current edition of AS/NZS 2208 and all applicable regulatory and certification requirements.

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1. Introduction

1.1 General

The construction industry relies upon safety glazing materials to protect building occupants from injury arising from accidental human impact while maintaining the performance, durability and functionality expected of modern glazing systems. Safety glazing is used throughout residential, commercial and industrial buildings in applications where human impact is foreseeable and where failure of ordinary annealed glass could result in serious injury.

Throughout Australia and New Zealand, the performance requirements for safety glazing materials are specified within **AS/NZS 2208 – Safety Glazing Materials in Buildings**. The Standard establishes the minimum performance criteria, product classifications and test methods used to determine whether a glazing material may be classified as a safety glazing material for building applications.

Compliance with AS/NZS 2208 provides confidence that a product has demonstrated satisfactory performance when subjected to the specified test programme. However, successful testing alone does not ensure that every product subsequently manufactured will continue to achieve the same level of performance. Consistent conformity can only be achieved through controlled manufacturing processes, competent personnel, effective quality management and ongoing production verification.

For this reason, manufacturers seeking independent product certification should regard testing as one component of a much broader conformity assessment process.

1.2 Why This Publication Has Been Developed

Certification Solutions International Pty Ltd (CSI) has developed this Technical Guidance to assist manufacturers, processors, importers and other interested organisations in understanding not only the technical requirements of AS/NZS 2208, but also the practical steps necessary to consistently manufacture, test and certify safety glazing materials.

Experience gained through factory inspections, witness testing and product certification has shown that many testing failures are not caused by deficiencies within the Standard itself. Rather, they arise because manufacturers have not fully understood the relationship between product design, manufacturing controls, production quality management and the testing programme used to demonstrate conformity.

In many cases, manufacturers invest considerable time and expense in producing test specimens, arranging laboratory testing and preparing certification evidence, only to discover that relatively simple deficiencies in manufacturing controls, traceability or specimen preparation prevent successful certification.

This publication has therefore been prepared to assist organisations in avoiding those common problems by explaining how CSI approaches product conformity assessment and how manufacturers can establish systems that consistently produce compliant products.

1.3 The CSI Philosophy

CSI believes that product certification should provide value beyond the issue of a certificate.

The objective of certification is not simply to determine whether a product passed a particular test on a particular day. Rather, it is to provide continuing confidence that every product manufactured within the approved scope of certification continues to comply with the applicable Standard throughout the certification period.

This philosophy aligns with the principles of accredited product certification under ISO/IEC 17065 and forms the basis of the **CSi PAS-Mark Product Certification Scheme**, established under **PAS_001 – PAS-Mark Product Certification Scheme – Rules and Requirements Manual**.

Accordingly, CSi works with manufacturers to encourage the development of robust manufacturing systems, effective production controls and comprehensive technical evidence capable of supporting both initial certification and ongoing surveillance.

Manufacturers who implement these principles generally experience improved product consistency, reduced production waste, fewer customer complaints and greater confidence during certification assessments.

1.4 Purpose of this Technical Guidance

This publication has been prepared to explain the practical application of AS/NZS 2208 within a manufacturing and product certification environment.

It is intended to assist organisations to:

- understand the performance requirements of AS/NZS 2208;
- understand how CSi interprets those requirements during product certification;
- establish suitable manufacturing controls before formal testing commences;
- prepare representative production specimens;
- understand the testing programme applicable to different glazing materials;
- prepare technical evidence suitable for submission under the CSi PAS-Mark Product Certification Scheme;
- understand the relationship between laboratory testing, factory production control and ongoing certification;
- minimise unnecessary testing costs by improving first-time testing success; and
- establish production systems capable of maintaining long-term conformity.

This publication is intended to complement, not replace, the requirements of AS/NZS 2208, PAS_001 and other applicable Standards and regulatory requirements.

1.5 How to Use This Technical Guidance

This publication has been structured to follow the same sequence normally experienced by a manufacturer seeking product certification.

The document begins by explaining the regulatory framework applicable to safety glazing materials before progressively addressing product design, manufacturing considerations, specimen preparation, testing, interpretation of results, certification evidence and ongoing surveillance activities.

Throughout this publication, readers will encounter three distinct categories of information:

Requirements identify mandatory obligations specified within AS/NZS 2208, the CSi PAS-Mark Product Certification Scheme or other applicable regulatory documents.

Technical Guidance explains recognised methods of achieving compliance and reflects Certification Solutions International's practical experience in product certification, witness testing and conformity assessment.

CSi Recommendations identify industry best practices that, while not necessarily mandatory, are strongly encouraged because they improve manufacturing consistency, reduce certification risk and support ongoing product conformity.

By understanding the distinction between these three categories, manufacturers will be better equipped to develop products and production systems capable of consistently meeting both technical and certification requirements.

2 Regulatory Framework

2.1 General

Manufacturers seeking certification of safety glazing materials should first understand that product certification forms part of a broader regulatory framework governing the design, manufacture, testing and installation of glazing products throughout Australia and New Zealand.

While AS/NZS 2208 establishes the performance requirements for safety glazing materials, compliance with the Standard alone does not necessarily demonstrate compliance with all applicable legislative, Building Code or project-specific requirements.

Manufacturers are responsible for ensuring their products satisfy all applicable regulatory obligations before products are placed on the market.

Certification Solutions International (CSi) evaluates products against the applicable product Standard and the requirements of the CSi PAS-Mark Product Certification Scheme. However, product certification does not remove the manufacturer's responsibility for ensuring the certified product remains suitable for its intended application.

2.2 National Construction Code (Australia)

Within Australia, glazing products are commonly specified as part of the National Construction Code (NCC), together with referenced Australian Standards applicable to the design, manufacture and installation of glazing systems.

The NCC references numerous Standards applicable to glazing, depending upon the intended building application. Compliance with AS/NZS 2208 forms one component of demonstrating product suitability where safety glazing materials are required.

Manufacturers should therefore consider the complete regulatory framework rather than viewing AS/NZS 2208 as a standalone Standard.

2.3 New Zealand Building Code

Within New Zealand, glazing products are regulated through the New Zealand Building Code together with the applicable Verification Methods, Acceptable Solutions and referenced Standards.

Manufacturers supplying products into the New Zealand market should ensure that product testing, certification evidence and supporting technical documentation satisfy both the applicable New Zealand Building Code requirements and the relevant Standards referenced within those documents.

Where products are intended for supply into both Australia and New Zealand, manufacturers should carefully identify any differences between regulatory requirements before product development commences.

2.4 Relationship Between Product Standards

Safety glazing products are rarely assessed against a single Standard.

Depending upon the intended application, manufacturers may need to demonstrate conformity with several Standards that collectively establish the performance of the finished glazing system.

For example, AS/NZS 2208 establishes the safety performance of glazing materials subjected to human impact. However, additional Standards may apply to structural performance, wind resistance, glazing installation, durability, insulating glass units, framed window systems or specialist glazing applications.

Manufacturers should therefore identify all Standards applicable to their products during the design stage rather than after prototype testing has commenced.

Early identification of applicable Standards significantly reduces redesign costs and minimises delays during certification.

2.5 Product Certification

Product certification provides independent confidence that a product has been assessed against the applicable requirements of the nominated Standard and continues to comply with those requirements through ongoing surveillance activities.

Unlike one-off laboratory testing, accredited product certification provides continuing oversight of the manufacturer's production systems, quality management processes and product conformity.

Under the CSi PAS-Mark Product Certification Scheme, certification is based upon a combination of technical evidence, product testing, manufacturing assessment and continuing surveillance rather than a single laboratory report.

Accordingly, manufacturers should consider product certification as an ongoing partnership focused upon maintaining product conformity throughout the certification cycle.

CSi Technical Insight

Many organisations commence product development by arranging laboratory testing before fully understanding the regulatory framework applicable to their products.

Experience has shown that manufacturers who first identify all applicable regulatory, technical and certification requirements generally achieve certification more efficiently than organisations that rely solely upon testing to establish compliance.

Understanding the complete certification pathway before manufacturing prototype specimens frequently reduces project costs, avoids unnecessary testing and assists manufacturers in developing products that are capable of achieving and maintaining certification.

2.6 The Role of the CSi PAS-Mark Product Certification Scheme

The CSi PAS-Mark Product Certification Scheme has been developed to provide independent third-party certification of products against nominated Standards and associated certification requirements.

The Scheme operates in accordance with the principles of ISO/IEC 17065 and is supported by a suite of controlled documents that collectively define the certification process, client obligations, conditions of certification and ongoing surveillance requirements.

For safety glazing materials, the principal CSi Scheme documents include:

- **PAS_001 – PAS-Mark Product Certification Scheme – Rules and Requirements Manual**
- **PAS_002 – PAS-Mark Product Certification Scheme – Terms, Conditions and Appeals**
- **PAS_003 – PAS-Mark Product Certification Scheme – Use of Certificate and Certification Mark**

These documents should be read together with this Technical Guidance, as each serves a different purpose within the overall certification process.

While this publication explains how manufacturers can prepare for successful product certification, PAS_001 defines the certification requirements that must be satisfied before certification can be granted and maintained.

2.7 Chapter Summary

Product certification operates within a broader regulatory framework than AS/NZS 2208 alone.

Manufacturers should understand the relationship between Building Code requirements, product Standards and the CSi PAS-Mark Product Certification Scheme before commencing product development.

Early identification of all applicable regulatory and certification requirements significantly reduces unnecessary testing, redesign and certification delays.

Successful certification depends not only upon demonstrating compliance with AS/NZS 2208 but also upon satisfying the ongoing conformity assessment requirements defined within the CSi PAS-Mark Product Certification Scheme.

3 Understanding Safety Glazing Materials

3.1 Introduction

Before safety glazing materials can be successfully tested or certified, it is important to understand how different glazing products behave when subjected to human impact.

Different manufacturing processes produce significantly different fracture characteristics, residual strength and post-breakage behaviour. These differences determine whether a product may be classified as a safety glazing material in accordance with AS/NZS 2208 and whether the product is suitable for a particular building application.

Understanding the characteristics of each glazing material assists manufacturers during product design, product development, quality control and certification planning.

It also assists specifiers, builders and regulators in selecting products appropriate for their intended application.

3.2 What is Safety Glazing?

Safety glazing is glazing specifically designed or processed to minimise the likelihood of serious injury following accidental human impact.

Unlike ordinary annealed glass, safety glazing materials are manufactured so that, when fractured, they either:

- fracture into relatively small particles that are less likely to cause serious injury; or
- remain substantially intact after fracture through the use of an interlayer or other retaining medium.

The objective of safety glazing is not to prevent breakage.

The objective is to reduce the risk of injury when breakage occurs.

This distinction is fundamental to understanding AS/NZS 2208 and the performance requirements applicable to safety glazing products.

3.3 Categories of Safety Glazing Materials

Safety glazing materials covered by AS/NZS 2208 include a variety of products manufactured using different processes and technologies.

Typical products include:

- Toughened safety glass.
- Laminated safety glass.
- Toughened laminated safety glass.
- Organic-coated safety glass.
- Organic-backed mirrors where recognised by the Standard.
- Painted safety glazing products.
- Curved safety glazing products complying with the applicable requirements.

Although these products may all be classified as safety glazing materials, their manufacturing processes, performance characteristics and certification requirements differ significantly.

Manufacturers should therefore understand the characteristics of each product before selecting the appropriate testing programme.

3.4 Ordinary Annealed Glass

Ordinary annealed glass is manufactured by controlled cooling following the float glass manufacturing process.

Although suitable for many glazing applications, annealed glass fractures into large sharp shards capable of causing serious injury following human impact.

For this reason, annealed glass is generally unsuitable for locations where safety glazing materials are required by the applicable Building Code or referenced Standards.

Manufacturers should recognise that simply increasing the thickness of annealed glass does not convert it into safety glazing.

Safety glazing performance is determined by the product's behaviour following impact rather than its nominal thickness.

CSi Technical Insight

One of the most common misconceptions encountered during product certification is the assumption that thicker glass automatically provides safer glass.

In reality, safety performance is determined primarily by fracture behaviour following impact.

A thinner safety glazing material complying with AS/NZS 2208 may provide substantially greater protection against injury than a much thicker piece of ordinary annealed glass.

3.5 Toughened Safety Glass

Toughened safety glass is produced by heating glass to a controlled temperature before rapidly cooling its surfaces.

This process introduces permanent compressive stresses into the glass surfaces and balancing tensile stresses within the core of the glass.

The resulting product possesses significantly greater resistance to mechanical loading than ordinary annealed glass and, when fractured, typically disintegrates into numerous relatively small fragments.

It is this characteristic fracture behaviour that enables toughened glass to satisfy the human impact requirements of AS/NZS 2208 when manufactured correctly.

However, manufacturers should recognise that thermally toughened safety glass cannot normally be cut, drilled or edge worked after the toughening process has been completed.

Accordingly, all fabrication operations should be completed before the glass enters the toughening furnace.

3.6 Laminated Safety Glass

Laminated safety glass is manufactured by permanently bonding two or more sheets of glass together using one or more polymer interlayers under controlled heat and pressure.

Unlike thermally toughened glass, laminated safety glass is designed to retain fractured glass fragments within the interlayer following breakage. This significantly reduces the risk of injury and, depending upon the glazing construction, may also continue to provide a degree of security, weather resistance and structural integrity after fracture.

The performance of laminated safety glass depends upon considerably more than the thickness of the glass plies. Product performance is influenced by numerous manufacturing variables including:

- Glass type.
- Glass thickness.
- Number of glass plies.
- Interlayer material.
- Interlayer thickness.
- Interlayer manufacturer.
- Lamination process.
- Edge quality.
- Adhesion between the glass and interlayer.
- Manufacturing consistency.

Manufacturers should recognise that changing any one of these variables may alter the product's performance and may require additional technical assessment or testing before certification evidence can be extended to the revised construction.

Certification Consideration

Under the CSI PAS-Mark Product Certification Scheme, certification applies only to the glazing construction supported by acceptable certification evidence.

Changes to glass type, glass thickness, interlayer type, interlayer manufacturer, interlayer thickness, manufacturing process or production location should be reviewed by CSI before the product continues to be represented as certified.

3.7 Heat-Strengthened Glass

Heat-strengthened glass is manufactured using a thermal process similar to thermally toughened glass but with a slower cooling cycle.

The process develops surface compression levels greater than ordinary annealed glass but lower than thermally toughened glass.

Heat-strengthened glass provides improved resistance to thermal stress and mechanical loading when compared with ordinary annealed glass. However, when fractured, it typically breaks into larger fragments than thermally toughened safety glass.

Accordingly, manufacturers should carefully determine whether heat-strengthened glass is appropriate for applications requiring compliance with AS/NZS 2208.

The suitability of heat-strengthened glass should always be established by reference to the applicable Standard and supporting certification evidence.

3.8 Organic-Coated Safety Glass

Organic-coated safety glass incorporates a durable polymer coating that contributes to the residual performance of the glazing following fracture.

Depending upon the product design, the coating assists in retaining fractured glass fragments and reducing the likelihood of injury after impact.

Manufacturers should ensure that the coating process remains consistently controlled during production.

Particular attention should be given to:

- coating thickness;
- curing process;
- adhesion;
- surface preparation;
- environmental durability; and
- long-term coating performance.

Failure to adequately control these manufacturing processes may significantly affect product performance.

3.9 Curved Safety Glass

Curved safety glazing products present additional manufacturing challenges when compared with flat glazing products.

The bending process may influence residual stress distribution, optical quality, dimensional tolerances and product performance.

Manufacturers producing curved safety glazing should establish manufacturing controls that ensure consistent product geometry and repeatable production quality.

Where curved products are submitted for certification, the certification evidence should be representative of the maximum certified curvature, dimensions and manufacturing process.

CSi Technical Insight

Experience has shown that product certification projects involving curved glazing frequently require more detailed technical evaluation than equivalent flat glazing products.

Early consultation with CSi during product development assists manufacturers in identifying the most appropriate certification pathway, reducing unnecessary testing and avoiding delays during the certification process.

3.10 Selecting the Appropriate Product for Certification

Manufacturers frequently ask which glazing construction should be submitted for certification.

There is no universal answer.

The most appropriate product depends upon:

- the intended building application;
- applicable Building Code requirements;
- the referenced Standards;
- customer performance expectations;
- manufacturing capability;
- long-term production consistency;
- commercial objectives; and
- the scope of certification sought.

Manufacturers are encouraged to consult with CSi during the early stages of product development.

Early technical discussions frequently identify opportunities to optimise product design, reduce unnecessary testing and establish a certification programme that aligns with both the manufacturer's commercial objectives and the requirements of the CSi PAS-Mark Product Certification Scheme.

3.11 Chapter Summary

Understanding the characteristics of safety glazing materials is fundamental to successful product development, testing and certification.

Different glazing products exhibit significantly different fracture characteristics, manufacturing requirements and performance outcomes. Manufacturers should therefore select glazing constructions based upon their intended application, applicable regulatory requirements and long-term manufacturing capability rather than simply selecting the least expensive or thickest glazing construction.

Early consideration of product design, manufacturing consistency and certification requirements will significantly reduce product development time, minimise unnecessary testing and improve the likelihood of successful certification under the CSi PAS-Mark Product Certification Scheme.

