

SCHEME FOR THE CERTIFICATION OF DESIGN (BUILDING STRUCTURES)

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Chairman of Scottish Registration Board
Structural Engineers Registration Ltd

About me

- Regional Director in Glasgow for Peter Brett Associates, a leading development and infrastructure consultancy
- Chartered Engineer with 30+ years experience
- Approved Certifier of Design since 2005
- Member of Scottish Registration Board (SRB) since 2007
- Chairman of the SRB since 2012

Content

Brief history of design certification in Scotland

SER Scheme

Approved Certifier

Scope of certification

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Issues/concerns

BSD research projects

Building Regulations in Scotland

- Can be traced back to AD 1119 with the creation of the Royal Burgh of Berwick
- Initially concerned with structure, fire, health and sanitation
- Need to rationalise standards led in 1954 to setting up of Committee on Building Legislation in Scotland
- The report of the committee *The Guest Report* was published in 1957
- Building (Scotland) Act 1959

Certification of design

- In 1986 the Housing (Scotland) Act paved the way to certification of structural designs being incorporated into the 1990 Building Standards
- The enabling legislation entitled any chartered member of the Institution of Civil Engineers or the Institution of Structural Engineers to sign a certificate confirming that calculations demonstrating compliance with the relevant standards had been carried out.

Certification of design

- During the 1990's it was widely acknowledged that the legislation did not give sufficient confidence that the requirements of the regulations were being met.

Certification of design

- There was no requirement for the engineer to be experienced in the design of buildings
- No requirement to demonstrate any knowledge of the regulations.
- No requirement to keep up to date with the relevant legislation, design standards and best practice
- Furthermore the certificate that was provided (Form 4A/4B) became more of a promise that the structural design would be carried out rather than confirmation that the design had been carried out.

Certification of design

- The Building (Scotland) Act 2003 introduced the concept of:
 - Approved Certifiers of Design
 - Approved Bodies

Certification of design

- The Building (Scotland) Act 2003 requires members of certification schemes, amongst other things, to:
 - be suitably qualified and experienced
 - undertake relevant CPD
 - allow their activities to be audited
 - be employed by an approved firm which has professional indemnity insurance

Certification of design

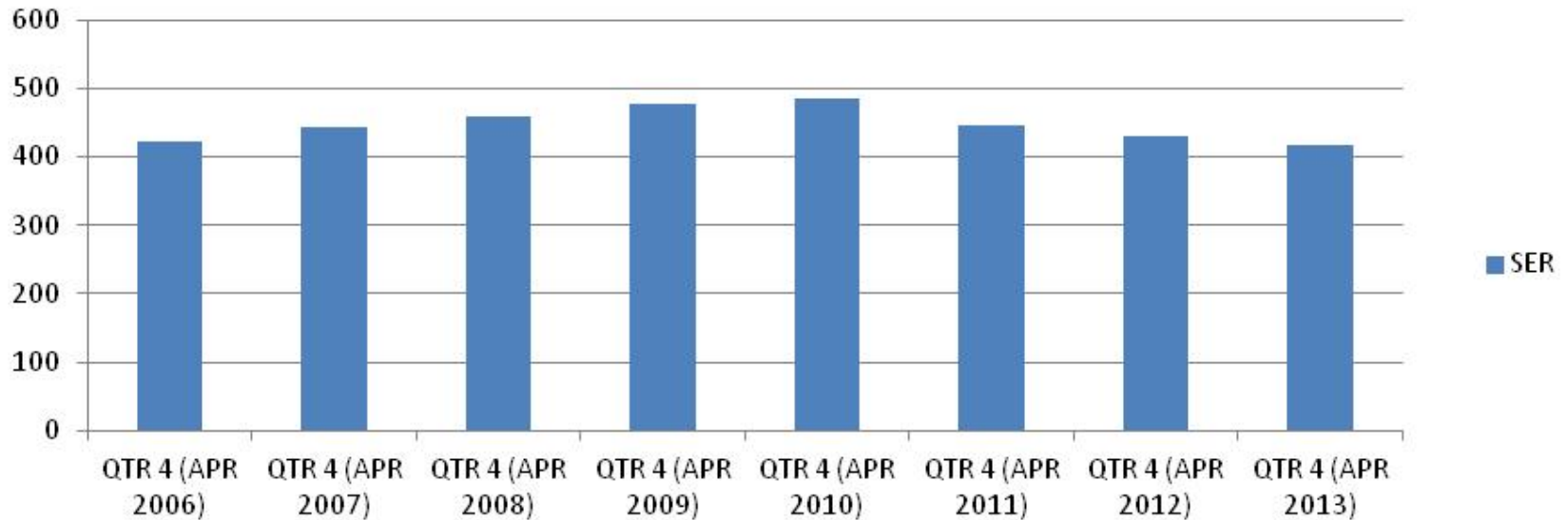
- The Scottish Government appointed Structural Engineers Registration Ltd (SER) to provide a scheme for the Certification of Design (Building Structures)

