



CONFORMITY ASSESSMENT FOR THE EXECUTION OF STEEL & ALUMINIUM STRUCTURES

DOCUMENT CAESAS/1: SCHEME DESCRIPTION AND BENEFITS

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1 GENERAL BACKGROUND

TWI Certification Ltd has been assessed against the requirements of the Construction Products Regulation (CPR) 2011 (retained EU law No 305/2011) and BS EN ISO/IEC 17065 by the United Kingdom Accreditation Service (UKAS), the sole national accreditation body recognised by the UK Government. UKAS is independent of Government but is appointed as the national accreditation body by the Accreditation Regulations 2009 (SI No 3155/2009) and operates under a Memorandum of Understanding with the Government through the Secretary of State for Department for Business, Energy & Industrial Strategy (DBEIS). On the basis of satisfactory assessment by UKAS and its recommendation to DBEIS, TWI Certification Ltd has been approved by Ministry of Housing, Communities & Local Government (MHCLG), and has been designated to carry out conformity assessment according to the UK CPR operating under the UK Statutory Instrument (SI) No 1359 and as an Approved Body for the SI (AB 2400). The UK Approved Body status and scope of conformity assessment of TWI Certification Ltd is published at <https://www.gov.uk/uk-market-conformity-assessment-bodies>.

For manufacturers exporting into Europe and requiring EU FPC certification to CE Mark their products, TWI Certification Ltd has entered into partnership agreements with European Certification Body partners to continue to offer this service. These partnerships enable customers to hold certification to UKCA, CE(UK)NI and CE mark their products under one assessment. TWI Certification Ltd will conduct the assessment and then both Certification Bodies will conduct the evaluation review and certification decision. Agreement with the customer will be required to allow TWI Certification Ltd to share client data or information with the European partner. Formally the customer will be required to have a contract with the European partner and a contract with TWI Certification Ltd to issue the EU and UK FPC certificates, if all is successful under assessment.

Current harmonised European standards for construction products have become UK designated standards. There has been no change in the essential requirements for certification.

The relevant European harmonised Standard for UKCA / CE(UK)NI Marking of fabricated steelwork is EN 1090-1 Execution of steel structures and aluminium structures, the other two essential parts are as follows

Part 2 Technical requirements for the execution of steel structures

Part 3 Technical requirements for the execution of aluminium structures

BS EN 1090-2 supports the application of EN 1090-1 by providing the technical requirements relevant to the manufacture of steel components. BS EN 1090-3 supports the application of EN 1090-1 by providing the technical requirements relevant to the manufacture of aluminium components. With respect to UKCA / CE(UK)NI Marking the relevant clauses of BS EN 1090-2 and BS EN 1090-3 are as follows:

• Documentation (clause 4 and Annex A) additional information, list of options and requirements related to the execution classes

1. Scope
2. Normative references
3. Terms and definitions
4. Specifications and documentation
5. Constituent products
6. Preparation and/or assembly
7. Welding
8. Mechanical fastening (and adhesive bonding) (for aluminium only)
9. Erection
10. Surface treatment
11. Geometrical tolerances
12. Inspection, testing and correction

How to determine the correct Execution Class

BS EN 1090 Parts -2 and -3 introduce the concept of Execution Class. Four execution classes 1 to 4, denoted EXC1 to EXC4, are given, for which requirement strictness increases from EXC1 to EXC3 with EXC4 being based on EXC3 with further project specific requirements.

Each Execution Class contains a set of requirements for fabrication and erection and these requirements may be applied to the structure as a whole, an individual component or a detail of a component. A single structure may include several execution classes. Those items that are dependent on the choice of Execution Class are itemised in BS EN 1090-3 Reference Section 4.1.2 guidance on Execution Classes.

It is a design decision for the specifier to select the Execution Class required for the structure, the individual component or the particular detail of a component. The main reason for giving four execution classes is to provide a level of reliability against failure that is matched to the consequences of failure for the structure, the component or the detail. Execution Class is widely used throughout the Standard as a reliability differentiator for providing choice of quality, testing and qualification requirements.