Before commencing formal testing, manufacturers should ensure they fully understand the glazing product being manufactured, the intended certification scope and the evidence required to support ongoing conformity.

4 Product Design and Certification Planning

4.1 General

The design stage is the most important phase of any product certification project.

Decisions made during product design influence manufacturing efficiency, product performance, testing costs, certification timeframes and the long-term ability of a manufacturer to consistently produce conforming products.

Experience gained by Certification Solutions International has shown that manufacturers who invest sufficient time in product design and certification planning generally experience fewer technical problems during testing and significantly shorter certification timeframes than organisations that commence laboratory testing before product development has been completed.

Manufacturers are therefore encouraged to consider certification requirements during product design rather than after prototype manufacturing has commenced.

4.2 Designing for Certification

Many manufacturers develop products with the objective of successfully passing an individual laboratory test.

Although understandable, this approach frequently results in unnecessary redesign, repeated testing and increased certification costs.

A more effective approach is to design products capable of being consistently manufactured under normal production conditions while simultaneously satisfying the technical requirements of the applicable Standard and the ongoing requirements of the CSi PAS-Mark Product Certification Scheme.

Products intended for certification should therefore be designed with consideration of:

- manufacturing capability;
- material availability;
- production tolerances;
- quality control;
- repeatability of manufacture;
- calibration requirements;

- production inspection;
- traceability;
- ongoing surveillance; and
- future product variations.

Manufacturers who design products with certification in mind generally experience fewer production difficulties after certification has been granted.

4.3 Product Design Review

Before prototype manufacture commences, manufacturers should complete a documented design review.

The review should confirm that the proposed glazing construction is technically capable of satisfying the performance requirements of AS/NZS 2208 and that the manufacturing process is capable of consistently reproducing the proposed design.

The review should include consideration of:

- intended product application;
- applicable Building Code requirements;
- applicable Standards;
- glass type;
- glass thickness;
- glazing construction;
- interlayer selection;
- dimensional limitations;
- manufacturing capability;
- production quality controls;
- inspection methods;
- proposed certification scope; and
- anticipated future product variations.

Where uncertainties exist, manufacturers are encouraged to discuss the proposed product with CSI before prototype manufacture begins.

Early technical discussions frequently identify opportunities to reduce unnecessary testing, improve manufacturing efficiency and simplify the certification process.

CSI Technical Insight

One of the most common causes of certification delays is not product failure—it is inadequate planning.

Manufacturers that undertake a structured design review before producing test specimens are generally able to identify potential technical issues early, reducing costly redesign, repeated laboratory testing and delays in bringing products to market.

4.4 Chapter Summary

Successful product certification begins with effective product design.

Manufacturers should design products that are capable of consistent production rather than focusing solely upon passing an individual laboratory test.

A structured design review undertaken before prototype manufacture assists manufacturers in identifying technical issues early, reducing development costs and improving the efficiency of the certification process.

Early engagement with CSI during product development provides additional confidence that the proposed certification programme is appropriate for the intended product and certification scope.

5 Manufacturing Controls

5.1 General

Successful product certification begins long before the first test specimen is manufactured.

Manufacturers consistently achieving successful certification recognise that product conformity is established during manufacturing rather than during laboratory testing.

Testing demonstrates the performance of a product. Manufacturing controls ensure that every subsequent product continues to achieve the same level of performance.

For this reason, the CSI PAS-Mark Product Certification Scheme places significant emphasis on manufacturing controls as part of the overall conformity assessment process.

Manufacturers should establish documented production processes capable of consistently producing products equivalent to those originally evaluated during certification.

5.2 Manufacturing Consistency

Consistent manufacturing is fundamental to maintaining product certification.

Regardless of the glazing product being manufactured, production should be controlled to ensure that all products remain within the approved design specification.

Manufacturing controls should address, where applicable:

- Incoming material verification.
- Glass identification.
- Glass thickness verification.
- Interlayer identification.
- Interlayer storage conditions.
- Production equipment settings.

- Furnace operating parameters.
- Lamination parameters.
- Environmental conditions.
- Inspection procedures.
- Product identification.
- Batch traceability.
- Final inspection.
- Product release.

Variations in manufacturing processes that appear insignificant may influence product performance and should therefore be appropriately controlled.

5.3 Control of Incoming Materials

The quality of the finished glazing product is directly influenced by the quality and consistency of the materials used during manufacture.

Manufacturers should establish procedures for verifying that incoming materials comply with specified purchasing requirements before they are released into production.

Incoming inspection activities should include, where appropriate:

- verification of supplier documentation;
- confirmation of material identification;
- dimensional verification;
- thickness verification;
- visual inspection for damage;
- storage requirements;
- batch identification; and
- traceability to purchasing records.

Particular attention should be given to polymer interlayers, coatings and specialist materials where product performance is highly dependent upon the manufacturer's specified material properties.

Certification Consideration

Where product certification is based upon specific materials or nominated suppliers, manufacturers should not substitute alternative materials without first determining whether the proposed change may affect product conformity or the certification evidence supporting the certified product.

Material substitutions may require technical assessment and, in some circumstances, additional testing before certification can continue unchanged.

5.4 Production Equipment

Manufacturing equipment should be maintained in a condition capable of consistently producing products that comply with the approved product specification.

Manufacturers should establish documented maintenance programmes covering all equipment that may influence product conformity.

Equipment requiring planned maintenance may include:

- glass cutting equipment;
- edge processing equipment;
- washing equipment;
- toughening furnaces;
- lamination equipment;
- autoclaves;
- coating equipment;
- measuring equipment;
- inspection equipment; and
- handling equipment.

Preventive maintenance reduces the likelihood of product variation and contributes to consistent manufacturing quality.

5.5 Process Control

Each stage of production should be performed using documented procedures that define the acceptable operating parameters for the manufacturing process.

Process controls should ensure that manufacturing personnel understand:

- operating temperatures;
- processing times;
- pressure settings;
- heating and cooling cycles;
- handling requirements;
- acceptance criteria;
- inspection requirements; and
- actions to be taken where product nonconformity is identified.

Manufacturers should recognise that undocumented manufacturing practices frequently result in inconsistent production outcomes and increased certification risk.

CSi Technical Insight

One of the most common findings identified during CSi manufacturing assessments is reliance upon operator experience rather than documented production controls.

Experienced personnel are an important manufacturing asset. However, long-term product conformity should never depend solely upon individual knowledge.

Documented production procedures improve consistency, simplify training, support succession planning and provide greater confidence that certified products will continue to comply with the approved product specification.

5.6 Product Traceability

Every certified product should be capable of being traced back to the manufacturing records supporting its production.

Traceability assists manufacturers in:

- demonstrating conformity;
- investigating complaints;
- managing product recalls;
- implementing corrective actions;
- supporting surveillance activities; and
- maintaining confidence in certified products.

Where practical, manufacturers should maintain traceability between:

- raw materials;
- production batches;
- processing records;
- inspection records;
- testing records;
- product identification; and
- customer deliveries.

Effective traceability significantly improves the efficiency of certification surveillance and enables manufacturers to respond quickly when production issues arise.

5.7 Chapter Summary

Manufacturing controls provide the foundation for ongoing product conformity.

Consistent production, documented procedures, effective process control and complete product traceability enable manufacturers to repeatedly produce products equivalent to those originally evaluated during certification.

Manufacturers who maintain effective manufacturing controls generally experience fewer nonconformities, improved production efficiency and greater confidence during CSi surveillance assessments.

6 Quality Management and Production Quality Control

6.1 General

A successful laboratory test demonstrates that a product complied with the applicable requirements of AS/NZS 2208 at the time the test was performed.

Product certification requires considerably more.

The objective of product certification is to provide continuing confidence that every product subsequently manufactured remains equivalent to the product originally evaluated during certification.

This objective can only be achieved through the implementation of effective production quality control systems capable of consistently monitoring manufacturing processes, product conformity and ongoing compliance with the CSi PAS-Mark Product Certification Scheme.

Manufacturers should therefore regard production quality control as an integral component of product certification rather than an activity undertaken solely to satisfy certification requirements.

6.2 Production Quality Control

Production Quality Control (PQC) comprises the planned activities undertaken by the manufacturer to verify that products continue to comply with the approved product specification.

An effective PQC programme provides confidence that manufacturing processes remain under control and that product performance remains consistent throughout routine production.

Depending upon the manufacturing process, production quality control activities may include:

- incoming material inspections;
- dimensional verification;
- process monitoring;
- furnace monitoring;
- lamination monitoring;
- visual inspection;
- product sampling;
- production testing;
- equipment verification;
- calibration;

- nonconforming product control;
- corrective action; and
- product release.

Manufacturers should ensure that production quality control activities are documented and supported by appropriate records.

6.3 Quality Plans

Under the CSi PAS-Mark Product Certification Scheme, manufacturers may be required to develop and implement a documented Product Quality Plan appropriate to the certified product.

The Quality Plan should define the manufacturing controls necessary to consistently produce products conforming to the approved product specification.

Although Quality Plans will vary depending upon the product being manufactured, they generally include:

- manufacturing sequence;
- critical process controls;
- inspection stages;
- acceptance criteria;
- sampling frequencies;
- testing requirements;
- calibration requirements;
- product identification;
- traceability;
- record retention;
- responsibilities; and
- corrective action procedures.

The Quality Plan should become the primary operational document used by production personnel responsible for manufacturing certified products.

CSi Technical Insight

Manufacturers frequently ask CSi what is the single most important document supporting ongoing certification.

It is not the laboratory test report.

It is the Product Quality Plan.

A well-developed Quality Plan enables manufacturers to consistently reproduce the certified product long after the original laboratory testing has been completed.

6.4 Inspection and Testing During Production

Manufacturers should establish routine inspection and testing activities appropriate to the products being manufactured.

Routine inspections provide confidence that production remains within the approved manufacturing tolerances before products are released to customers.

Inspection activities may include:

- dimensional verification;
- visual inspection;
- glass identification;
- edge quality;
- surface quality;
- coating quality;
- product marking;
- packaging inspection; and
- final release inspection.

Where production testing forms part of the approved Quality Plan, testing should be performed using documented procedures and calibrated equipment.

6.5 Calibration and Measuring Equipment

Reliable inspection results depend upon accurate measuring equipment.

Manufacturers should establish procedures for identifying, calibrating, maintaining and protecting measuring equipment used during production and inspection activities.

Equipment requiring calibration may include:

- thickness gauges;
- measuring tapes;
- vernier calipers;
- micrometres;
- thermometers;
- temperature data loggers;
- pressure gauges;
- timers; and

- other measuring devices used to verify product conformity.

Calibration records should be maintained and be available for review during CSI manufacturing assessments and surveillance activities.

Certification Consideration

During CSI factory assessments, evidence of effective production quality control is evaluated together with product testing results.

Manufacturers who maintain comprehensive production records, effective Quality Plans and documented inspection systems generally experience more efficient surveillance assessments and greater confidence in maintaining certification.

6.6 Chapter Summary

Product certification extends beyond successful laboratory testing.

Effective Production Quality Control, documented Quality Plans, routine inspection activities and calibrated measuring equipment provide continuing confidence that certified products remain compliant throughout routine production.

Manufacturers who implement robust quality management systems supported by effective Product Quality Plans are better positioned to maintain long-term certification under the CSI PAS-Mark Product Certification Scheme.

7 Product Testing Requirements

7.1 General

Product testing is undertaken to demonstrate that a safety glazing material satisfies the performance requirements specified by AS/NZS 2208 and any additional requirements applicable to the CSI PAS-Mark Product Certification Scheme.

Testing provides objective evidence that a representative product complies with the applicable Standard at the time of evaluation. However, successful testing alone does not constitute product certification.

Within the CSI PAS-Mark Product Certification Scheme, test results form one component of the overall certification evidence and are evaluated together with manufacturing controls, production quality management, product traceability and factory assessment findings.

Manufacturers should therefore ensure that all test specimens submitted for evaluation are fully representative of normal production.

7.2 Objectives of Product Testing

The primary objectives of product testing are to:

- verify compliance with the applicable requirements of AS/NZS 2208;
- confirm that the proposed glazing construction satisfies the nominated product classification;
- validate the manufacturer's product design;
- demonstrate repeatability of manufacturing processes;

- provide objective certification evidence;
- support product certification under the CSI PAS-Mark Product Certification Scheme; and
- establish a technical baseline for future surveillance activities.

Testing should never be regarded as simply obtaining a laboratory report.

It forms part of the manufacturer's overall demonstration of product conformity.

7.3 Representative Test Specimens

The validity of any laboratory test depends upon the representativeness of the specimens submitted for evaluation.

Manufacturers should ensure that specimens submitted for testing are manufactured using normal production equipment, personnel, materials and manufacturing processes.

Specimens should not receive special treatment intended solely to improve laboratory performance if those conditions cannot be consistently reproduced during routine production.

Representative specimens should accurately reflect:

- normal manufacturing methods;
- approved product design;
- production tolerances;
- approved materials;
- production equipment;
- routine manufacturing personnel;
- standard inspection procedures; and
- normal product release processes.

Failure to submit representative specimens may invalidate certification evidence and compromise confidence in the certified product.

Certification Consideration

CSI may require additional information where there is evidence that submitted test specimens are not representative of normal production.

Where significant differences exist between production products and tested specimens, additional assessment or testing may be required before certification can proceed.

7.4 Selection of Test Specimens

Manufacturers should carefully select specimens that represent the full scope of certification being sought.

Particular consideration should be given to:

- maximum certified dimensions;

- minimum certified dimensions where relevant;
- glass thickness;
- glazing construction;
- interlayer configuration;
- coatings;
- edge finish;
- product orientation;
- manufacturing tolerances; and
- intended end-use.

Selecting inappropriate specimens frequently results in unnecessary retesting and delays during certification.

Early consultation with CSI is recommended where uncertainty exists regarding specimen selection.

7.5 Identification of Test Specimens

Each specimen should be uniquely identified before testing commences.

The identification system should enable complete traceability between the test specimen and the associated manufacturing records.

Typical identification information includes:

- unique specimen identification number;
- production batch number;
- manufacturing date;
- product designation;
- glazing construction;
- glass thickness;
- interlayer details;
- production location; and
- intended certification scope.

This information should remain traceable throughout the certification process and subsequent surveillance activities.

CSI Technical Insight

One of the most common administrative problems encountered during certification assessments is incomplete specimen traceability.

Although the laboratory test itself may have been successfully completed, inadequate identification records frequently delay certification because CSI cannot demonstrate an auditable link between the tested specimen and the manufacturer's production records.

Comprehensive specimen identification requires only a small amount of additional effort during manufacture but can prevent significant delays later in the certification process.

7.6 Preparation Before Testing

Before specimens are dispatched for testing, manufacturers should verify that:

- all required fabrication has been completed;
- product dimensions have been confirmed;
- product markings have been applied where applicable;
- inspection has been completed;
- manufacturing records have been finalised;
- traceability records are complete;
- packaging is suitable to prevent transport damage;
- supporting documentation accompanies the shipment; and
- CSI has confirmed the agreed testing programme.

Careful preparation before dispatch significantly reduces the likelihood of damaged specimens, administrative delays and invalid testing.

7.7 Chapter Summary

Successful product testing begins long before the laboratory commences testing.

Representative specimens, complete traceability, documented manufacturing controls and careful planning provide the foundation for reliable certification evidence.

Manufacturers who invest time in preparing appropriate specimens and supporting documentation generally experience fewer testing delays and a more efficient certification process.

Product testing should therefore be viewed as a planned stage within the overall product certification journey rather than an isolated laboratory activity.

8 Understanding the AS/NZS 2208 Test Programme

8.1 General

The objective of the AS/NZS 2208 test programme is to determine whether a glazing material satisfies the performance requirements necessary to be classified as a safety glazing material for building applications.

Unlike many product Standards, AS/NZS 2208 does not rely upon a single test to demonstrate conformity. Instead, the Standard contains a series of performance assessments that collectively evaluate the safety characteristics, durability and ongoing performance of the glazing product.

The tests applicable to a particular product depend upon the glazing material being evaluated, its construction, manufacturing process and intended application.

Manufacturers should therefore understand the purpose of each test before product development commences.

Successful product certification depends upon selecting the appropriate test programme rather than simply arranging laboratory testing.

8.2 Objectives of the Test Programme

The AS/NZS 2208 test programme has been developed to evaluate several important characteristics of safety glazing materials.

These include:

- resistance to human impact;
- fracture behaviour;
- fragment characteristics;
- interlayer performance;
- durability;
- environmental resistance;
- resistance to deterioration following manufacture; and
- long-term product performance.

Each test contributes to the overall assessment of product conformity.

No individual test should be considered in isolation.

CSI evaluates the complete body of technical evidence when determining product conformity under the PAS-Mark Product Certification Scheme.

8.3 Test Programme Selection

Manufacturers frequently ask:

"Which AS/NZS 2208 tests apply to my product?"

The answer depends upon the glazing material being certified.

Different products require different combinations of testing.

For example:

- Toughened safety glass requires impact testing and fragmentation assessment.
- Laminated safety glass requires impact testing together with durability assessments applicable to laminated constructions.
- Organic-coated products require testing appropriate to their product construction.