Structural Engineers Registration Ltd

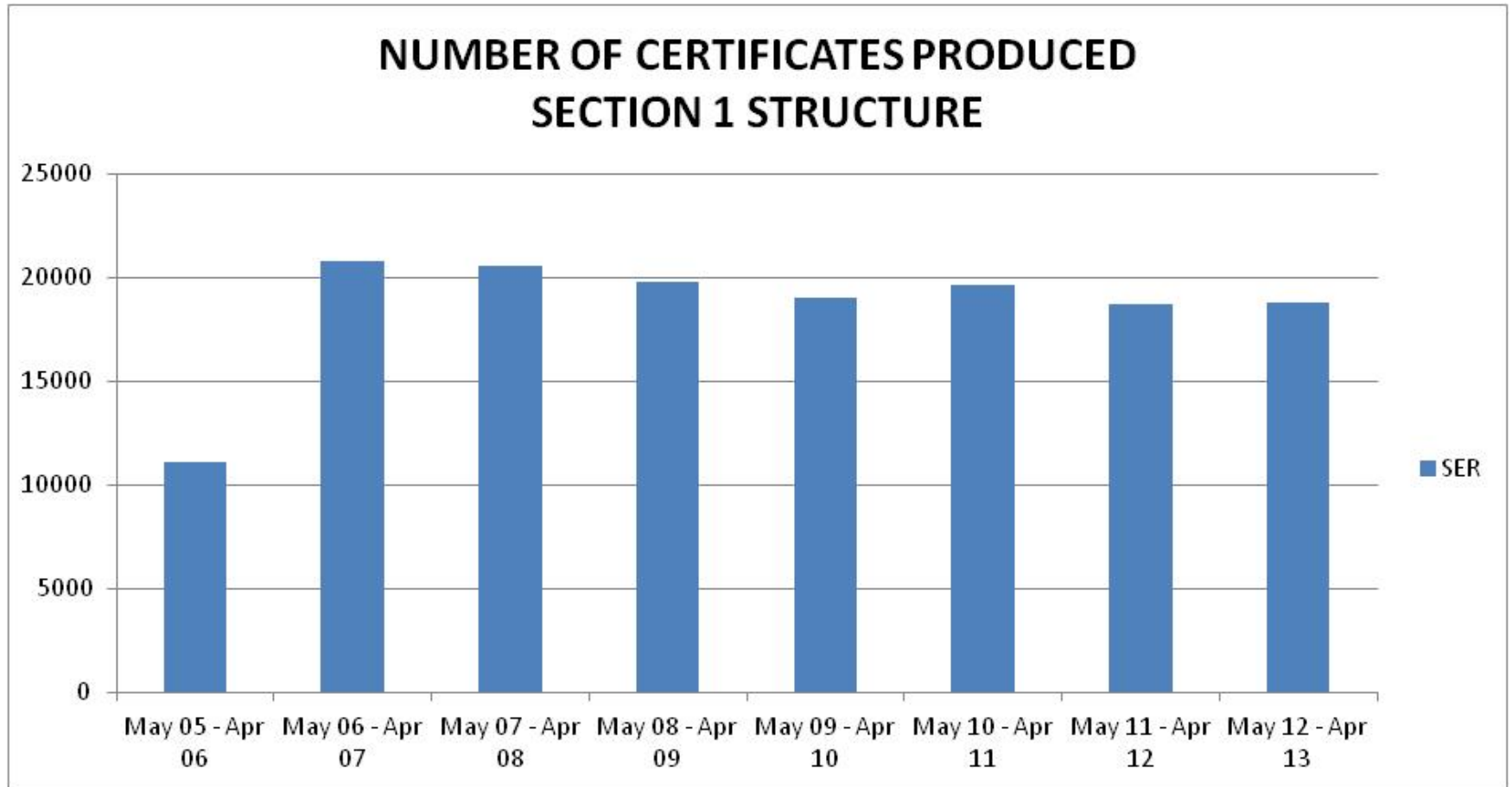
- SER is a collaboration between the Institution of Structural Engineers and Institution of Civil Engineers
- The company is wholly owned by IStructE
- SER also operates a scheme for the States of Jersey