For general guidance please refer to Appendix 1 (Aluminium).

Welding Coordination

For Execution Classes 2, 3 and 4, welding coordination shall be maintained during the execution of welding by welding coordination personnel suitably qualified for, and experienced in the welding operations they supervise as specified in EN ISO 14731.

For general guidance please refer to Appendix 2.

Weld Quality Levels

Information on weld quality levels is given in BS EN 1090-2 Clause 7.6 which references EN ISO 5817: "Welding. Fusion-welded joints in steel, nickel, titanium and their alloys (beam welding excluded). Quality levels for imperfections" for steels structures, and BS EN 1090-3 Clause 12.4.4 which references EN ISO 10042: "Welding — Arc-welded joints in aluminium and its alloys — Quality levels for imperfections" for aluminium structures.

2 Assessment and Verification of Constancy of Performance of Construction Products

The Assessment and Verification of Constancy of Performance (AVCP) is a system defining how to assess products and control the constancy of assessments results. Depending on the required level of safety criticality of a product (i.e., structural products are usually very safety critical, decorative products are usually not critical), UKCA / CE(UK)NI Marking can involve different systems of AVCP of construction products in relation to their essential characteristics. For safety-critical products, this will normally involve testing, inspection and certification by a third-party body. For non-safety critical products, the UKCA / CE(UK)NI marking will usually involve a manufacturer's declaration only, without third party involvement.

The systems of AVCP of construction products are set by the Commission for product families. There are five given systems. For each AVCP system the manufacturer must have factory production control (FPC) and initial type-testing (ITT), and produce a manufacturer's declaration of performance.

The AVCP systems are 1+, 1, 2+, 3 and 4 the highest being 1+ and the lowest level being 4. The processes involved in attaining the requirements of each system and who is responsible for those processes are shown in Table 1. The assessment systems are established in Article 28 and Annex V of the UK CPR.

Under AVCP system 2+ the tasks to be carried out by an Approved Body (TWI CL) are initial inspection of the factory and of Factory Production Control (FPC), continuous surveillance, assessment and evaluation of the FPC. When satisfactorily carried out this results in the issue of a UK Certificate of Conformity.