- Curved glazing products may require additional assessment to demonstrate conformity of the manufactured product.

Manufacturers should confirm the applicable testing programme with CSI before manufacturing formal test specimens.

Early confirmation avoids unnecessary testing and assists manufacturers in developing realistic certification programmes.

8.4 Type Testing

Type testing establishes the initial technical evidence supporting product certification.

The objective of type testing is to demonstrate that representative products satisfy the applicable requirements of AS/NZS 2208.

Type testing should always be undertaken using specimens representative of routine production.

Products manufactured specifically to optimise laboratory performance, but which cannot be consistently reproduced during production, are not representative of the certified product.

Accordingly, CSI expects manufacturers to submit specimens manufactured using normal production equipment, production personnel and documented manufacturing procedures.

Certification Consideration

Type testing establishes the technical baseline for certification.

Future production will be compared against this baseline during factory assessments, surveillance activities and any future evaluation of product changes.

Manufacturers should therefore ensure that the tested product accurately represents the product intended for ongoing commercial manufacture.

8.5 Witness Testing

In some circumstances, testing may be witnessed by Certification Solutions International rather than undertaken solely within an independent laboratory.

Witness testing provides additional confidence that:

- representative production specimens have been evaluated;
- testing has been conducted in accordance with the agreed programme;
- specimen identification has been maintained;
- traceability has been preserved; and
- certification evidence accurately represents the product submitted for certification.

Witness testing does not automatically replace the need for testing by an appropriately accredited laboratory where accreditation is required by the certification scheme or the applicable Standard.

The purpose and status of witness testing should therefore be agreed before testing commences.

CSi Technical Insight

Witness testing should never be viewed as simply observing laboratory activities.

It provides manufacturers with an opportunity to discuss technical issues, clarify certification requirements and confirm that the evidence being generated will be suitable for product certification.

Early technical engagement during testing frequently avoids delays that might otherwise occur during the certification review process.

8.6 Relationship Between Testing and Certification

Manufacturers occasionally assume that a successful laboratory report automatically results in certification.

This is not the case.

Within the CSi PAS-Mark Product Certification Scheme, laboratory testing forms only one component of the overall conformity assessment process.

Certification decisions are based upon the collective evaluation of:

- product design;
- applicable Standards;
- laboratory testing;
- manufacturing controls;
- Product Quality Plans;
- factory assessment findings;
- production traceability;
- corrective action processes;
- surveillance requirements; and
- all supporting certification evidence.

Testing demonstrates product performance.

Certification demonstrates continuing confidence that the manufacturer can consistently reproduce that performance throughout the certification period.

8.7 Chapter Summary

The AS/NZS 2208 test programme provides the technical evidence necessary to demonstrate the performance of safety glazing materials.

Successful certification depends not only upon selecting the correct tests but also upon ensuring that representative specimens, appropriate manufacturing controls and complete certification evidence support the testing programme.

Manufacturers who understand the relationship between testing and certification are better positioned to achieve efficient product certification and maintain ongoing compliance under the CSi PAS-Mark Product Certification Scheme.

9. Laminated Safety Glass – Impact Test

9.0 Technical Information

Item	Details
Applicable Standard	AS/NZS 2208:2023 – <i>Safety Glazing Materials in Buildings</i>
Applicable Test Method	Appendix D – Impact Test
Applicable Products	Laminated Safety Glass and Toughened Laminated Safety Glass (where applicable).
Purpose of the Test	To verify that laminated safety glazing materials satisfy the human impact performance requirements of AS/NZS 2208.
Primary Evidence	Certification Product conformity evidence supporting certification under the CSi PAS-Mark Product Certification Scheme.

9.1 General

The Laminated Safety Glass Impact Test specified within Appendix D of AS/NZS 2208 is undertaken to determine whether a laminated safety glazing construction satisfies the human impact safety performance requirements necessary for classification as a Grade A Safety Glazing Material.

Unlike ordinary annealed glass, laminated safety glass is designed to retain fractured glass fragments within the polymer interlayer following accidental human impact. The objective of the assessment is therefore not simply to determine whether the glazing fractures, but to evaluate the behaviour of the complete laminated glazing construction after impact.

For manufacturers seeking certification under the CSi PAS-Mark Product Certification Scheme, successful completion of the impact test forms one component of the technical evidence supporting certification.

The impact test should never be considered in isolation. CSi evaluates the complete body of certification evidence, including product design, manufacturing controls, production quality management, traceability, factory assessment and ongoing surveillance before determining product conformity.

9.2 Manufacturer Submission Requirements

Before CSi schedules impact testing, sufficient technical information should be submitted to enable the proposed certification programme to be reviewed.

Depending upon the glazing construction and certification scope, manufacturers should normally provide:

- Product specification.

- Product drawings.
- Glazing construction details.
- Glass type and thickness.
- Interlayer manufacturer.
- Interlayer product designation.
- Interlayer thickness.
- Manufacturing location.
- Product Quality Plan.
- Manufacturing procedures.
- Production traceability procedures.
- Calibration records.
- Previous testing (where applicable).
- Proposed certification scope.

Providing complete information before testing enables CSI to confirm that the proposed assessment programme is appropriate and that the resulting evidence will be suitable for certification.

9.3 Objective of the Laminated Safety Glass Impact Test

The objective of the Laminated Safety Glass Impact Test is to demonstrate that the complete laminated glazing construction satisfies the impact safety requirements specified within AS/NZS 2208.

The assessment confirms that the glazing construction reduces the likelihood of serious injury following accidental human impact through the combined performance of:

- the glass plies;
- the laminated interlayer; and
- the manufacturing process used to produce the finished glazing product.

Manufacturers should recognise that the complete glazing construction is evaluated rather than the individual materials incorporated within that construction.

Consequently, impact performance may be influenced by:

- Glass type.
- Glass thickness.
- Number of glass plies.
- Glass quality.

- Interlayer manufacturer.
- Interlayer product.
- Interlayer thickness.
- Lamination process.
- Bond integrity.
- Edge quality.
- Manufacturing consistency.

Changes to any of these characteristics may influence product performance and may require additional technical assessment before the certification evidence can be extended to the revised glazing construction.

9.4 Representative Test Specimens

The validity of any impact test depends upon the use of representative production specimens.

All specimens submitted for certification testing should be manufactured using the same:

- manufacturing equipment;
- production materials;
- manufacturing procedures;
- production personnel;
- inspection procedures; and
- production controls

that will be used during routine commercial manufacture.

Specimens specially prepared to improve laboratory performance, but which cannot be consistently reproduced during production, should not be submitted as certification evidence.

CSi may request additional information where there is evidence that submitted specimens are not representative of normal production.

9.5 Preparation Before Testing

Prior to dispatch for testing, manufacturers should confirm that:

- the glazing construction complies with the approved product specification;
- all fabrication operations have been completed;
- product dimensions comply with the applicable requirements;
- edge finishing has been completed;

- specimens have been visually inspected;
- specimen identification has been permanently applied;
- production records have been completed;
- traceability has been verified;
- packaging adequately protects the specimens during transport; and
- all supporting documentation accompanies the test specimens.

Careful preparation before testing significantly reduces delays and improves confidence in the resulting certification evidence.

9.6 Test Equipment

Impact testing should only be undertaken using equipment complying with the requirements of Appendix D of AS/NZS 2208.

Manufacturers should ensure that all equipment used during testing is maintained in a condition capable of producing reliable and repeatable results.

Prior to testing, the following should be verified where applicable:

- equipment identification;
- equipment condition;
- calibration status;
- maintenance records;
- environmental conditions; and
- suitability for the proposed testing programme.

Evidence demonstrating the calibration and maintenance of critical equipment should be retained as part of the supporting certification records.

9.7 Conducting the Test

The Laminated Safety Glass Impact Test shall be conducted in accordance with the requirements of Appendix D of AS/NZS 2208.

This Technical Guidance does not replace the Standard or reproduce the prescribed test method.

During testing, manufacturers should ensure that:

- specimen identification is maintained;
- the agreed testing programme is followed;

- observations are accurately recorded;
- photographs are taken before and after testing;
- unexpected events are documented;
- damaged specimens are identified;
- deviations from the agreed programme are recorded; and
- all testing records remain fully traceable to the production batch.

Where testing is witnessed by CSI, any deviation that may affect the validity of the certification evidence should be discussed before testing continues.

9.8 Recording Test Results

Accurate test records are essential for product certification.

The test record should enable CSI to demonstrate complete traceability between the manufactured product, the test specimens and the certification evidence.

Where appropriate, the test record should include:

- specimen identification;
- product designation;
- glazing construction;
- production batch;
- manufacturing date;
- test date;
- testing location;
- equipment identification;
- environmental conditions;
- operator;
- CSI witness (where applicable);
- observations;
- photographs;
- test outcome; and
- supporting comments.

All records should be retained in accordance with the manufacturer's documented record retention procedures and the requirements of the CSI PAS-Mark Product Certification Scheme.

9.9 Common Causes of Failure

Experience gained during certification assessments indicates that unsuccessful impact testing is more commonly associated with deficiencies in manufacturing or specimen preparation than deficiencies in the Standard itself.

Common causes include:

- incorrect glazing construction;
- poor edge preparation;
- inadequate lamination;
- contamination within the laminate;
- incorrect interlayer selection;
- poor bond integrity;
- dimensional variation;
- inadequate specimen identification;
- incomplete production records; and
- non-representative production specimens.

Manufacturers who maintain effective production controls generally experience fewer testing failures and more efficient certification outcomes.

9.10 Acceptance Criteria

The acceptance criteria applicable to the Laminated Safety Glass Impact Test are specified within Appendix D of AS/NZS 2208.

Manufacturers should obtain and apply the current published edition of the Standard when preparing products for testing.

During certification, CSI evaluates the complete body of technical evidence to confirm that the tested glazing construction satisfies the applicable acceptance criteria together with all other requirements of the CSI PAS-Mark Product Certification Scheme.

Certification Consideration

Successful completion of the Laminated Safety Glass Impact Test establishes certification evidence only for the glazing construction actually evaluated.

Manufacturers should not assume that changes to:

- glass type;
- glass thickness;

- glazing construction;
- interlayer composition;
- interlayer manufacturer;
- interlayer thickness;
- manufacturing process; or
- manufacturing location

remain covered by the original certification evidence.

Where changes are proposed, manufacturers should consult CSI before implementing those changes to determine whether additional technical assessment or testing is required to maintain certification.

CSI Technical Insight

The majority of certification delays experienced by CSI are not caused by failure of the impact test itself.

More commonly, delays result from incomplete technical documentation, inadequate production traceability, poor specimen preparation or changes to the glazing construction after testing has been completed.

Manufacturers who engage with CSI during product development and maintain comprehensive production records generally achieve certification more efficiently and reduce unnecessary testing costs.

9.11 Chapter Summary

The Laminated Safety Glass Impact Test provides one of the principal assessments used to demonstrate the human impact performance of laminated safety glazing materials.

Reliable certification evidence depends upon representative production specimens, controlled manufacturing processes, accurate test records and complete technical documentation.

Manufacturers who prepare thoroughly, maintain effective production controls and work closely with CSI throughout the certification process are better positioned to achieve certification efficiently and maintain ongoing compliance with the CSI PAS-Mark Product Certification Scheme.

10 Laminated Safety Glass – Boil Test

10.0 Technical Information

Item	Details
Applicable Standard	AS/NZS 2208:2023 – <i>Safety Glazing Materials in Buildings</i>
Applicable Test Method	Appendix F – Laminated Safety Glass Boil Test (<i>confirm Appendix designation during final verification</i>)
Applicable Products	Laminated Safety Glass and Toughened Laminated Safety Glass (where applicable).

Item	Details
Purpose of the Test	To evaluate the durability of the laminated glazing construction and the long-term adhesion between the glass plies and the laminated interlayer following exposure to elevated temperature and water.
Primary Evidence	Certification Product durability evidence supporting certification under the CSi PAS-Mark Product Certification Scheme.

10.1 General

The Laminated Safety Glass Boil Test specified within **Appendix F of AS/NZS 2208** is undertaken to assess the durability of laminated safety glazing materials by evaluating the integrity of the bond between the glass plies and the laminated interlayer following exposure to elevated temperature and water.

Unlike the Laminated Safety Glass Impact Test, which evaluates the behaviour of the glazing following accidental human impact, the Boil Test assesses the long-term durability of the laminated construction and its resistance to delamination under severe environmental conditions.

The purpose of the assessment is to provide confidence that the laminated glazing construction will maintain its structural integrity and safety characteristics throughout its intended service life.

For manufacturers seeking certification under the **CSi PAS-Mark Product Certification Scheme**, successful completion of the Boil Test provides one component of the technical evidence demonstrating the long-term durability of the laminated glazing construction.

The Boil Test should not be considered in isolation. CSi evaluates the complete body of certification evidence, including impact performance, manufacturing controls, product quality management, traceability, factory assessment and ongoing surveillance before determining product conformity.

10.2 Manufacturer Submission Requirements

Before CSi schedules the Laminated Safety Glass Boil Test, manufacturers should provide sufficient technical information to enable the proposed certification programme to be reviewed.

Depending upon the glazing construction and the proposed certification scope, manufacturers should normally provide:

- Product specification.
- Product drawings.
- Laminated glazing construction details.
- Glass type and thickness.
- Interlayer manufacturer.
- Interlayer product designation.
- Interlayer thickness.
- Manufacturing location.

- Product Quality Plan.
- Manufacturing procedures.
- Lamination process details.
- Production traceability procedures.
- Calibration records.
- Previous durability testing (where applicable).
- Proposed certification scope.

Providing complete technical information enables CSI to confirm that the proposed assessment programme is appropriate and that the resulting test evidence will be suitable for certification.

10.3 Objective of the Laminated Safety Glass Boil Test

The objective of the Laminated Safety Glass Boil Test is to verify that the laminated glazing construction maintains satisfactory adhesion between the glass plies and the laminated interlayer after exposure to the conditioning regime specified by AS/NZS 2208.

The assessment confirms that the laminated glazing construction possesses adequate durability to resist deterioration that could compromise product safety or performance during normal service.

Manufacturers should recognise that the Boil Test evaluates the complete laminated glazing construction rather than the individual materials incorporated within that construction.

Consequently, product durability may be influenced by:

- Glass type.
- Glass thickness.
- Interlayer manufacturer.
- Interlayer product.
- Interlayer thickness.
- Lamination process.
- Autoclave process.
- Bond integrity.
- Surface cleanliness.
- Moisture control.
- Manufacturing consistency.

Changes to any of these characteristics may influence product durability and may require additional technical assessment before the existing certification evidence can be extended to the revised glazing construction.

10.4 Representative Test Specimens

The validity of the Boil Test depends upon the use of representative production specimens.

All specimens submitted for certification testing should be manufactured using the same:

- production equipment;
- lamination process;
- production materials;
- manufacturing procedures;
- production personnel;
- inspection procedures; and
- production controls

that will be used during routine commercial manufacture.

Specimens specially manufactured to optimise laboratory performance, but which cannot be consistently reproduced during routine production, should not be submitted as certification evidence.

CSI may request additional information where there is evidence that submitted specimens are not representative of routine production.

10.5 Preparation Before Testing

Prior to dispatch for testing, manufacturers should verify that:

- the laminated glazing construction complies with the approved product specification;
- all fabrication operations have been completed;
- lamination has been completed in accordance with approved production procedures;
- specimens have been visually inspected;
- specimen identification has been permanently applied;
- production records have been completed;
- traceability has been verified;
- packaging adequately protects the specimens during transport; and
- all supporting documentation accompanies the test specimens.

Careful preparation before testing significantly improves testing efficiency and confidence in the resulting certification evidence.

10.6 Test Equipment

The Laminated Safety Glass Boil Test should only be undertaken using equipment complying with the requirements of Appendix F of AS/NZS 2208.

Manufacturers should ensure that all equipment used during testing is maintained in a condition capable of producing reliable and repeatable results.

Prior to testing, the following should be verified where applicable:

- equipment identification;
- calibration status;
- maintenance records;
- temperature monitoring equipment;
- timing equipment;
- environmental monitoring equipment; and
- suitability for the proposed testing programme.

Evidence demonstrating the calibration and maintenance of critical equipment should be retained as supporting certification evidence.

10.7 Conducting the Test

The Laminated Safety Glass Boil Test shall be conducted in accordance with the requirements of Appendix F of AS/NZS 2208.

This Technical Guidance does not replace the Standard or reproduce the prescribed test method.

During testing, manufacturers should ensure that:

- specimen identification is maintained;
- the agreed testing programme is followed;
- conditioning times are accurately recorded;
- temperatures are monitored;
- observations are documented;
- photographs are taken before and after testing;
- unexpected events are recorded;
- any visible deterioration is documented; and
- all records remain fully traceable to the production batch.

Where testing is witnessed by CSI, any deviation that may affect the validity of the certification evidence should be discussed before testing proceeds.

10.8 Recording Test Results

Accurate test records are essential for product certification.

The test record should enable CSI to demonstrate complete traceability between the manufactured product, the test specimens and the certification evidence.

Where appropriate, the test record should include:

- specimen identification;
- glazing construction;
- production batch;
- manufacturing date;
- test date;
- testing location;
- equipment identification;
- conditioning details;
- operator;
- CSI witness (where applicable);
- observations;
- photographs;
- evidence of delamination (if observed);
- test outcome; and
- supporting comments.