The SER Scheme in Scotland

NUMBER OF APPROVED CERTIFIERS
SECTION 1 STRUCTURE



The SER Scheme in Scotland



Criteria for membership

- Member or fellow of IStructE or ICE
- 5 years post-chartered experience of the design and construction of building structures
- Be able to demonstrate knowledge and experience of Scottish Building Standards system
- Must be employed by an Approved Body
- Must agree to submit details of CPD undertaken

Duties of Approved Certifier

- Must be satisfied that he is competent to certify a particular design
- Must undertake certification in a methodical manner
- Must keep adequate records of the certification process to be made available for audit
- Must ensure that the design is complete and that it has had the appropriate level of checking

Duties of Approved Certifier

MUST NOT

- Sign a certificate for work that does not comply with the regulations
- Sign a certificate if the design is incomplete and/or has not been appropriately checked
- The Act states that any certifier who issues a certificate which is false or misleading or who issues a certificate recklessly is guilty of an offence.

Scope of certification

The declaration on the certificate is:

I certify that ... the structural design complies with the Building (Scotland) Regulations 2004 with respect to Standards 1.1 and 1.2 ...

Scope of certification

standard

1.1

mandatory

Every **building** must be designed and *constructed* in such a way that the loadings that are liable to act on it, taking into account the nature of the ground, will not lead to:

- (a) the collapse of the whole or part of the *building*;
- (b) deformations which would make the *building* unfit for its intended use, unsafe, or cause damage to other parts of the *building* or to fittings or to installed equipment; or
- (c) impairment of the stability of any part of another *building*.

The standard refers to the **building** not to the structure

Scope of certification

Building is defined as any structure or erection, or part thereof, whether temporary or permanent

It therefore includes the following:

- Cladding and glazing
- Ceilings
- Non-loadbearing walls
- Staircases
- Protective barriers
- etc

Audits

- An important aspect of the certification schemes is the requirement for the auditing of Approved Bodies and Approved Certifiers
- It is through auditing that there can be confidence that the statutory requirements are being met.
- The Verifiers, SER and other scheme providers are all audited by BSD

Audits

- It is by auditing Approved Bodies and Approved Certifiers that their performance can be monitored
- The main purpose of the audit is to check that the design and detailing is being carried out and checked and that the project is being certified using an acceptable methodology
- The purpose of the audit is **NOT** to check the design

What does the audit cover?

- Did the certifier identify all of the building elements covered by the warrant application?
- Had the elements above been designed and detailed and appropriately checked?
- Were any items, which are to be designed by a third party specified in sufficient detail?
- Was the level of information submitted for warrant adequate?
- Was the design completed before the certificate was signed ?

The audit

Scheme for Certification of Design (Building Structures)

*The Institution
of Structural
Engineers*



ice
Institution of Civil Engineers

**Scheme for Certification of Design
(Building Structures)**

**Procedures for Auditing the Activities of
Approved Bodies and Approved Certifiers**

October 2011



The audit

- The procedures describe how the audit will be undertaken
- They describe 31 criteria against which certifiers are audited

Audit criteria

1 Procedures and Planning

- P1A Scope of Certification
- P1B Certification Plan
- P1C Project Records
- P1D Programming of Work
- P1E Yet to be designed details
(schedule 1)

2 General Design Overview and Parameters

- P2A Loading Assessment
- P2B Overall Stability
- P2C Disproportionate Collapse
- P2D Conversions
- P2E Structural movement joints

3 Reports and Investigations

- P3A Ground Investigation Report
- P3B Existing Building Condition Assessment

4 Design (Principal Structure)

- P4A Mineral consolidation
- P4B Substructure (excluding Piling)
- P4C Piling
- P4D Earth Retaining Structures
- P4E Ground Improvement
- P4F Superstructure
- P4G Ties Fixings and Connections

5 Design (Building Envelope)

- P5A Cladding System (including glazing)
- P5B Cladding fixings and supports
- P5C Cladding movement joints

Audit criteria

6 Design (Secondary Structure)

- P6A Ties and connections
- P6B Internal (Non-loadbearing) partitions
- P6C Protective Barriers