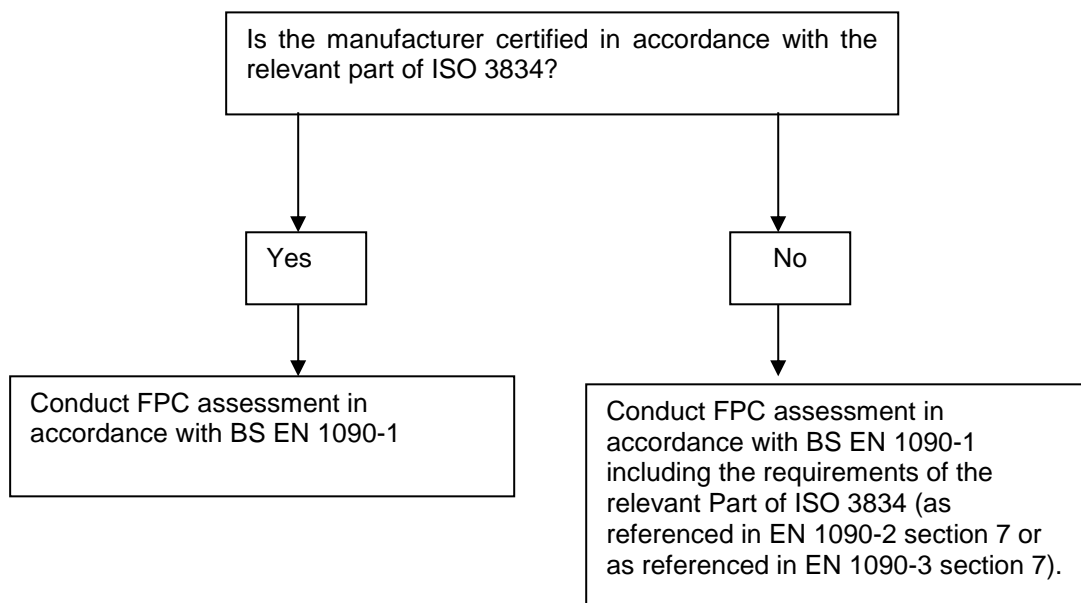
Table 1

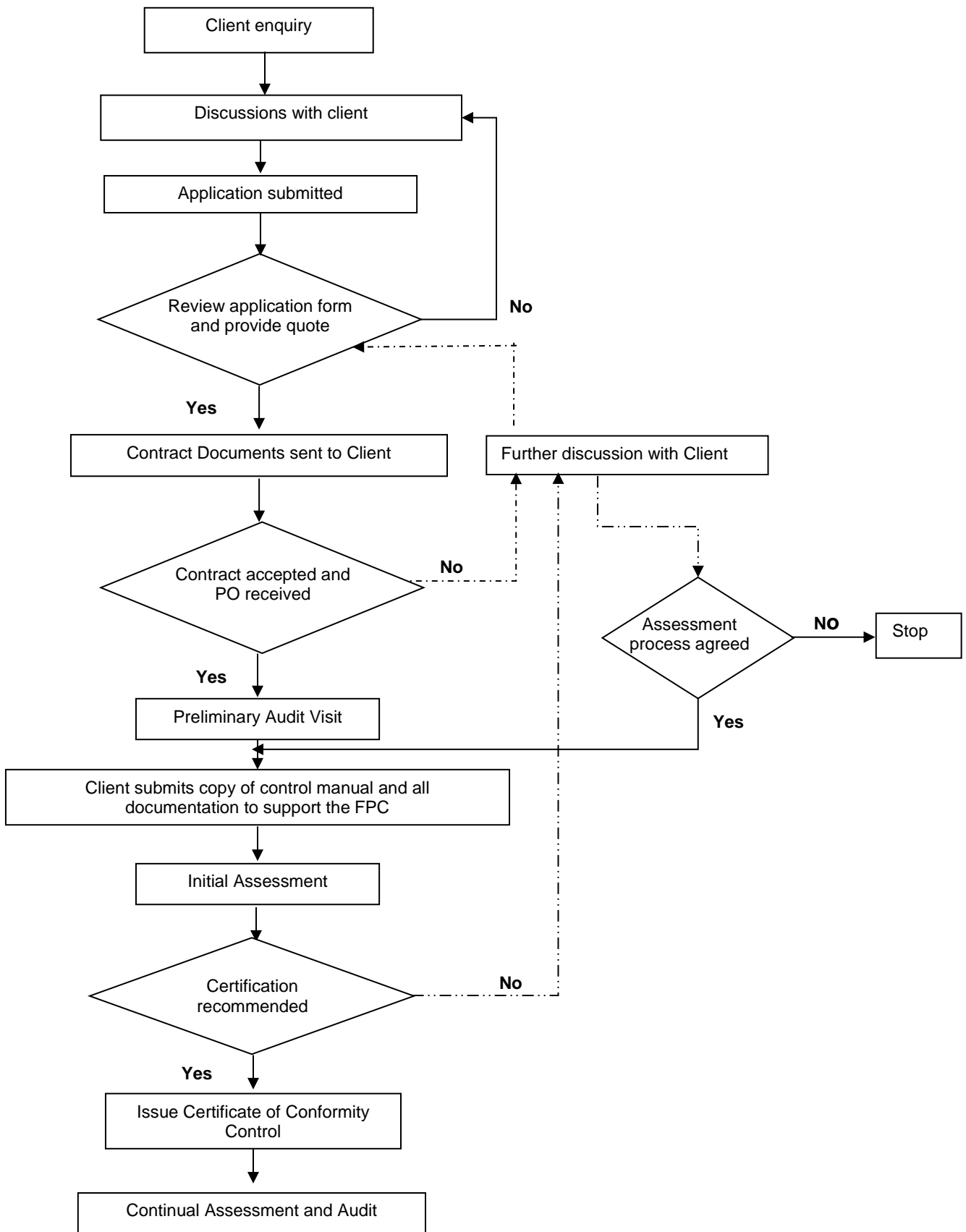
Tasks for Manufacturer	1+	1	2+	3	4
Factory Production Control (FPC)	✓	✓	✓	✓	✓
Further testing of samples taken at factory according to prescribed test plan	✓	✓	✓		
Determination of product type on basis of type testing, type calculation, tabulated values or descriptive documentation of product			✓		✓
Tasks for the approved body	1+	1	2+	3	4
Determination of product type on basis of type testing, type calculation, tabulated values or descriptive documentation of product	✓	✓		✓	
Initial inspection of the manufacturing plant and of FPC	✓	✓	✓		
Continuous surveillance, assessment and evaluation of FPC	✓	✓	✓		
Audit testing of samples samples taken before placing product on the market	✓				