All records should be retained in accordance with the manufacturer's documented record retention procedures and the requirements of the CSI PAS-Mark Product Certification Scheme.

10.9 Common Causes of Failure

Experience gained during certification assessments indicates that unsatisfactory Boil Test performance is commonly associated with deficiencies in manufacturing rather than deficiencies within the Standard.

Common causes include:

- inadequate glass cleaning;
- contamination prior to lamination;
- incorrect interlayer storage;
- moisture contamination;
- poor lamination practices;
- incorrect autoclave parameters;

- inadequate bond formation;
- edge contamination;
- inconsistent production controls; and
- non-representative production specimens.

Manufacturers maintaining effective production controls generally experience more consistent durability performance and more efficient **certification outcomes**.

10.10 Acceptance Criteria

The acceptance criteria applicable to the Laminated Safety Glass Boil Test are specified within **Appendix F of AS/NZS 2208**.

Manufacturers should obtain and apply the current published edition of the Standard when preparing products for testing.

During certification, CSI evaluates the complete body of technical evidence to confirm that the tested glazing construction satisfies the applicable acceptance criteria together with all other requirements of the CSI PAS-Mark Product Certification Scheme.

Certification Consideration

Successful completion of the Laminated Safety Glass Boil Test establishes certification evidence only for the glazing construction actually evaluated.

Manufacturers should not assume that changes to:

- glass type;
- glass thickness;
- glazing construction;
- interlayer manufacturer;
- interlayer product;
- interlayer thickness;
- lamination process; or
- manufacturing location

remain covered by the original certification evidence.

Where product changes are proposed, manufacturers should consult CSI before implementing those changes to determine whether additional technical assessment or testing is required to maintain certification.

CSi Technical Insight

The Boil Test is one of the most effective methods of identifying deficiencies in the lamination process that may not be visible during routine production inspection.

Manufacturers who maintain effective control of glass preparation, interlayer handling, lamination parameters and autoclave processing generally achieve more consistent durability performance and experience fewer certification delays.

10.11 Chapter Summary

The Laminated Safety Glass Boil Test provides important evidence demonstrating the long-term durability of laminated safety glazing materials.

Reliable certification evidence depends upon representative production specimens, controlled lamination processes, accurate test records and complete technical documentation.

Manufacturers who maintain disciplined manufacturing controls, effective Product Quality Plans and close communication with CSi throughout the certification process are better positioned to achieve certification efficiently and maintain ongoing compliance under the CSi PAS-Mark Product Certification Scheme.

11 Toughened Safety Glass – Fragmentation Test

11.0 Technical Information

Item	Details
Applicable Standard	AS/NZS 2208:2023 – <i>Safety Glazing Materials in Buildings</i>
Applicable Test Method	Appendix E – Fragmentation Test – Flat Glass
Applicable Products	Thermally Toughened Safety Glass (Flat Glass).
Purpose of the Test	To verify that thermally toughened safety glass fractures into the characteristic particle size and distribution required by AS/NZS 2208.
Primary Evidence	Certification Product conformity evidence supporting certification under the CSi PAS-Mark Product Certification Scheme.

11.1 General

The Fragmentation Test specified in **Appendix E of AS/NZS 2208** is undertaken to verify that thermally toughened safety glass exhibits the characteristic fracture pattern required for classification as a safety glazing material.

Unlike laminated safety glass, which relies upon an interlayer to retain fractured glass, thermally toughened safety glass achieves its safety performance by fracturing into a large number of relatively small particles that significantly reduce the likelihood of serious injury following breakage.

The Fragmentation Test is therefore one of the principal assessments used to confirm that the thermal toughening process has been successfully completed and that the resulting fracture pattern satisfies the requirements of AS/NZS 2208.

For manufacturers seeking certification under the CSI PAS-Mark Product Certification Scheme, successful completion of the Fragmentation Test forms an essential component of the technical evidence supporting product certification.

11.2 Manufacturer Submission Requirements

Before CSI schedules Fragmentation Testing, manufacturers should provide sufficient technical information to enable the proposed certification programme to be reviewed.

Depending upon the product and the proposed certification scope, manufacturers should normally provide:

- Product specification.
- Product drawings.
- Glass type.
- Glass thickness.
- Nominal dimensions.
- Toughening furnace identification.
- Manufacturing location.
- Product Quality Plan.
- Toughening process procedures.
- Production traceability procedures.
- Calibration records.
- Previous testing (where applicable).
- Proposed certification scope.

Providing complete technical information enables CSI to confirm that the proposed testing programme is appropriate and that the resulting evidence will support certification.

11.3 Objective of the Fragmentation Test

The objective of the Fragmentation Test is to verify that thermally toughened safety glass fractures in the characteristic manner required by AS/NZS 2208.

The assessment confirms that the toughening process has developed the required internal stress profile so that, when fractured, the glass disintegrates into the particle distribution specified by the Standard.

The Fragmentation Test therefore provides confidence that the product has been correctly heat treated and is capable of providing the expected level of safety performance following accidental breakage.

Manufacturers should recognise that the test evaluates the completed thermally toughened product rather than the original annealed glass.

Consequently, the results may be influenced by:

- Glass type.
- Glass thickness.
- Furnace operating parameters.
- Heating cycle.
- Cooling cycle.
- Furnace maintenance.
- Roller condition.
- Glass quality.
- Edge preparation.
- Manufacturing consistency.

11.3.1 Verification of Surface Compression

The fragmentation characteristics of thermally toughened safety glass are directly related to the level of surface compression developed during the thermal toughening process.

For this reason, manufacturers should not rely solely on fragmentation testing to verify the effectiveness of the toughening process. CSI recommends that manufacturers establish routine verification of surface compression as part of their Production Quality Plan to provide ongoing confidence that the toughening furnace is operating within validated process parameters.

Manufacturers producing thermally toughened safety glass and heat-strengthened glass should have access to suitable optical surface compression measuring equipment capable of accurately measuring surface compression in accordance with the requirements of AS/NZS 2208. Routine measurement of surface compression provides valuable process information, assists in identifying furnace variations before they affect production quality and supports ongoing process validation between formal certification assessments.

Surface compression is commonly measured using optical stress measurement equipment specifically designed for thermally processed glass. Manufacturers should ensure that the selected equipment is suitable for the glass thicknesses being produced and is maintained and calibrated in accordance with the manufacturer's recommendations.

Typical optical stress measurement equipment is capable of measuring both surface compression and case depth, providing manufacturers with valuable information regarding furnace performance and process consistency. Routine monitoring of these parameters assists manufacturers in identifying process variation before product conformity is affected.

AS/NZS 2208 specifies the minimum and maximum surface compression values applicable to thermally toughened safety glass and heat-strengthened glass. Manufacturers should establish routine monitoring to verify that production consistently remains within the specified surface compression range and maintain records demonstrating ongoing process control.

Surface compression measurements should be undertaken using recognised equipment appropriate for the glass thickness and product type being manufactured. Calibration and verification records for the measuring equipment should be maintained and be available during CSI factory assessments and surveillance activities.

Routine monitoring of surface compression should form part of the manufacturer's documented Production Quality Plan together with defined acceptance criteria, sampling frequencies and actions to be taken where results fall outside the validated operating range.

CSi Recommendation

Certification Solutions International strongly recommends that manufacturers verify surface compression as part of routine production quality control rather than relying solely on fragmentation testing. Routine surface compression monitoring provides early indication of furnace variation, reduces the risk of non-conforming product and supports ongoing compliance with the CSi PAS-Mark Product Certification Scheme.

11.3.2 Heat-Strengthened Glass

Heat-strengthened glass is manufactured using a thermal process similar to thermally toughened safety glass but is cooled at a slower rate, resulting in lower surface compression and lower residual tensile stresses.

The fracture characteristics of heat-strengthened glass differ significantly from those of thermally toughened safety glass. When fractured, heat-strengthened glass typically breaks into larger fragments than thermally toughened safety glass and does not exhibit the characteristic fragmentation pattern required for classification as a thermally toughened safety glazing material.

Manufacturers should therefore recognise that heat-strengthened glass is **not** equivalent to thermally toughened safety glass and should not be represented as such unless the applicable product requirements and supporting certification evidence demonstrate compliance with the relevant Standard.

Heat-strengthened glass is commonly selected where increased resistance to thermal stress is required while maintaining improved optical quality and reducing the likelihood of spontaneous breakage when compared with fully toughened safety glass. Designers, specifiers and manufacturers should ensure that heat-strengthened glass is only specified where permitted by the applicable Building Code, referenced Standards and the project specification.

Manufacturers proposing to certify heat-strengthened products should discuss the proposed certification programme with CSi before testing commences to determine the applicable assessment requirements.

11.3.3 Heat-Soaked Thermally Toughened Safety Glass

Heat-soaking is an additional post-toughening process applied to thermally toughened safety glass to reduce the likelihood of spontaneous breakage associated with **nickel sulphide (NiS) inclusions**.

In Australia and New Zealand, heat-soaking is generally undertaken in accordance with **EN 14179-1 – Glass in Building – Heat Soaked Thermally Toughened Safety Glass – Part 1: Definition and Description**. This Standard specifies the heat-soak process, equipment requirements and operating parameters intended to minimise the risk of in-service spontaneous breakage resulting from unstable nickel sulphide inclusions.

During the heat-soak process, thermally toughened safety glass is subjected to a controlled heating cycle in a purpose-designed heat-soak furnace. The process is intended to encourage fracture of glass containing unstable nickel sulphide inclusions before the product is released for installation, thereby reducing the likelihood of spontaneous breakage in service.

Manufacturers should recognise that **heat-soaking is not a substitute for the thermal toughening process** and does not alter the fragmentation characteristics or performance requirements specified by **AS/NZS 2208**. Compliance with AS/NZS 2208 must first be demonstrated through the applicable testing programme before heat-soaking is considered as an additional manufacturing process.

Manufacturers should also recognise that heat-soaking is generally specified as a project, contract or client requirement rather than as a mandatory requirement of AS/NZS 2208. The decision to heat-soak thermally toughened safety glass should therefore be based upon the project specification, risk assessment and the requirements of the building designer, engineer or client.

The purpose of heat-soaking is to provide an additional level of confidence in the long-term reliability of thermally toughened safety glass by reducing the probability of spontaneous breakage after installation. While heat-soaking significantly reduces the probability of spontaneous breakage resulting from nickel sulphide inclusions, no heat-soak process can guarantee the complete elimination of all nickel sulphide inclusions. Manufacturers should therefore avoid representing heat-soaked thermally toughened safety glass as being free from the possibility of spontaneous breakage.

Where heat-soaked thermally toughened safety glass forms part of the proposed certification scope, manufacturers should implement documented procedures consistent with **EN 14179-1** and maintain records demonstrating effective process control. These records should normally include:

- identification of the heat-soak furnace;
- heat-soak process parameters;
- furnace calibration and maintenance records;
- production batch identification;
- product traceability;
- loading configurations;
- heat-soak cycle records;
- inspection and release records; and
- identification of any breakages occurring during the heat-soak process.

Where applicable, CSI may review these records during factory assessments and ongoing surveillance activities to verify that the heat-soaking process remains effectively controlled and consistently applied as part of the manufacturer's Production Quality Plan.

CSI Technical Insight

Heat-soaking should be regarded as an additional quality assurance process rather than a replacement for effective furnace control. Manufacturers who consistently achieve compliant surface compression, maintain stable furnace operating parameters and implement heat-soaking in accordance with EN 14179-1 generally experience lower rates of spontaneous breakage and greater confidence in long-term product performance.

11.4 Representative Test Specimens

Representative production specimens are essential to the validity of the Fragmentation Test.

Specimens submitted for certification should be manufactured using:

- normal production equipment;
- routine production personnel;
- documented production procedures;
- approved raw materials;
- normal inspection processes; and

- routine production controls.

Specimens should represent normal commercial production and should not be specially manufactured solely for certification purposes.

Where CSI considers that submitted specimens are not representative of production, additional information or further testing may be requested.

11.5 Preparation Before Testing

Before testing commences, manufacturers should verify that:

- the product complies with the approved specification;
- all fabrication operations were completed prior to toughening;
- specimen identification is permanently applied;
- production records are complete;
- traceability has been verified;
- dimensions have been confirmed;
- the glass has been visually inspected; and
- all supporting documentation accompanies the specimens.

Proper preparation assists in ensuring the validity of the certification evidence and reduces delays during assessment.

11.6 Test Equipment

The Fragmentation Test shall be undertaken using equipment complying with **Appendix E of AS/NZS 2208**.

Manufacturers should ensure that all measuring and test equipment is appropriately maintained, calibrated and suitable for the proposed testing programme.

Evidence demonstrating equipment calibration and maintenance should be retained as part of the supporting certification records.

11.7 Conducting the Test

The Fragmentation Test shall be conducted strictly in accordance with **Appendix E of AS/NZS 2208**.

This Technical Guidance explains the certification process but does not reproduce the prescribed test method.

Throughout the assessment, manufacturers should ensure that:

- specimen identification is maintained;
- the agreed testing programme is followed;
- observations are recorded;
- photographs are taken following fracture;
- any deviations are documented; and

- complete traceability is maintained between the specimen and the production records.

11.8 Recording Test Results

Complete test records should be maintained to demonstrate traceability between the manufactured product and the certification evidence.

Records should include, where appropriate:

- specimen identification;
- production batch;
- manufacturing date;
- glass thickness;
- test date;
- testing location;
- equipment identification;
- operator;
- CSI witness (where applicable);
- observations;
- photographs;
- fragmentation assessment; and
- test outcome.

11.9 Common Causes of Failure

Experience gained during certification assessments indicates that unsatisfactory Fragmentation Test results are commonly associated with:

- incorrect furnace temperatures;
- inadequate quenching;
- poor furnace maintenance;
- roller distortion;
- inconsistent heating cycles;
- unsuitable edge preparation;
- glass defects;
- production variation; and
- inadequate process control.

Effective control of the thermal toughening process significantly improves production consistency and certification outcomes.

11.10 Acceptance Criteria

The acceptance criteria applicable to the Fragmentation Test are specified within **Appendix E of AS/NZS 2208**.

Manufacturers should apply the current published edition of the Standard when preparing products for testing.

During certification, CSi evaluates the complete body of technical evidence to confirm that the product satisfies the applicable acceptance criteria together with all other requirements of the CSi PAS-Mark Product Certification Scheme.

Certification Consideration

Successful completion of the Fragmentation Test establishes certification evidence only for the thermally toughened glazing construction actually evaluated.

Changes to:

- glass type;
- glass thickness;
- furnace process;
- manufacturing location;
- production controls; or
- other characteristics influencing fragmentation performance

should be reviewed by CSi before implementation to determine whether further assessment or testing is necessary to maintain certification.

CSi Technical Insight

The Fragmentation Test provides one of the clearest indicators of the consistency of the thermal toughening process.

Manufacturers maintaining disciplined furnace control, documented production procedures and effective process monitoring generally achieve more consistent fragmentation performance, reduced production variability and greater confidence during certification and surveillance activities.

11.11 Chapter Summary

The Fragmentation Test provides essential evidence demonstrating that thermally toughened safety glass exhibits the fracture characteristics required by AS/NZS 2208.

Successful certification depends upon representative production specimens, consistent thermal processing, complete production records and reliable test evidence.

Manufacturers who maintain effective furnace control, robust production procedures and close communication with CSi are better positioned to achieve and maintain certification under the CSi PAS-Mark Product Certification Scheme.

12 Organic-Coated Safety Glass – Weathering Test

12.0 Technical Information

Item	Details
Applicable Standard	AS/NZS 2208:2023 – <i>Safety Glazing Materials in Buildings</i>
Applicable Test Method	Appendix G – Weathering Test
Applicable Products	Organic-Coated Safety Glass and other glazing products where Appendix G is applicable.
Purpose of the Test	To evaluate the long-term durability of the organic coating following exposure to accelerated weathering conditions specified by AS/NZS 2208.
Primary Evidence	Certification Evidence demonstrating that the organic coating maintains its performance characteristics following accelerated weathering.

12.1 General

Organic-coated safety glass achieves its safety performance through the application of a durable polymer coating to one or more glass surfaces. Following fracture, the coating assists in retaining fractured glass fragments, thereby reducing the likelihood of injury and contributing to the residual safety performance of the glazing.

Unlike thermally toughened or laminated safety glass, the long-term performance of organic-coated safety glass is highly dependent upon the durability of the applied coating. Exposure to ultraviolet radiation, moisture, temperature variation and environmental contaminants may influence coating adhesion, flexibility, appearance and long-term performance.

The long-term performance of organic-coated safety glass is heavily dependent upon the quality of the coating process. Surface preparation, coating formulation, application technique, coating thickness, curing conditions and environmental control during manufacture all influence the finished product. Manufacturers should recognise that deficiencies in any of these stages may not become evident until the product is subjected to accelerated weathering or enters service.

For this reason, AS/NZS 2208 includes the Weathering Test specified in **Appendix G** to assess the ability of the coating system to maintain its performance following accelerated environmental exposure.