7 Specification

- P7A Structural Materials
- P7B Structural Components
- P7C Structural Fixings

8 Structural Fire Protection

- P8A Elements of Structure
- P8B Single Storey Portal Framed Buildings

9 Requirements of Membership of the Scheme

- P9A Operating within the limits of declared competence

Audit criteria

Reference	Sub-Classification and auditor action	Background and Evidence	Major Non-Conformances	Improvement Issues
P6C	<p>Protective Barriers</p> <p>Auditors should check that the certifier has made adequate enquiry regarding the ability of any pedestrian or vehicle barriers within the building to withstand design loads.</p>	<p>Standards 4.4 and 4.12 require the provision of protection for pedestrians and vehicles respectively to changes in level within the building. Protection may take various forms including walls, partitions, fixed glazing handrails or parapets.</p> <p>The Guidance contained within the Technical Handbooks accompanying the Building Standards recommends that these should be designed to withstand loads calculated in accordance with BS 6399: Part 1.</p> <p>Evidence will comprise structural calculations and/or test certification carried out in accordance with an appropriate national or European technical standard.</p>	<p>Absence of performance specification (contractor designed elements only).</p> <p>Use of incorrect loadings in design or performance specification.</p> <p>Absence of suitably designed and checked calculations or test results (barriers not listed in Schedule 1) and/or details.</p> <p>Where certified on the basis of test results failure to check compatibility with other supporting elements.</p> <p>Insufficient details / performance specification.</p> <p>In the case of licensed sports grounds failure to refer to or address Guide to Safety at Sports Grounds.</p>	<p>Deficiencies in the building warrant plans / plans do not adequately detail how the barrier system is to be constructed.</p> <p>Absence of reference to BS 585 or BS6180 as appropriate.</p> <p>Where contractor designed option used the Certifier has failed to make, or record, adequate enquiry regarding the design of the barrier and/or the experience of the engineers undertaking the design.</p> <p>Where contractor designed option used deficiencies in the performance specification.</p> <p>Inadequate or insufficient design calculations.</p>

Information to be made available

- Certification plan and scoping document
- Drawings submitted with the warrant application (architect's and engineer's)
- Calculations
- Specifications
- SI reports, survey reports, etc

Audit outcome

- A No action required, next audit in 3-5 years.
- B Auditee to implement corrective action, next audit in 3-5 years.
- C Auditee to implement corrective action and a follow up audit in 6-12 months required to monitor implementation
- D1 Warning of suspension pending mentoring by member of SRB and review of proposals for corrective actions. Then follow up audit in 6-12 months

Audit outcome

- D2 Suspension of membership pending mentoring by member of SRB, review of proposals for corrective action, then formal interview. If readmitted follow up audit within 6-12 months
- E Withdrawal of membership

Issues

- The Act requires a building warrant to have been granted before any work is carried out

The system is pre-emptive

Issues

- Often there is a desire to submit a warrant application early in the project programme.
 - to demonstrate that a key project milestone has been achieved or to obtain the verifier's comments on items of non-certified work.
- Structural design lags behind architectural design
- Some elements are designed by a third party employed by the contractor
- Certificate of design required to get discount

Staged Warrants/Schedule 1

- The legislation makes provision for a building warrant to be applied for and granted in stages.
- *9 (4) Where this subsection applies, the verifier may grant a building warrant for the construction or demolition of the building subject to the condition that work on the stage in question is not to be proceeded with until—(a) such further information relating to that stage as the verifier may require is submitted to it, (b) it is satisfied, on the basis of that information, as to the matter specified in subsection (3), and (c) it has made an amendment to the warrant authorising the work to proceed.*

Use of Schedule 1

- There is a reluctance to use staged warrants
- There is a procedure which, under certain circumstances, permits the certification of the design of certain building elements that are normally designed by a designer employed by the supplier or contractor to be undertaken on the basis of a performance specification provided as part of the warrant application.
- These elements are listed on Schedule 1

Use of Schedule 1

- Original intention was that this would apply to discrete minor elements the design for which is not available at the time the warrant application is made eg timber roof trusses
- It is now being used for mutually dependent elements, such as the entire building envelope
- Some consultants are using it because the design has not been sufficiently developed
- And some are using it to limit the amount of work they have to do!