The TWI CL scheme for Conformity Assessment of the Execution of Steel and Aluminium Structures (CAESAS) in accordance with the requirements of the standard BS EN 1090-1 covers the essential parts of Factory Production Control (FPC) requirements, it also covers a large part of the requirement for a satisfactory assessment of the manufacturer in accordance with the WFCS for the relevant Part of ISO 3834 (as referenced in EN 1090-2 section 7 or as referenced in EN 1090-3 section 7).

3 Flow Chart for **EG UK Certificate of Conformity Procedure**

The following flow chart shows the TWI Certification Ltd process, from the initial receipt of an enquiry to the issue of a UK Certificate of Conformity in accordance with EN 1090-1.





Action	By Whom
1) Apply for certification	Applicant
2) Fill in Preliminary enquiry	Applicant
3) Review & issue of quotation and contract	TWI
4) Carry out preliminary visit	Assessor/Lead assessor
5) Send Document Review information as requested by TWI CL	Applicant
6) Assess Document Review	Assessor/Lead assessor
7) Initial Assessment	Lead assessor
8) Report Finding to TWI Certification Ltd	Lead assessor
9) Report findings to Management Committee	TWI Certification Ltd
10) Invoice Applicant	TWI Certification Ltd
11) Pay Invoice	Applicant
12) Confirm Certification	Management Committee/Scheme Manager
13) Issue Certificates	TWI Certification Ltd

As part of the factory control process verification in quality terms, welding is identified as a 'Special Process' which means that it requires specialist management, personnel and procedures. This has led to a number of developments, notably the publications of BS EN ISO 3834. This document prescribes requirements to provide assurance of welding and fabricating competence, and includes the feature of welding co-ordination in which companies must nominate competent Welding Co-ordinators (Welding Engineers, Welding Supervisors, etc) who take responsibility for welding functions on behalf of their employers. Separate documents are available on the Certification of people with Welding Coordination responsibilities through CSWIP and/or through the European Welding Federation (EWF)/International Institute of Welding (IIW).

4 OUTLINE OF THE WELDING FABRICATOR CERTIFICATION SCHEME (WFCS)

ISO 3834 defines management quality requirements for fusion welding it incorporates the following parts:

- ISO 3834 Quality Requirements for Fusion Welding of Metallic Materials
- Part 1: Criteria for the Selection of the Appropriate Level of Quality Requirements
- Part 2: Comprehensive Quality Requirements
- Part 3: Standard Quality Requirements
- Part 4: Elementary Quality Requirements
- Part 5: Documents with which it is necessary to confirm to claim conformity to the quality requirements of 3834-2, 3834-3, 3834-4.
- Part 6: Guidelines on implementing ISO 3834.

The TWI Certification Ltd scheme is administered by the Welding Fabricator Certification Management Committee (WFCMC) and the Certification Board for certification of TWI Certification Ltd.

Companies that meet the requirements of the Scheme are entered on the TWI CL Register of Certified Companies located at <https://www.twicertification.com/validation/>. All registered companies receive a CAESAS/EN 1090 Certificate from TWI Certification Ltd and are permitted to use the scheme logo.