Manufacturers seeking certification under the CSi PAS-Mark Product Certification Scheme should recognise that the Weathering Test forms only one component of the overall certification programme. Product certification also requires evaluation of manufacturing controls, coating application procedures, production quality management, factory assessment and ongoing surveillance activities.

12.2 Manufacturer Submission Requirements

Before CSi schedules Weathering Testing, manufacturers should provide sufficient technical information to enable the proposed certification programme to be reviewed.

Depending upon the product and certification scope, manufacturers should normally provide:

- Product specification.

- Product drawings.
- Glass type and thickness.
- Organic coating specification.
- Coating manufacturer.
- Coating identification.
- Coating thickness (where applicable).
- Surface preparation procedures.
- Coating application procedures.
- Curing process.
- Manufacturing location.
- Product Quality Plan.
- Production traceability procedures.
- Calibration records.
- Previous weathering test reports (where applicable).
- Proposed certification scope.

Where coating materials are supplied by a third-party manufacturer, CSI may also request the coating manufacturer's technical data sheets, application instructions and evidence demonstrating that the coating is suitable for the intended glazing application.

Providing complete technical information before testing enables CSI to confirm that the proposed assessment programme is appropriate and that the resulting evidence will be suitable for certification.

12.3 Objective of the Weathering Test

The objective of the Weathering Test is to verify that the organic coating continues to provide satisfactory performance following exposure to the accelerated weathering conditions specified within Appendix G of AS/NZS 2208.

The assessment evaluates the long-term durability of the coating system and provides confidence that environmental exposure will not significantly reduce the coating's contribution to the safety performance of the glazing.

Manufacturers should recognise that the Weathering Test evaluates the complete coated glazing product rather than the coating material in isolation.

Accordingly, long-term performance may be influenced by:

- Glass type.
- Glass surface preparation.
- Coating formulation.

- Coating manufacturer.
- Coating thickness.
- Application method.
- Curing conditions.
- Environmental contamination.
- Production consistency.
- Manufacturing controls.

Changes to any of these characteristics may influence product performance and may require additional technical assessment before the certification evidence can be extended to the revised glazing construction.

12.4 Representative Test Specimens

Representative production specimens are fundamental to the validity of the Weathering Test.

All specimens submitted for certification testing should be manufactured using:

- normal production equipment;
- routine coating materials;
- documented coating application procedures;
- routine production personnel;
- approved curing processes; and
- normal production controls.

Specimens should accurately represent routine commercial manufacture and should not receive special preparation intended solely to improve laboratory performance.

Where CSI determines that submitted specimens are not representative of routine production, additional assessment or testing may be required before certification proceeds.

12.5 Preparation Before Testing

Before specimens are released for Weathering Testing, manufacturers should verify that:

- the glazing complies with the approved product specification;
- surface preparation has been completed in accordance with documented procedures;
- the coating has been correctly applied;
- curing has been completed;
- specimens have been visually inspected;
- specimen identification has been permanently applied;

- production records have been completed;
- traceability has been verified;
- packaging protects the coated surface during transport; and
- all supporting documentation accompanies the test specimens.

Appropriate preparation before testing significantly improves confidence in the resulting certification evidence and reduces unnecessary delays during the certification process.

12.6 Test Equipment

The Weathering Test shall be undertaken using equipment complying with the requirements of **Appendix G of AS/NZS 2208**.

Manufacturers should ensure that all test equipment is capable of maintaining the environmental conditions specified by the Standard throughout the duration of the test programme.

The reliability of the Weathering Test is directly dependent upon the accuracy and stability of the environmental exposure equipment. Inaccurate control of ultraviolet radiation, temperature, humidity or water spray cycles may invalidate the test results and compromise the certification evidence.

Manufacturers should also ensure that the weathering chamber is routinely verified to provide uniform exposure conditions throughout the test area. Uneven ultraviolet exposure, temperature variation or inconsistent water spray distribution may produce misleading test results that do not accurately represent product performance.

Prior to testing, manufacturers should verify, where applicable:

- equipment identification;
- calibration status;
- preventive maintenance records;
- ultraviolet light source performance;
- irradiance monitoring equipment;
- temperature monitoring equipment;
- humidity monitoring equipment;
- exposure cycle timers; and
- suitability of the equipment for the proposed testing programme.

Calibration and maintenance records should be retained as part of the supporting certification evidence and be available for review during CSI factory assessments and surveillance activities.

12.7 Conducting the Weathering Test

The Weathering Test shall be conducted strictly in accordance with **Appendix G of AS/NZS 2208**.

This Technical Guidance explains the certification process but does not reproduce the prescribed laboratory procedure specified within the Standard.

Throughout the weathering programme manufacturers should ensure that:

- specimen identification is maintained throughout the exposure period;
- the approved test programme is followed;
- exposure conditions are continuously monitored;
- any interruptions to the exposure cycle are recorded;
- observations are documented throughout the test programme;
- photographs are taken before and after exposure;
- any deterioration of the coating is recorded; and
- complete traceability is maintained between the test specimens, production records and certification evidence.

Where Weathering Testing is witnessed by CSI, any deviation that may affect the validity of the certification evidence should be discussed before testing continues.

12.8 Recording Test Results

Accurate and complete records are essential to demonstrate the validity of the Weathering Test and to support ongoing product certification.

Test records should enable CSI to demonstrate complete traceability between the manufactured product, the test specimens and the resulting certification evidence.

Where applicable, the test record should include:

- specimen identification;
- glazing construction;
- coating identification;
- coating batch number;
- manufacturing date;
- test commencement date;
- completion date;
- exposure equipment identification;
- environmental exposure conditions;
- operator identification;
- CSI witness (where applicable);
- observations recorded during exposure;

- photographic records;
- evidence of coating deterioration (where observed);
- final assessment; and
- supporting comments.

All records should be retained in accordance with the manufacturer's documented record retention procedures and the requirements of the CSI PAS-Mark Product Certification Scheme.

12.9 Common Causes of Failure

Experience gained during certification assessments indicates that unsatisfactory Weathering Test results are most commonly associated with deficiencies in the coating application process rather than deficiencies within the Standard itself.

Common causes include:

- inadequate surface preparation;
- contamination prior to coating application;
- incorrect coating thickness;
- incorrect curing conditions;
- poor adhesion between the coating and the glass surface;
- unsuitable coating materials;
- inconsistent application methods;
- inadequate environmental controls during manufacture;
- poor production quality control; and
- non-representative production specimens.

Experience has shown that many weathering failures originate during the coating application process rather than during the weathering test itself. Effective control of surface preparation, coating application and curing conditions significantly improves long-term product performance and reduces certification risk.

Manufacturers maintaining disciplined coating application procedures and effective production controls generally experience more consistent product performance and improved certification outcomes.

12.10 Acceptance Criteria

The acceptance criteria applicable to the Weathering Test are specified within **Appendix G of AS/NZS 2208**.

Manufacturers should obtain and apply the current published edition of the Standard when preparing products for testing.

During certification, CSI evaluates the complete body of technical evidence to confirm that the tested glazing construction satisfies the applicable acceptance criteria together with all other requirements of the CSI PAS-Mark Product Certification Scheme.

Certification Consideration

Successful completion of the Weathering Test establishes certification evidence only for the coated glazing construction actually evaluated.

Manufacturers should not assume that changes to:

- coating manufacturer;
- coating formulation;
- coating thickness;
- application method;
- curing process;
- surface preparation procedures;
- manufacturing location; or
- other characteristics influencing coating durability

remain covered by the original certification evidence.

Where changes are proposed, manufacturers should consult CSI before implementing those changes to determine whether additional technical assessment or testing is necessary to maintain certification.

CSi Technical Insight

The long-term performance of organic-coated safety glass depends upon far more than successful completion of the Weathering Test.

Manufacturers who maintain documented coating application procedures, controlled curing processes, effective production quality control and comprehensive traceability generally achieve significantly more consistent coating performance throughout production.

Experience has shown that investment in process control during manufacture provides greater long-term benefits than relying solely upon final product testing to demonstrate conformity.

CSi Recommendation

Certification Solutions International strongly recommends that manufacturers validate their complete coating application process before submitting products for formal certification testing. Verification of coating thickness, adhesion, curing conditions and environmental controls during routine production significantly improves long-term coating durability and reduces the likelihood of failure during accelerated weathering testing or ongoing surveillance activities.

12.11 Chapter Summary

The Weathering Test provides important evidence demonstrating the long-term durability of organic-coated safety glazing materials following accelerated environmental exposure.

Reliable certification evidence depends upon representative production specimens, controlled coating application processes, calibrated environmental exposure equipment, accurate test records and complete technical documentation.

Manufacturers who establish disciplined coating application procedures, maintain effective production quality control and work closely with CSI throughout the certification process are better positioned to achieve and maintain certification under the CSI PAS-Mark Product Certification Scheme.

13 Organic-Coated Safety Glass – Ageing Test

13.0 Technical Information

Item	Details
Applicable Standard	AS/NZS 2208:2023 – <i>Safety Glazing Materials in Buildings</i>
Applicable Test Method	Appendix H – Ageing Test
Applicable Products	Organic-Coated Safety Glass and other glazing products where Appendix H is applicable.
Purpose of the Test	To assess the long-term performance and stability of the organic coating following accelerated ageing in accordance with AS/NZS 2208.
Primary Evidence	Certification Evidence demonstrating that the glazing product maintains its performance characteristics following accelerated ageing.

13.1 General

The Ageing Test specified within **Appendix H of AS/NZS 2208** is undertaken to assess the long-term stability of organic-coated safety glazing materials following accelerated ageing.

The purpose of the assessment is to provide confidence that the organic coating continues to perform as intended throughout the expected service life of the product and that deterioration resulting from ageing does not adversely affect the safety performance of the glazing.

Unlike the Weathering Test, which evaluates the effects of accelerated environmental exposure, the Ageing Test assesses the ability of the coating system to maintain its integrity following the ageing conditions specified within the Standard.

Manufacturers seeking certification under the CSI PAS-Mark Product Certification Scheme should recognise that the Ageing Test forms one component of the overall conformity assessment programme and should be considered together with all other applicable testing, manufacturing controls and ongoing surveillance requirements.

13.2 Manufacturer Submission Requirements

Before CSI schedules Ageing Testing, manufacturers should provide sufficient technical information to enable the proposed certification programme to be reviewed.

Depending upon the product and certification scope, manufacturers should normally provide:

- Product specification.
- Product drawings.

- Glass type and thickness.
- Organic coating specification.
- Coating manufacturer.
- Coating product identification.
- Coating thickness (where applicable).
- Surface preparation procedures.
- Coating application procedures.
- Curing process.
- Manufacturing location.
- Product Quality Plan.
- Production traceability procedures.
- Calibration records.
- Previous Ageing Test reports (where applicable).
- Proposed certification scope.

Providing complete technical information before testing enables CSI to confirm that the proposed assessment programme is appropriate and that the resulting certification evidence will be suitable for product certification.

13.3 Objective of the Ageing Test

The objective of the Ageing Test is to verify that the organic-coated glazing product maintains satisfactory performance following the accelerated ageing conditions specified within **Appendix H of AS/NZS 2208**.

The assessment provides confidence that the coating system continues to provide the performance necessary to support the classification of the glazing material as a safety glazing product.

Manufacturers should recognise that the assessment evaluates the complete coated glazing product rather than the coating material alone.

Product performance may therefore be influenced by:

- Glass type.
- Glass surface preparation.
- Coating formulation.
- Coating manufacturer.
- Coating thickness.
- Coating application method.

- Curing conditions.
- Manufacturing controls.
- Production consistency.
- Environmental contamination during manufacture.

Changes to any of these characteristics may influence long-term product performance and may require additional technical assessment before existing certification evidence can be extended to the revised product.

13.4 Representative Test Specimens

Representative production specimens are fundamental to the validity of the Ageing Test.

All specimens submitted for certification testing should be manufactured using:

- normal production equipment;
- routine coating materials;
- documented coating application procedures;
- routine production personnel;
- approved curing processes; and
- normal production controls.

Specimens should accurately represent routine commercial manufacture and should not receive special preparation intended solely to improve laboratory performance.

Where CSI determines that submitted specimens are not representative of routine production, additional assessment or testing may be required before certification proceeds.

13.5 Preparation Before Testing

Before specimens are released for Ageing Testing, manufacturers should verify that:

- the glazing complies with the approved product specification;
- surface preparation has been completed in accordance with documented procedures;
- the coating has been correctly applied;
- curing has been completed;
- specimens have been visually inspected;
- specimen identification has been permanently applied;
- production records have been completed;
- traceability has been verified;
- packaging protects the coated surface during transport; and

- all supporting documentation accompanies the test specimens.

Appropriate preparation before testing significantly improves confidence in the resulting certification evidence and reduces unnecessary delays during the certification process.

13.6 Test Equipment

The Ageing Test shall be undertaken using equipment complying with the requirements of **Appendix H of AS/NZS 2208**.

Manufacturers should ensure that all equipment used during the Ageing Test is capable of maintaining the environmental conditions specified by the Standard throughout the complete duration of the test.

The reliability of the Ageing Test depends upon the ability of the ageing equipment to consistently reproduce the specified exposure conditions. Variations in temperature, environmental control or operating parameters may invalidate the test results and reduce confidence in the resulting certification evidence.

Prior to testing, manufacturers should verify, where applicable:

- equipment identification;
- calibration status;
- preventive maintenance records;
- temperature monitoring equipment;
- environmental monitoring equipment;
- exposure timing equipment;
- operating condition verification; and
- suitability of the equipment for the proposed testing programme.

Calibration and maintenance records should be retained as supporting certification evidence and be available during CSI factory assessments and surveillance activities.

13.7 Conducting the Ageing Test

The Ageing Test shall be conducted strictly in accordance with the requirements of **Appendix H of AS/NZS 2208**.

This Technical Guidance explains the certification process but does not reproduce the prescribed laboratory procedure contained within the Standard.

Throughout the ageing programme manufacturers should ensure that:

- specimen identification is maintained throughout the assessment;
- the approved testing programme is followed;
- exposure conditions are monitored and recorded;
- any interruptions to the ageing cycle are documented;
- observations are recorded throughout the programme;

- photographs are taken before and after testing;
- evidence of deterioration is recorded where observed; and
- complete traceability is maintained between the specimens, manufacturing records and certification evidence.

Where Ageing Testing is witnessed by CSI, any deviation that may influence the validity of the certification evidence should be discussed before testing proceeds.

13.8 Recording Test Results

Accurate and complete records are essential to demonstrate the validity of the Ageing Test and to support ongoing product certification.

The test record should enable CSI to demonstrate complete traceability between the manufactured product, the test specimens and the certification evidence.

Where applicable, the test record should include:

- specimen identification;
- glazing construction;
- coating identification;
- coating batch number;
- manufacturing date;
- test commencement date;
- completion date;
- ageing equipment identification;
- ageing conditions;
- operator identification;
- CSI witness (where applicable);
- observations recorded during the ageing programme;
- photographic records;
- evidence of coating deterioration (where observed);
- final assessment; and
- supporting comments.

All records should be retained in accordance with the manufacturer's documented record retention procedures and the requirements of the CSI PAS-Mark Product Certification Scheme.

13.9 Common Causes of Failure

Experience gained during certification assessments indicates that unsatisfactory Ageing Test results are generally associated with deficiencies in manufacturing or coating application rather than deficiencies within the Standard itself.

Common causes include:

- inadequate surface preparation;
- incorrect coating formulation;
- incorrect coating thickness;
- inadequate curing;
- contamination during coating application;
- poor adhesion to the glass surface;
- inconsistent manufacturing processes;
- inadequate production quality control;
- unsuitable coating materials; and
- non-representative production specimens.

Manufacturers maintaining disciplined coating application procedures and effective production controls generally experience more consistent long-term coating performance and improved certification outcomes.

13.10 Acceptance Criteria

The acceptance criteria applicable to the Ageing Test are specified within **Appendix H of AS/NZS 2208**.

Manufacturers should obtain and apply the current published edition of the Standard when preparing products for testing.

During certification, CSI evaluates the complete body of technical evidence to confirm that the tested glazing construction satisfies the applicable acceptance criteria together with all other requirements of the CSI PAS-Mark Product Certification Scheme.

Certification Consideration

Successful completion of the Ageing Test establishes certification evidence only for the coated glazing construction actually evaluated.

Manufacturers should not assume that changes to:

- coating manufacturer;
- coating formulation;
- coating thickness;
- coating application method;

- curing process;
- surface preparation procedures;
- manufacturing location; or
- other characteristics influencing long-term coating performance

remain covered by the original certification evidence.

Where changes are proposed, manufacturers should consult CSI before implementing those changes to determine whether additional technical assessment or testing is necessary to maintain certification.

CSI Technical Insight

Long-term product performance depends upon consistent manufacturing processes rather than successful completion of a single ageing assessment.

Manufacturers who implement documented coating application procedures, controlled curing processes, effective production quality control and comprehensive production traceability generally achieve more consistent long-term product performance and experience fewer certification issues during surveillance activities.

13.11 Chapter Summary

The Ageing Test provides important evidence demonstrating the long-term stability of organic-coated safety glazing materials following accelerated ageing.

Reliable certification evidence depends upon representative production specimens, controlled coating application processes, calibrated ageing equipment, accurate test records and complete technical documentation.