Use of Schedule 1

- SER are about to issue more detailed guidance in a revised version of Technical Bulletin 1
- This will restrict the use of schedule 1 and will place a greater emphasis on the use of staged warrants
- If the information required by the Procedural Guidance issued by BSD (Blue Book) cannot be provided, stage the warrant

The Blue Book

Procedural Guidance on Certification
including information to be submitted
with a Building Warrant Application

April 2010
Version 2



Checklist 1 – All Houses

Building Element	Information to be shown on the warrant plans	Incl	n/a
Ground Conditions	A description of the soil/rock type onto which the foundation will be constructed and a note of the required bearing capacity. [See also note 1]		
Mineral consolidation	Limits of the consolidation perimeter		
Piling	Pile and ground beam general arrangement to include, commencement level, cut off level, design load and typical pile cap details.		
Vibro compaction	Anticipated layout of stone columns; diameters and notional centres; required safe bearing capacity and details of site testing.		
Ground improvement	Typical details including dimensions, change of level; material specification and typical reinforcement details where appropriate.		
Spread foundations			
Walls	All walls that are necessary for the stability of the structure must be shown. [See note 5] Leaf construction and dimensions, cavity width, mortar designation, wall tie type and spacing. Span, dimension and material of beams and lintels, padstone details and bearing requirements. Wind posts and fixings		
Cladding	Details of any external cladding material, glazing and its fixing to the structure of the house		
Roofs	General plan of truss layout. [See note 5] Typical truss shapes. Loading to be sustained, on rafters and ties including location of water tanks. Support details, and typical tying down details. Plan of roof showing stability bracing and location / centres of tying down details		
Beams and Lintels	Material, location, dimensions, bearing and lateral restraint.		
Fixings and supports	Details of spacing and fixing of restraint ties between external walls, floors and roof trusses at both rafter and ceiling tie level		
Protective barriers / handrails	Location and typical construction details and design loading.		
Floors	Materials, dimensions, centers, span and span direction of structural flooring materials including trimming details for openings.		
Earth retaining structures	Typical details of retaining walls included within the scope of the warrant application; layout, dimensions, construction and typical reinforcement details. [See note 2]		

Additional requirement for Timber Framed Houses

Underbuilding	Details of underbuilding and panel tie down (including internal racking panels) to foundations / sole plate restraint to underbuilding.		
Walls	Stud general arrangement and dimensions including cripple studs and the locations of any additional studs required to accommodate high local loads from roof trusses, water tanks etc. [See Note 3]		
Walls	All timber framed walls that are necessary for the stability of the structure must be shown		
Walls	Nailing Schedule and platform connection to wall panels. [See note 4]		

Form Q

- Clients often not aware this needs to be submitted with the Completion Certificate
- Frequently, Approved Certifiers are receiving information for review at after the work has been constructed.
- Many instances where information is not forthcoming due to contractual dispute or due to party going out of business.
- Anecdotal evidence that verifiers are still issuing Completion Certificates without a Form Q

Form Q

- SER have agreed with BSD and LABSS that greater control is required and that Form Q should be issued by SER
- SER can then audit the process of review by certifier
- This facility is to be built into the revamp of SER's IT system

Timing of certificate

- Design certificate has to be submitted with the warrant application to get the discount.
- In reality, design is rarely complete at submission stage and changes occur between application for and granting of warrant.
- The implications of allowing the certificate to be submitted later in the approval process are being considered.

BSD Research Project

 The Scottish Government

BRE
**A study into the level of
checking of structural
design**

Date: April 2014

A8331628

A study into the level of checking of structural design

BSD Research Project

- SER Scheme *'has been shown to be robust and to set high standards'*
- Each verifier has their own approach, with only a few having experienced engineers
- Assessment of competence is not consistent amongst verifiers
- *'There was lack of consistency and indeed transparency in the approach amongst the verifiers to structural checking.'*

BSD Research Project

- *The approach typically reflected the resources available to the verifier*
- *‘all verifiers interviewed had procedures in place to manage structural checking.’*
- *‘There was no evidence that the end products of certified and non-certified approaches were different’*

BSD Research Project

- SER intend to issue further guidance on the certification of the design of work which might be classified as low complexity and low risk.
- The intention is to encourage certification of lower value work by demonstrating that certification is not too onerous for small projects.

BSD Research Project

- Do the different approaches result in the in the same level of confidence that the regulations are being met?
- Is it appropriate that there are two significantly different approaches to checking compliance?
- BSD held a workshop in September to consider these and other issues.

Liaison between BSD/LABSS/SER

- The regular meetings are proving to be very helpful in resolving issues.
- Many thanks to all involved

Thank you for listening