Manufacturers who establish disciplined manufacturing controls, maintain effective production quality systems and work closely with CSI throughout the certification process are better positioned to achieve and maintain certification under the CSI PAS-Mark Product Certification Scheme.

14 Uniformity and Surface Compression

14.0 Technical Information

Item	Details
Applicable Standard	AS/NZS 2208:2023 – <i>Safety Glazing Materials in Buildings</i>
Applicable Test Method	Appendix I – Uniformity and Surface Compression
Applicable Products	Thermally Toughened Safety Glass and Heat-Strengthened Glass where Appendix I applies.
Purpose of the Assessment	To verify that the glass has been thermally processed to achieve the required surface compression and stress uniformity specified by AS/NZS 2208.
Primary Evidence	Certification Evidence demonstrating that surface compression and stress distribution comply with the requirements of AS/NZS 2208 and support ongoing production conformity.

14.1 General

Appendix I of AS/NZS 2208 provides a method for assessing the surface compression and stress uniformity of thermally processed glass.

Unlike the Fragmentation Test, which demonstrates the fracture characteristics of the finished product, measurement of surface compression provides a direct assessment of the residual stresses developed during the thermal processing cycle.

Surface compression is one of the most important indicators of the effectiveness and consistency of the toughening process. Correct surface compression enables thermally processed glass to develop the characteristic fracture pattern and mechanical strength required by AS/NZS 2208.

Manufacturers should recognise that surface compression measurements do not replace the mandatory testing required by AS/NZS 2208. Rather, they provide an additional means of verifying that the manufacturing process remains under control and capable of consistently producing conforming products.

Within the CSi PAS-Mark Product Certification Scheme, Appendix I provides valuable technical evidence supporting product certification, routine production quality control and ongoing surveillance activities.

14.2 Manufacturer Submission Requirements

Before CSi evaluates surface compression measurements, manufacturers should provide sufficient technical information to enable the assessment programme to be reviewed.

Depending upon the product and certification scope, manufacturers should normally provide:

- Product specification.
- Product drawings.
- Glass type.
- Glass thickness.
- Furnace identification.
- Thermal processing parameters.
- Surface compression measuring equipment identification.
- Equipment calibration records.
- Production Quality Plan.
- Production sampling procedures.
- Production traceability procedures.
- Previous surface compression records (where applicable).
- Proposed certification scope.

Providing complete technical information enables CSi to determine that the proposed assessment programme is appropriate and that the resulting evidence will adequately support certification.

14.3 Objective of the Uniformity and Surface Compression Assessment

The objective of Appendix I is to verify that thermally processed glass has developed the surface compression required by AS/NZS 2208 and that the residual stress distribution is sufficiently uniform across the glass.

Surface compression measurements provide confidence that:

- the thermal processing cycle has been correctly controlled;
- furnace performance remains stable;
- quench performance is satisfactory;
- production variability is minimised; and
- the product is capable of consistently achieving the performance expected of thermally processed safety glass.

Manufacturers should recognise that acceptable fragmentation performance alone does not necessarily demonstrate optimum furnace performance.

Routine measurement of surface compression enables manufacturing trends to be identified before they influence product conformity and provides valuable process information supporting continuous improvement.

Surface compression measurements should therefore form an integral component of the manufacturer's Production Quality Plan.

14.4 Representative Test Specimens

Measurements undertaken under Appendix I should be performed using specimens representative of routine production.

Representative specimens should be manufactured using:

- routine production equipment;
- approved furnace settings;
- normal production personnel;
- documented manufacturing procedures;
- approved raw materials; and
- normal production controls.

Specimens manufactured specifically for assessment but not representative of normal commercial production should not be relied upon as certification evidence.

Where CSI determines that specimens are not representative of routine production, additional assessment may be required.

14.5 Preparation Before Testing

Before surface compression measurements are undertaken, manufacturers should verify that:

- the glass complies with the approved product specification;
- all fabrication operations have been completed prior to thermal processing;
- specimens are clean and free from contamination that may affect optical measurement;
- specimen identification has been permanently applied;
- production records have been completed;
- traceability has been confirmed;
- measuring equipment is within calibration; and
- supporting documentation accompanies the assessment.

Appropriate preparation assists in obtaining reliable measurements and maintaining complete traceability between production records and certification evidence.

14.6 Test Equipment

Surface compression measurements shall be undertaken using equipment complying with the requirements of **Appendix I of AS/NZS 2208** and the manufacturer's operating instructions.

Unlike destructive testing, the assessment of surface compression relies upon specialised optical measuring equipment capable of accurately determining the residual stress developed during the thermal toughening process.

Manufacturers should ensure that measuring equipment is appropriate for the glass type, thickness and product configuration being evaluated.

Equipment commonly used for this purpose includes optical stress measurement instruments capable of measuring:

- surface compression;
- case depth (where applicable);
- stress distribution;
- stress uniformity; and
- optical anisotropy associated with thermal processing.

The selected equipment should be capable of achieving the measurement accuracy required for routine production quality control and certification activities.

Before measurements are undertaken, manufacturers should verify:

- equipment identification;
- current calibration status;
- verification against certified reference standards (where applicable);
- preventive maintenance records;
- operator competency;

- environmental conditions that may influence optical measurements;
- instrument cleanliness; and
- suitability of the equipment for the glass thickness being evaluated.

Calibration certificates and verification records should be retained as controlled quality records and made available during CSI factory assessments and surveillance activities.

Where multiple optical stress meters are used within a manufacturing facility, manufacturers should periodically compare measurement results between instruments to confirm consistency of recorded values.

14.7 Conducting the Assessment

Surface compression measurements shall be performed in accordance with **Appendix I of AS/NZS 2208**.

This Technical Guidance provides practical certification guidance only and does not reproduce the detailed measurement procedure specified within the Standard.

During the assessment, manufacturers should ensure that:

- specimen identification is maintained throughout the assessment;
- measurement locations comply with the Standard;
- the instrument is correctly configured for the glass thickness;
- measurements are undertaken by competent personnel;
- readings are repeated where necessary to confirm consistency;
- any abnormal readings are investigated;
- observations are documented;
- measurement records remain traceable to the production batch; and
- any deviations from the agreed assessment programme are recorded.

Manufacturers should avoid relying upon a single measurement to assess furnace performance. Where practical, measurements should be obtained from representative production samples over time to establish confidence in process stability.

Routine monitoring enables production trends to be identified before non-conforming products are manufactured and supports continual improvement of the thermal processing operation.

14.8 Recording Test Results

Complete and accurate records are essential to demonstrate continuing compliance with **Appendix I** and to support product certification.

Measurement records should enable complete traceability between the manufactured product, the production batch and the resulting certification evidence.

Where applicable, records should include:

- specimen identification;
- product designation;
- glass type;
- nominal glass thickness;
- production batch number;
- manufacturing date;
- furnace identification;
- optical stress meter identification;
- instrument calibration status;
- measurement locations;
- individual surface compression readings;
- case depth measurements (where applicable);
- operator identification;
- CSI witness (where applicable);
- observations;
- corrective actions arising from abnormal results; and
- final assessment.

Manufacturers should maintain these records in accordance with their documented record retention procedures and the requirements of the CSI PAS-Mark Product Certification Scheme.

Trend analysis of historical measurements is encouraged, as it provides valuable evidence that the thermal toughening process remains stable over time.

14.9 Common Causes of Failure

Experience gained during certification assessments indicates that unacceptable surface compression measurements are generally associated with deficiencies in furnace control or production consistency rather than deficiencies in the Standard.

Common causes include:

- incorrect furnace temperature profiles;
- uneven heating across the furnace;
- inadequate quench performance;
- blocked or poorly balanced quench nozzles;

- roller wear affecting heat transfer;
- incorrect conveyor speed;
- unsuitable loading patterns;
- inadequate equipment calibration;
- inconsistent measurement techniques;
- poor maintenance practices; and
- inadequate production process control.

Manufacturers implementing disciplined furnace maintenance programmes, validated operating parameters and routine process verification generally achieve more consistent surface compression values and improved product conformity.

14.10 Acceptance Criteria

The acceptance criteria applicable to **Uniformity and Surface Compression** are specified within **Appendix I of AS/NZS 2208**.

Manufacturers shall apply the current published edition of the Standard when determining product conformity.

During certification, CSi evaluates the complete body of technical evidence to determine whether the measured surface compression values, together with all other applicable certification evidence, demonstrate conformity with the requirements of AS/NZS 2208 and the CSi PAS-Mark Product Certification Scheme.

Surface compression measurements should always be interpreted in conjunction with the applicable product testing programme and should not be considered in isolation.

Certification Consideration

Successful demonstration of acceptable surface compression establishes certification evidence only for the manufacturing process, furnace configuration and product construction that were evaluated.

Manufacturers should consult CSi before implementing changes that may influence residual stress characteristics, including:

- furnace replacement or major refurbishment;
- quench system modifications;
- changes to furnace operating parameters;
- changes to glass supplier or composition;
- changes to nominal glass thickness outside the approved certification scope;
- relocation of production equipment; or
- other manufacturing changes that may affect thermal processing.

Such changes may require additional technical assessment or verification before existing certification evidence can continue to be relied upon.

CSi Technical Insight

Surface compression measurement is one of the most effective process verification tools available to manufacturers of thermally processed glass.

While fragmentation testing confirms the end result, routine surface compression monitoring enables manufacturers to identify process variation before product performance is affected.

Manufacturers who routinely monitor and trend surface compression values generally experience:

- improved furnace stability;
- greater production consistency;
- fewer product failures;
- reduced manufacturing waste;
- improved confidence during surveillance assessments; and
- stronger technical evidence supporting ongoing product certification.

CSi Recommendation

Certification Solutions International strongly recommends that manufacturers incorporate routine surface compression monitoring into their documented **Production Quality Plan**.

The monitoring programme should define:

- sampling frequency;
- measurement locations;
- acceptance criteria;
- instrument verification requirements;
- operator competency requirements;
- trend analysis methodology; and
- actions to be taken when results fall outside established operating limits.

Routine monitoring supports continual process verification and provides objective evidence that the manufacturing process remains capable of consistently producing thermally processed safety glass complying with AS/NZS 2208.

14.11 Chapter Summary

Appendix I provides manufacturers with an effective means of verifying the consistency of the thermal toughening process through the measurement of surface compression and stress uniformity.

Reliable certification evidence depends upon representative production specimens, calibrated optical measuring equipment, competent personnel, accurate records and disciplined production controls.

Manufacturers who integrate routine surface compression monitoring into their Production Quality Plan are better positioned to demonstrate ongoing conformity, maintain stable manufacturing processes and support continued certification under the CSi PAS-Mark Product Certification Scheme.

15 Curved Glass Impact Test

15.0 Technical Information

Item	Details
Applicable Standard	AS/NZS 2208:2023 – <i>Safety Glazing Materials in Buildings</i>
Applicable Test Method	Appendix J – Curved Glass Impact Test
Applicable Products	Curved Laminated Safety Glass, Curved Thermally Toughened Safety Glass and other curved glazing products where Appendix J applies.
Purpose of the Test	To verify that curved safety glazing materials satisfy the human impact performance requirements of AS/NZS 2208.
Primary Evidence	Certification Product conformity evidence demonstrating that the curved glazing construction complies with Appendix J and supports certification under the CSi PAS-Mark Product Certification Scheme.

15.1 General

Curved safety glazing is increasingly used in modern buildings where architectural design, aesthetics or functional requirements demand glazing that departs from traditional flat construction.

Although curved safety glazing may be manufactured from the same base materials as flat glazing, the bending process introduces additional manufacturing variables that may influence product performance.

Appendix J of AS/NZS 2208 provides the impact test requirements applicable to curved safety glazing materials.

The purpose of the Curved Glass Impact Test is to verify that the completed curved glazing construction continues to provide the level of human impact safety required for classification as a safety glazing material.

Manufacturers should recognise that the bending process itself may influence product behaviour.

Factors such as:

- bending radius;
- glass thickness;
- furnace temperature;
- heating uniformity;
- cooling characteristics;
- residual stress distribution;

- optical quality; and
- dimensional accuracy

may all influence the performance of curved safety glazing.

Accordingly, curved products should never be assumed to perform identically to equivalent flat products without appropriate evaluation.

For manufacturers seeking certification under the CSI PAS-Mark Product Certification Scheme, successful completion of Appendix J provides an essential component of the technical evidence supporting certification of curved safety glazing products.

15.2 Manufacturer Submission Requirements

Before CSI schedules Curved Glass Impact Testing, manufacturers should provide sufficient technical information to enable the proposed certification programme to be reviewed.

Depending upon the product and certification scope, manufacturers should normally provide:

- Product specification.
- Product drawings.
- Glass type.
- Glass thickness.
- Curvature radius.
- Bending method.
- Bending furnace identification.
- Manufacturing location.
- Product Quality Plan.
- Manufacturing procedures.
- Production traceability procedures.
- Calibration records.
- Previous curved glass testing (where applicable).
- Proposed certification scope.

Where multiple radii or glazing constructions are proposed for certification, manufacturers should consult CSI before testing commences to determine whether additional representative specimens or technical assessment are required.

Providing complete technical information before testing enables CSI to confirm that the proposed assessment programme is appropriate and that the resulting certification evidence will adequately support the intended certification scope.

15.3 Objective of the Curved Glass Impact Test

The objective of the Curved Glass Impact Test is to verify that curved safety glazing materials satisfy the impact performance requirements specified in **Appendix J of AS/NZS 2208**.

The assessment provides confidence that the manufacturing process used to produce the curved glazing has not adversely affected its ability to perform as a safety glazing material.

Manufacturers should recognise that the assessment evaluates the complete curved glazing construction rather than individual components.

Impact performance may therefore be influenced by:

- glass type;
- glass thickness;
- bending radius;
- bending process;
- thermal processing;
- lamination process (where applicable);
- residual stress distribution;
- edge preparation;
- manufacturing consistency; and
- production quality control.

Changes to any of these characteristics may affect product performance and should be reviewed by CSI before the existing certification evidence is extended to modified products.

15.4 Representative Test Specimens

Representative production specimens are fundamental to the validity of the Curved Glass Impact Test.

All specimens submitted for certification testing should be manufactured using:

- routine production equipment;
- approved bending processes;
- normal production personnel;
- documented manufacturing procedures;
- approved raw materials; and
- routine production controls.

Specimens should represent normal commercial production, including the approved curvature, dimensions and manufacturing method.

Specimens manufactured specifically for testing but not representative of routine production should not be relied upon as certification evidence.

Where CSI determines that submitted specimens are not representative of normal production, additional assessment or testing may be required before certification proceeds.

15.5 Preparation Before Testing

Before specimens are released for Curved Glass Impact Testing, manufacturers should verify that:

- the glazing complies with the approved product specification;
- the required curvature has been achieved;
- product dimensions have been verified;
- edge finishing has been completed;
- specimens have been visually inspected;
- specimen identification has been permanently applied;
- production records have been completed;
- traceability has been verified;
- packaging protects the curved glass during transport; and
- all supporting documentation accompanies the test specimens.

Appropriate preparation before testing significantly improves confidence in the resulting certification evidence and reduces unnecessary delays during the certification process.

15.6 Test Equipment

The Curved Glass Impact Test shall be undertaken using equipment complying with the requirements of **Appendix J of AS/NZS 2208**.

Manufacturers should ensure that all impact testing equipment is maintained in a condition capable of producing reliable, repeatable and representative test results.

Because curved glazing differs geometrically from flat glazing, particular attention should be given to the test rig and specimen support arrangements to ensure they comply with the requirements of the Standard.

Prior to testing, manufacturers should verify, where applicable:

- equipment identification;
- calibration status;
- preventive maintenance records;
- impact apparatus dimensions;
- impactor condition;

- specimen support equipment;
- measuring equipment;
- environmental conditions;
- timing equipment (where applicable); and
- suitability of the equipment for the proposed testing programme.

Calibration certificates and maintenance records should be retained as supporting certification evidence and be available during CSI factory assessments and surveillance activities.

Manufacturers should also confirm that the support arrangement accurately accommodates the curvature of the specimen without introducing restraint or loading conditions that differ from those specified in Appendix J.

15.7 Conducting the Test

The Curved Glass Impact Test shall be conducted strictly in accordance with the requirements of **Appendix J of AS/NZS 2208**.

This Technical Guidance explains the certification process but does not reproduce the prescribed laboratory procedure contained within the Standard.

Throughout the assessment manufacturers should ensure that:

- specimen identification is maintained;
- the approved testing programme is followed;
- the specified specimen orientation is maintained;
- the specimen is correctly supported;
- impact locations comply with Appendix J;
- observations are recorded throughout testing;
- photographs are taken before and after impact;
- fracture behaviour is documented;
- post-impact observations are recorded; and
- complete traceability is maintained between the specimen, production records and certification evidence.

Where testing is witnessed by CSI, any deviation that may influence the validity of the certification evidence should be discussed before testing proceeds.

15.8 Recording Test Results

Accurate and complete records are essential to demonstrate the validity of the Curved Glass Impact Test and to support product certification.

Test records should enable complete traceability between the manufactured product, the test specimens and the resulting certification evidence.

Where applicable, the test record should include:

- specimen identification;
- glazing construction;
- glass type;
- glass thickness;
- bending radius;
- nominal dimensions;
- manufacturing date;
- production batch;
- test date;
- testing location;
- equipment identification;
- operator identification;
- CSI witness (where applicable);
- observations during testing;
- fracture characteristics;
- photographic records;
- final assessment; and
- supporting comments.

Manufacturers should retain these records in accordance with their documented record retention procedures and the requirements of the CSI PAS-Mark Product Certification Scheme.

15.9 Common Causes of Failure

Experience gained during certification assessments indicates that unsuccessful Curved Glass Impact Tests are generally associated with deficiencies in manufacturing or process control rather than deficiencies within the Standard.

Common causes include:

- inconsistent bending radius;
- incorrect thermal processing;

- excessive optical distortion associated with poor furnace control;
- residual stress variation;
- inadequate edge preparation;
- dimensional variation;
- poor lamination quality (where applicable);
- inconsistent production processes;
- inadequate production quality control; and
- non-representative production specimens.

Manufacturers maintaining effective control of the bending process, furnace operating parameters and production quality systems generally achieve more consistent product performance and improved certification outcomes.

15.10 Acceptance Criteria

The acceptance criteria applicable to the Curved Glass Impact Test are specified within **Appendix J of AS/NZS 2208**.

Manufacturers should obtain and apply the current published edition of the Standard when preparing products for testing.

During certification, CSI evaluates the complete body of technical evidence to confirm that the tested curved glazing construction satisfies the applicable acceptance criteria together with all other requirements of the CSI PAS-Mark Product Certification Scheme.

Certification Consideration

Successful completion of the Curved Glass Impact Test establishes certification evidence only for the curved glazing construction that has been evaluated.

Manufacturers should not assume that changes to:

- glass type;
- glass thickness;
- bending radius;
- bending process;
- furnace operating parameters;
- glazing construction;
- manufacturing location; or
- other characteristics influencing impact performance

remain covered by the original certification evidence.

Where product changes are proposed, manufacturers should consult CSI before implementing those changes to determine whether additional technical assessment or testing is necessary to maintain certification.

CSI Technical Insight

Certification of curved safety glazing generally requires greater technical evaluation than equivalent flat glazing products.

The manufacturing process introduces variables that do not exist in flat glass production, including curvature control, dimensional accuracy and residual stress variation.

Manufacturers who implement documented bending procedures, validated furnace operating parameters, effective production quality control and comprehensive traceability generally experience more consistent product performance and greater confidence during certification and surveillance activities.

15.11 Chapter Summary

The Curved Glass Impact Test provides important evidence demonstrating that curved safety glazing materials satisfy the human impact performance requirements of **Appendix J of AS/NZS 2208**.

Reliable certification evidence depends upon representative production specimens, controlled bending processes, accurate test records, calibrated testing equipment and complete technical documentation.

Manufacturers who establish disciplined manufacturing controls, maintain effective Production Quality Plans and work closely with CSI throughout the certification process are better positioned to achieve and maintain certification under the CSI PAS-Mark Product Certification Scheme.

16 Curved Glass Fragmentation Test

16.0 Technical Information

Item	Details
Applicable Standard	AS/NZS 2208:2023 – <i>Safety Glazing Materials in Buildings</i>
Applicable Test Method	Appendix K – Curved Glass Fragmentation Test
Applicable Products	Curved Thermally Toughened Safety Glass and other curved thermally processed glazing products where Appendix K applies.
Purpose of the Test	To verify that curved thermally toughened safety glass fractures into the characteristic particle size and distribution required by AS/NZS 2208.
Primary Evidence	Certification Product conformity evidence demonstrating compliance with Appendix K and supporting certification under the CSI PAS-Mark Product Certification Scheme.

16.1 General

The Curved Glass Fragmentation Test specified within **Appendix K of AS/NZS 2208** is undertaken to verify that curved thermally toughened safety glass exhibits the characteristic fracture pattern required for classification as a safety glazing material.

Although the thermal toughening process is fundamentally similar to that used for flat glass, the introduction of curvature creates additional manufacturing variables that may influence the residual stress distribution and resulting fragmentation characteristics.

The objective of Appendix K is therefore to confirm that the curved manufacturing process has not adversely affected the safety performance of the finished glazing product.

For manufacturers seeking certification under the CSI PAS-Mark Product Certification Scheme, successful completion of the Curved Glass Fragmentation Test forms an essential component of the technical evidence supporting certification.

Manufacturers should recognise that fragmentation performance reflects the effectiveness and consistency of the complete thermal processing operation, including glass preparation, heating, bending, quenching and production quality control.

16.2 Manufacturer Submission Requirements

Before CSI schedules Curved Glass Fragmentation Testing, manufacturers should provide sufficient technical information to enable the proposed certification programme to be reviewed.

Depending upon the product and certification scope, manufacturers should normally provide:

- Product specification.
- Product drawings.
- Glass type.
- Glass thickness.
- Curvature radius.
- Nominal dimensions.
- Bending furnace identification.
- Toughening furnace identification (where separate).
- Manufacturing location.
- Product Quality Plan.
- Thermal processing procedures.
- Production traceability procedures.
- Calibration records.
- Previous fragmentation testing (where applicable).
- Proposed certification scope.

Providing complete technical information enables CSI to confirm that the proposed assessment programme is appropriate and that the resulting certification evidence will adequately support the intended certification scope.

16.3 Objective of the Curved Glass Fragmentation Test

The objective of the Curved Glass Fragmentation Test is to verify that curved thermally toughened safety glass fractures in the characteristic manner specified by **Appendix K of AS/NZS 2208**.

The assessment provides confidence that the bending and thermal toughening processes have produced the residual stress profile necessary to achieve the required fragmentation characteristics.

Manufacturers should recognise that the assessment evaluates the completed curved glazing product rather than the original flat glass from which it was manufactured.

Fragmentation performance may therefore be influenced by:

- glass type;
- glass thickness;
- bending radius;
- furnace operating parameters;
- heating cycle;
- cooling cycle;
- residual stress distribution;
- edge preparation;
- glass quality;
- production consistency; and
- process control.

Changes to any of these characteristics may influence fragmentation behaviour and should be reviewed by CSI before existing certification evidence is extended to modified products.

16.4 Representative Test Specimens

Representative production specimens are fundamental to the validity of the Curved Glass Fragmentation Test.

All specimens submitted for certification testing should be manufactured using:

- routine production equipment;
- approved bending processes;
- approved thermal toughening processes;
- normal production personnel;
- documented manufacturing procedures;
- approved raw materials; and

- routine production controls.

Specimens should accurately represent routine commercial production, including the approved curvature, dimensions and thermal processing conditions.

Specimens manufactured specifically to optimise laboratory performance but not representative of routine production should not be relied upon as certification evidence.

Where CSI determines that submitted specimens are not representative of routine production, additional assessment or testing may be required before certification proceeds.

16.5 Preparation Before Testing

Before specimens are released for Curved Glass Fragmentation Testing, manufacturers should verify that:

- the product complies with the approved product specification;
- all fabrication operations were completed before thermal processing;
- the required curvature has been achieved;
- specimen dimensions have been verified;
- specimens have been visually inspected;
- specimen identification has been permanently applied;
- production records have been completed;
- traceability has been verified;
- packaging adequately protects the curved glass during transport; and
- all supporting documentation accompanies the test specimens.

Appropriate preparation before testing significantly improves confidence in the resulting certification evidence and reduces unnecessary delays during the certification process.

16.6 Test Equipment

The Curved Glass Fragmentation Test shall be undertaken using equipment complying with the requirements of **Appendix K of AS/NZS 2208**.

Manufacturers should ensure that all test equipment is maintained in a condition capable of producing reliable, repeatable and representative test results.

Although the fragmentation assessment is similar to that undertaken for flat thermally toughened glass, additional consideration should be given to supporting and handling curved specimens to avoid introducing unintended stresses before fracture.

Prior to testing, manufacturers should verify, where applicable:

- equipment identification;
- calibration status;

- preventive maintenance records;
- specimen support equipment;
- fracture initiation equipment;
- measuring equipment;
- photographic recording equipment;
- environmental conditions; and
- suitability of the equipment for the proposed testing programme.

Calibration certificates and maintenance records should be retained as supporting certification evidence and be available during CSI factory assessments and surveillance activities.

Manufacturers should ensure that specimen handling before fracture does not influence the natural fragmentation characteristics of the curved glass.

16.7 Conducting the Test

The Curved Glass Fragmentation Test shall be conducted strictly in accordance with the requirements of **Appendix K of AS/NZS 2208**.

This Technical Guidance explains the certification process but does not reproduce the prescribed laboratory procedure contained within the Standard.

Throughout the assessment manufacturers should ensure that:

- specimen identification is maintained;
- the approved testing programme is followed;
- the specimen is correctly supported;
- fracture is initiated in accordance with Appendix K;
- the resulting fragmentation pattern is preserved for examination;
- observations are recorded throughout the assessment;
- photographs are taken immediately following fracture;
- any abnormal fracture behaviour is documented; and
- complete traceability is maintained between the specimen, production records and certification evidence.

Where testing is witnessed by CSI, any deviation that may influence the validity of the certification evidence should be discussed before testing proceeds.

16.8 Recording Test Results

Complete and accurate records are essential to demonstrate the validity of the Curved Glass Fragmentation Test and to support product certification.

Test records should enable complete traceability between the manufactured product, the production batch and the resulting certification evidence.

Where applicable, records should include:

- specimen identification;
- glazing construction;
- glass type;
- nominal glass thickness;
- curvature radius;
- production batch number;
- manufacturing date;
- furnace identification;
- test date;
- testing location;
- equipment identification;
- operator identification;
- CSi witness (where applicable);
- observations;
- photographic records of the fragmentation pattern;
- fragmentation assessment; and
- final assessment.

Manufacturers should retain these records in accordance with their documented record retention procedures and the requirements of the CSi PAS-Mark Product Certification Scheme.

Where multiple specimens are evaluated, individual results should be clearly identified and retained to support future technical reviews and surveillance activities.

16.9 Common Causes of Failure

Experience gained during certification assessments indicates that unacceptable Curved Glass Fragmentation Test results are generally associated with deficiencies in thermal processing or manufacturing consistency rather than deficiencies within the Standard.

Common causes include:

- incorrect furnace operating parameters;
- inconsistent heating during the bending cycle;

- inadequate quench performance;
- uneven residual stress distribution;
- excessive variation in curvature;
- poor edge preparation;
- glass defects;
- inconsistent production processes;
- inadequate production quality control; and
- non-representative production specimens.

Manufacturers maintaining disciplined control of the bending process, thermal toughening cycle and production quality systems generally achieve more consistent fragmentation performance and improved certification outcomes.

16.10 Acceptance Criteria

The acceptance criteria applicable to the Curved Glass Fragmentation Test are specified within **Appendix K of AS/NZS 2208**.

Manufacturers should obtain and apply the current published edition of the Standard when preparing products for testing.

During certification, CSi evaluates the complete body of technical evidence to confirm that the tested curved glazing construction satisfies the applicable acceptance criteria together with all other requirements of the CSi PAS-Mark Product Certification Scheme.

Certification Consideration

Successful completion of the Curved Glass Fragmentation Test establishes certification evidence only for the curved glazing construction and manufacturing process that have been evaluated.

Manufacturers should not assume that changes to:

- glass type;
- glass thickness;
- bending radius;
- bending process;
- furnace operating parameters;
- quench system;
- manufacturing location; or
- other characteristics influencing fragmentation behaviour

remain covered by the original certification evidence.

Where product or process changes are proposed, manufacturers should consult CSI before implementation to determine whether additional technical assessment or testing is necessary to maintain certification.

CSI Technical Insight

The fragmentation characteristics of curved thermally toughened safety glass provide one of the clearest indicators of the consistency of the complete bending and thermal processing operation.

Manufacturers who implement validated furnace operating parameters, effective process monitoring, routine verification of surface compression and disciplined production quality control generally experience more consistent fragmentation performance, reduced production variability and greater confidence during certification and surveillance activities.

16.11 Chapter Summary

The Curved Glass Fragmentation Test provides essential evidence demonstrating that curved thermally toughened safety glass exhibits the fracture characteristics required by **Appendix K of AS/NZS 2208**.

Reliable certification evidence depends upon representative production specimens, controlled bending and thermal processing, calibrated test equipment, accurate records and complete technical documentation.

Manufacturers who establish disciplined manufacturing controls, maintain effective Production Quality Plans and work closely with CSI throughout the certification process are better positioned to achieve and maintain certification under the CSI PAS-Mark Product Certification Scheme.

17 Appendix A – Guide to Product Conformity

Item	Details
Applicable Standard	AS/NZS 2208:2023 – <i>Safety Glazing Materials in Buildings</i>
Applicable Appendix	Appendix A – Guide to Product Conformity
Applicable Products	All safety glazing materials evaluated in accordance with AS/NZS 2208.
Purpose	To explain the principles of product conformity and the relationship between product testing, manufacturing controls and accredited product certification.
Primary Certification Outcome	Demonstration that products are consistently manufactured in conformity with AS/NZS 2208 and maintained under an accredited product certification scheme.

17.1 General

Appendix A of **AS/NZS 2208** provides guidance on the principles of product conformity for safety glazing materials.

While the preceding chapters of this Technical Guidance have explained the individual test methods specified within AS/NZS 2208, Appendix A explains the broader concept of demonstrating and maintaining product conformity.

Manufacturers should recognise that product conformity extends well beyond the successful completion of laboratory testing.

A laboratory test demonstrates the performance of the specimens submitted for evaluation.

Product conformity demonstrates that all products subsequently manufactured continue to comply with the applicable Standard through controlled manufacturing processes, documented production quality control, routine verification activities and ongoing conformity assessment.

Within the **CSI PAS-Mark Product Certification Scheme**, product conformity is established through the combined evaluation of:

- product design;
- recognised product testing;
- manufacturing capability;
- documented Product Quality Plans;
- production quality control;
- product traceability;
- technical documentation;
- manufacturing assessments;
- surveillance activities; and
- ongoing certification management.

Accordingly, manufacturers should regard product conformity as a continuous manufacturing objective rather than a single laboratory event.

17.2 Understanding Product Conformity

One of the most common misunderstandings encountered during product certification is the assumption that successful laboratory testing alone demonstrates product conformity.

Although testing provides essential technical evidence, it represents only one element of the conformity assessment process.

A product can only be considered to remain conforming where the manufacturer demonstrates the ability to consistently reproduce the tested product under normal production conditions.

This requires effective control of:

- raw materials;
- production equipment;
- manufacturing procedures;
- inspection activities;
- calibration;
- competent personnel;
- production records;

- traceability; and
- continual verification.

Manufacturers should therefore view laboratory testing as the beginning of the conformity assessment process rather than its conclusion.

17.3 Product Testing versus Product Certification

Manufacturers frequently use the terms **testing**, **inspection** and **product certification** interchangeably.

These activities perform different functions.

Product Testing

Product testing determines whether representative specimens comply with the technical requirements of the applicable Standard.

Testing answers the question:

Did the submitted specimen comply with AS/NZS 2208 when tested?

Inspection

Inspection provides observations regarding products, manufacturing processes or facilities at a particular point in time.

Inspection answers the question:

What was observed during the inspection?

Product Certification

Product certification evaluates whether the manufacturer has demonstrated the ongoing capability to consistently produce products that continue to comply with the applicable Standard.

Certification answers the question:

Can continuing confidence be placed in the manufacturer's ability to consistently produce conforming products?

These activities complement one another but are not interchangeable.

Successful laboratory testing or inspection alone does not constitute accredited product certification.

17.4 Accredited Product Certification

Accredited product certification provides independent confidence that products continue to comply with the applicable Standard throughout the certification period.

Unlike one-off laboratory testing, accredited product certification includes continuing evaluation of the manufacturer's ability to consistently produce conforming products.

Under the CSi PAS-Mark Product Certification Scheme this includes, where applicable:

- review of the certification application;

- technical review of supporting documentation;
- recognised product testing;
- assessment of the manufacturer's Product Quality Plan;
- evaluation of manufacturing controls;
- review of inspection and testing activities;
- product traceability;
- management of design changes;
- surveillance business reviews;
- product re-evaluation;
- certification decision making; and
- ongoing maintenance of certification.

This approach provides manufacturers, regulators, specifiers and purchasers with greater confidence that certified products continue to comply with the applicable Standard beyond the initial laboratory assessment. It also reflects the PAS-Mark Scheme's emphasis on ongoing manufacturing control, surveillance and conformity rather than reliance on a single test report.

17.5 Why Independent Accreditation Matters

Product certification provides confidence only when the certification process itself is independent, technically competent and subject to ongoing oversight.

Manufacturers, regulators, specifiers and consumers should understand that not all organisations operating within the conformity assessment industry perform the same function or operate under the same accreditation requirements.

Some organisations provide:

- laboratory testing;
- inspection services;
- technical consulting;
- product evaluations; or
- engineering advice.

Each of these services plays an important role in demonstrating product performance and supporting product development. However, these activities should not be confused with **accredited product certification**.

Accredited product certification is a structured conformity assessment process undertaken by a competent certification body operating under an internationally recognised accreditation framework.

For manufacturers seeking certification of safety glazing materials to **AS/NZS 2208**, accredited product certification provides confidence that the certification process is conducted consistently, impartially and in accordance with internationally recognised conformity assessment principles.

17.6 The Role of JASANZ

The **Joint Accreditation System of Australia and New Zealand (JASANZ)** is the government-appointed accreditation body responsible for accrediting conformity assessment bodies operating within Australia and New Zealand.

JASANZ does **not** certify products.

JASANZ accredits organisations that have demonstrated the competence, impartiality and management systems necessary to undertake conformity assessment activities within their approved scope of accreditation.

For accredited Product Certification Bodies, JASANZ provides independent oversight of the certification process through regular accreditation assessments, technical reviews and ongoing surveillance of the certification body's operations.

This provides manufacturers and users of certified products with additional confidence that certification decisions are made using documented procedures, competent personnel and internationally recognised conformity assessment practices.

Manufacturers should recognise that accreditation of a certification body is independent of the manufacturer and provides an additional level of assurance regarding the integrity of the certification process itself.

17.7 Understanding the Different Types of Conformity Assessment Bodies

Manufacturers frequently encounter organisations offering testing, inspection, auditing and certification services.

Although these services are complementary, they perform different functions within the conformity assessment process.

Testing Laboratory

A testing laboratory determines whether a submitted specimen complies with the technical requirements of the applicable Standard.

The laboratory reports the test results for the specimens evaluated.

Testing laboratories do not normally certify products or determine whether a manufacturer has demonstrated the ongoing ability to consistently manufacture conforming products.

Inspection Body

An inspection body examines products, manufacturing processes, installations or facilities and reports observations made at the time of the inspection.

Inspection activities provide valuable technical information but are generally limited to the scope of the inspection undertaken.

Inspection alone does not normally constitute accredited product certification.

Product Certification Body

A Product Certification Body evaluates the complete body of evidence necessary to determine whether products comply with the applicable Standard and whether the manufacturer has demonstrated the continuing capability to consistently produce conforming products.

This evaluation normally considers:

- recognised product testing;
- technical documentation;
- manufacturing processes;
- Product Quality Plans;
- production quality control;
- traceability;
- management of product changes;
- surveillance activities; and
- continuing conformity.

The certification decision is based upon the collective evaluation of this evidence rather than any individual test report or inspection.

17.8 Why Accredited Product Certification Creates Confidence

Every organisation involved in the design, manufacture, specification, supply and regulation of building products ultimately seeks the same outcome—confidence that products placed onto the market continue to comply with the applicable Standard throughout their service life.

Accredited product certification provides that confidence by combining independent technical evaluation with ongoing verification of manufacturing capability.

Unlike one-off testing, accredited product certification continues throughout the certification period by evaluating whether the manufacturer consistently maintains the same product design, production controls and quality management systems upon which certification was originally granted.

For manufacturers, accredited certification demonstrates to customers and regulators that product conformity is supported by independently assessed production systems rather than a single historical laboratory report.

For architects, engineers and building surveyors, accredited certification provides confidence that the certified product continues to be manufactured under controlled conditions consistent with the original technical evaluation.

For regulators, accredited certification provides an independently monitored conformity assessment process that extends beyond product testing to include manufacturing controls, surveillance and ongoing verification.

For building owners and consumers, accredited certification provides additional confidence that the products installed within buildings continue to be manufactured in accordance with the applicable product Standard.

The objective of accredited product certification is therefore not merely to confirm that a product complied with a Standard at one point in time, but to provide continuing confidence that conformity is maintained throughout the certification lifecycle.

17.9 Why Ongoing Conformity Is Important

Successful laboratory testing demonstrates that a representative product complied with AS/NZS 2208 on the day it was tested.

Manufacturers subsequently produce hundreds, thousands or, in some cases, millions of products throughout the certification period.

Confidence in those products depends upon the manufacturer's ability to consistently reproduce the same product that was originally evaluated.

For this reason, accredited product certification places significant emphasis on:

- documented manufacturing procedures;
- Product Quality Plans;
- approved suppliers;
- calibration;
- production inspection;
- batch testing;
- traceability;
- internal audits;
- corrective actions;
- surveillance assessments; and
- continual monitoring of product conformity.

These activities provide confidence that certified products continue to conform to the applicable Standard long after the original laboratory testing has been completed.

17.10 Selecting an Accredited Product Certification Body

When selecting an organisation to undertake product certification, manufacturers should ensure they understand the scope of services being provided.

Important considerations include:

- Is the organisation accredited to certify products within the relevant scope?
- Does certification include evaluation of the manufacturing facility?
- Does certification include review of the Product Quality Plan?
- Are product changes formally assessed?

- Is ongoing surveillance undertaken?
- Does the certification process include independent certification decision making?
- Are certified products supported by recognised testing and documented technical evidence?
- Can certification be independently verified through the accreditation body's public register?

Manufacturers who understand these considerations are better positioned to select a certification programme that provides confidence to regulators, specifiers, builders and end users.

17.11 The Product Certification Process

17.11.1 Introduction

Accredited product certification is a structured conformity assessment process designed to provide confidence that products continue to comply with the applicable Standard throughout the certification period.

Unlike one-off laboratory testing, accredited product certification combines technical evaluation, product testing, manufacturing assessment and ongoing surveillance into a systematic programme that continually verifies product conformity.

Although the certification process may vary depending upon the product, certification scope and applicable Standard, the fundamental stages of accredited product certification remain consistent.

The following overview explains the typical stages undertaken within the CSI PAS-Mark Product Certification Scheme.

Step 1 – Application Review

The certification process commences with the submission of an application for product certification.

The manufacturer should provide sufficient information to enable CSI to understand the proposed certification scope and establish an appropriate certification programme.

Typical information includes:

- Product description
- Product specifications
- Engineering drawings
- Manufacturing location
- Applicable Standards
- Proposed certification scope
- Existing technical evidence
- Previous test reports (where applicable)

CSI reviews the submitted information to determine whether the application is suitable to proceed and whether additional information is required before technical evaluation commences.

Step 2 – Technical Review

Following acceptance of the application, CSI undertakes a detailed technical review of the proposed certification programme.

This review confirms:

- applicable product Standards;
- certification scope;
- representative products;
- worst-case product selection;
- required testing;
- supporting technical documentation; and
- proposed certification pathway.

The objective of this review is to establish an efficient certification programme while avoiding unnecessary testing and reducing project delays.

Step 3 – Product Testing

Representative production specimens are subjected to the applicable testing programme required by AS/NZS 2208 and any additional certification requirements.

Testing should be undertaken using specimens manufactured under normal production conditions.

Where required, testing may be undertaken by recognised testing laboratories or witnessed by CSI in accordance with the approved certification programme.

The resulting test reports form part of the technical evidence supporting product certification.

Step 4 – Manufacturing Assessment

Accredited product certification extends beyond successful laboratory testing.

CSI evaluates the manufacturer's ability to consistently reproduce the certified product through assessment of manufacturing controls.

The assessment may include review of:

- manufacturing procedures;
- Product Quality Plans;
- production quality control;
- inspection activities;

- calibration systems;
- traceability;
- supplier controls;
- training and competency;
- document control; and
- management of product changes.

This assessment provides confidence that future production remains equivalent to the products originally evaluated.

Step 5 – Certification Decision

Following completion of the technical evaluation, testing and manufacturing assessment, the certification evidence is independently reviewed.

Certification decisions are made independently from the assessment activities to ensure impartiality and consistency.

Where all applicable requirements have been satisfied, CSI issues:

- Certificate of Conformance;
- Product Compliance Schedule(s);
- PAS-Mark Licence; and
- associated certification documentation.

Certification applies only to the approved product scope identified within the certification documents.

Step 6 – Ongoing Surveillance

Accredited product certification continues after certification has been granted.

CSI undertakes periodic surveillance activities to verify that certified products continue to comply with the applicable Standard.

Surveillance activities may include review of:

- manufacturing processes;
- Product Quality Plans;
- production records;
- calibration;
- traceability;
- batch testing;
- complaints;
- product changes;

- corrective actions; and
- continued implementation of certification requirements.

Surveillance provides continuing confidence that certified products remain consistent with the original certification evidence.

Step 7 – Product Re-evaluation

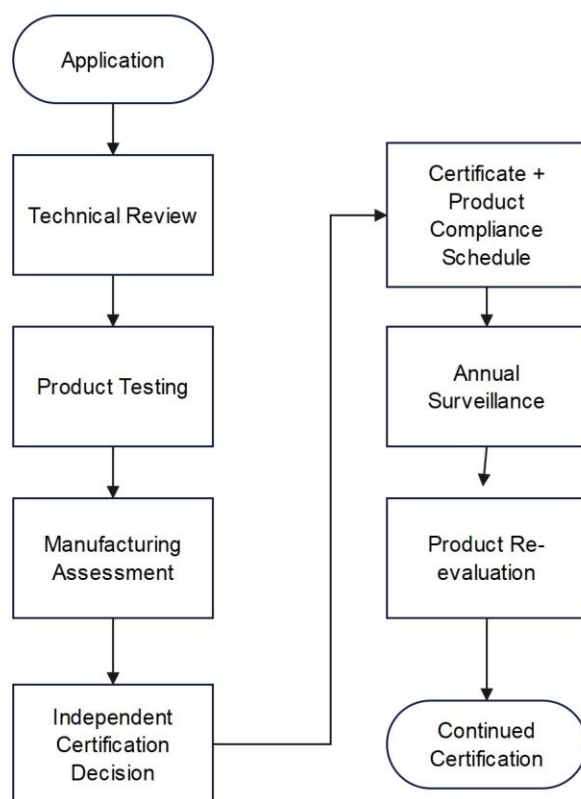
Where certification is renewed, extended or significantly modified, CSI undertakes further technical evaluation to confirm continuing conformity.

Re-evaluation may include:

- review of revised Standards;
- product changes;
- manufacturing changes;
- additional testing;
- expanded certification scope;
- surveillance findings; and
- updated technical evidence.

Successful completion of the re-evaluation enables certification to continue with confidence that products remain compliant with the applicable certification requirements.

Figure 17.1 — Accredited Product Certification Lifecycle



CSi Recommendation

Certification Solutions International recommends that manufacturers consider product certification during the earliest stages of product design rather than after prototype testing has commenced.

Early engagement enables:

- development of an appropriate testing programme;
- identification of the applicable Standards;
- selection of representative test specimens;
- preparation of a Product Quality Plan;
- establishment of production quality controls;
- development of traceability systems; and
- preparation of certification evidence before formal testing begins.

Experience has consistently shown that manufacturers who integrate certification planning into product development generally reduce certification timeframes, minimise unnecessary testing costs and achieve more efficient product certification outcomes.

Certification Consideration

Manufacturers selecting a conformity assessment body should clearly understand the services being provided.

Questions that should be considered include:

- Is the organisation accredited to undertake **product certification** for the applicable scope?
- Does the certification include continuing surveillance?
- Are manufacturing controls evaluated?
- Is ongoing product conformity assessed?
- Does certification extend beyond laboratory testing?
- Is certification supported by documented technical review and continuing oversight?

Understanding these distinctions assists manufacturers in selecting a certification pathway that provides confidence to regulators, specifiers, builders and consumers.

CSi Technical Insight

Certification Solutions International considers accredited product certification to be significantly more than the issue of a certificate following successful laboratory testing.

The objective of the CSi PAS-Mark Product Certification Scheme is to provide continuing confidence that certified products remain compliant throughout the certification cycle.

This confidence is achieved through the integration of recognised testing, technical evaluation, manufacturing assessment, Product Quality Plans, surveillance business reviews, traceability, ongoing verification and independent certification decision-making in accordance with the requirements of the PAS-Mark Scheme and internationally recognised conformity assessment principles.

The Difference Between Testing and Accredited Product Certification

Testing	Accredited Product Certification
Confirms the performance of the test specimen	Provides continuing confidence in the ongoing conformity of the certified product.
One point in time	Ongoing assessment throughout the certification cycle
Evaluates the submitted specimen	Evaluates the product, manufacturing process and supporting systems
Laboratory outcome	Independent certification decision
Does not normally include surveillance	Includes ongoing surveillance and maintenance of certification
Supports certification	Provides accredited third-party certification

17.12 Manufacturer Readiness Checklist for Accredited Product Certification

Purpose

Before commencing product certification, manufacturers should assess whether their product, manufacturing systems and supporting documentation are sufficiently developed to support an efficient certification programme.

The following checklist has been developed by Certification Solutions International to assist manufacturers in identifying common areas requiring attention before formal certification activities commence.

Completion of this checklist does not guarantee certification. However, manufacturers who can confidently answer **"Yes"** to each question are generally better prepared for accredited product certification and often experience fewer technical issues, reduced certification timeframes and lower overall project costs.

Product Certification Readiness Checklist

Category	Question	Yes	No	N/A
Regulatory Requirements	Have all applicable Australian and/or New Zealand regulatory requirements been identified?	☐	☐	☐
	Have all applicable product Standards been identified?	☐	☐	☐
	Is AS/NZS 2208 the correct product Standard for the proposed product?	☐	☐	☐
Product Design	Has the product design been finalised?	☐	☐	☐
	Are detailed engineering drawings available?	☐	☐	☐
	Has the intended certification scope been defined?	☐	☐	☐
Manufacturing Controls	Are documented manufacturing procedures available?	☐	☐	☐
	Are critical manufacturing parameters controlled?	☐	☐	☐
	Have approved raw materials and suppliers been identified?	☐	☐	☐
	Are production records maintained?	☐	☐	☐
Product Quality Plan	Has a Product Quality Plan been developed?	☐	☐	☐
	Are inspection and testing activities defined?	☐	☐	☐
	Are sampling frequencies documented?	☐	☐	☐
	Are acceptance criteria defined?	☐	☐	☐
Traceability	Can finished products be traced to production records?	☐	☐	☐



Category	Question	Yes	No	N/A
Calibration	Can production batches be traced to raw materials?	☐	☐	☐
	Are unique product identification methods implemented?	☐	☐	☐
	Is all measuring and testing equipment calibrated?	☐	☐	☐
	Are calibration records current?	☐	☐	☐
Representative Product	Have representative production specimens been selected?	☐	☐	☐
	Were specimens manufactured using normal production processes?	☐	☐	☐
Testing	Has the appropriate AS/NZS 2208 test programme been identified?	☐	☐	☐
	Has a recognised testing laboratory been selected?	☐	☐	☐
	Has CSI been consulted regarding the proposed testing programme?	☐	☐	☐
Certification Documentation	Are product specifications complete?	☐	☐	☐
	Are technical drawings available?	☐	☐	☐
	Are previous test reports available (where applicable)?	☐	☐	☐
	Is all supporting technical documentation available?	☐	☐	☐
Management Systems	Are procedures available for the control of non-conforming products?	☐	☐	☐
	Is a corrective action process implemented?	☐	☐	☐
	Are internal quality records maintained?	☐	☐	☐
Certification Maintenance	Are processes in place to manage product or design changes?	☐	☐	☐
	Is ongoing surveillance understood?	☐	☐	☐
	Is management committed to maintaining certification?	☐	☐	☐

CSI Recommendation

Manufacturers should complete this checklist before submitting an application for product certification.

Where several questions cannot be answered **"Yes"**, Certification Solutions International recommends resolving those issues before commencing formal laboratory testing. Early identification and correction of deficiencies frequently reduces project costs, avoids unnecessary testing and assists manufacturers in achieving certification more efficiently.

CSi Technical Insight

Experience gained through product certification, manufacturing assessments and witness testing has demonstrated that the majority of certification delays are not caused by product failure during testing. More commonly, delays result from incomplete technical documentation, inadequate production controls, poor traceability or insufficient preparation before testing commences.

Manufacturers who undertake a structured readiness review before applying for certification generally experience a more efficient certification process, improved communication with the certification body and greater confidence in maintaining ongoing conformity throughout the certification cycle.

17.13 Chapter Summary

Appendix A of AS/NZS 2208 introduces the principles of product conformity by recognising that product performance depends upon considerably more than successful laboratory testing.

Throughout this chapter, manufacturers have been encouraged to view accredited product certification as a comprehensive conformity assessment process integrating product testing, technical evaluation, manufacturing controls, Product Quality Plans, production quality control, traceability and ongoing surveillance.

Accredited product certification provides independent confidence that certified products continue to comply with the applicable Standard throughout the certification lifecycle rather than only at the time of initial testing.

Manufacturers who establish effective production systems, maintain comprehensive technical documentation and actively manage product conformity are better positioned to achieve efficient certification, maintain certification throughout the surveillance cycle and provide confidence to regulators, specifiers, builders and consumers.

Certification Solutions International considers accredited product certification to be a continuing partnership between the manufacturer and the certification body, with the shared objective of maintaining confidence in certified products throughout their service life.

Final CSi Technical Insight

Accredited product certification should not be viewed as the conclusion of a testing programme.

Rather, it represents the commencement of an ongoing commitment to product conformity.

Manufacturers who integrate certification requirements into product design, manufacturing, quality management and continual improvement generally experience more consistent product quality, reduced production variation, greater confidence during surveillance assessments and stronger market confidence in their certified products.

The most successful certification programmes are those where conformity is built into the manufacturing process from the outset rather than verified only after production has been completed.