5 BENEFITS FOR REGISTERED COMPANIES

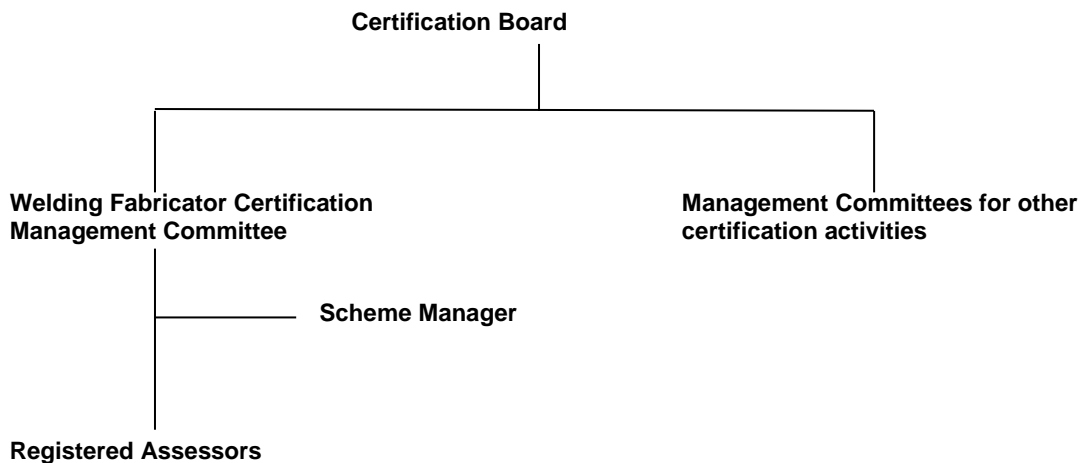
- Clear, high profile independent verification of its compliance with BS EN 1090 and UKAS requirements.
- Independent confirmation of competence for its welding and fabricating capabilities and staff in a defined scope of activity.
- Flexibility to UKCA, CE(UK)NI or CE mark through TWI CL and Partners
- Welding quality management and fabrication capability assessments carried out by specialist assessors registered by TWI Certification Ltd.
- Increased national and international business potential through demonstrated compliance with legal manufacturing requirements which are internationally recognised.
- Companies who do not wish to have their Quality Management system certificated to the full requirements of ISO 9001 can have their welding quality system and FPC in accordance with EN 1090 and also competence assessed against ISO 3834 and registered under the Schemes.

6 BENEFITS FOR CLIENTS OF REGISTERED COMPANIES

- Expertly led, independent, vendor assessment.
- In-depth, authoritative evaluation of fabricator's capability.
- Consistent assessment.
- Uniform presentation of information and data.

7 ORGANISATIONAL STRUCTURE

The certification management structure of TWI Certification Ltd is as follows:



8 SCHEME OPERATION

Applicant companies are audited by assessment teams specifically approved by the Scheme Manager. Assessors have proven welding knowledge and experience, and this ensures that assessment is expertly directed and that the results are authoritative.

Following assessment of the applicant company, the Lead Assessor reports the findings and the results to the Scheme Manager. If successful assessment and approval is given, the data will be entered onto the Register of Certified Companies. Registered companies are issued with a CAESAS Certificate

9 STEPS TO CERTIFICATION

The process for applicant companies involves the following stages:

- a) Submission of the application form directly to TWI Certification Ltd together with a copy of the organisation matrix.
- b) Notification to Applicant Company with quotation and assessment documentation for completion by the company.
- c) A Purchase Order number and signed contract returned by the applicant company. Work will not be invoiced until completed.
- d) Appointment/approval of Assessment Team by Scheme Manager.
- e) Preliminary evaluation (similar to a gap analysis) will be completed by the Lead Assessor to establish quality system status and scope of company facility.
- f) Planning of the assessment by Assessment Team.
- g) Assessment is carried out by the approved Assessment Team. During the assessment, one-to-one discussions and a shop floor walk around will be conducted with welding co-ordination personnel and verification of company capability obtained.

10 CERTIFICATION AND REGISTRATION OF APPLICANT COMPANIES BY TWI CERTIFICATION LTD

a) **Registration**

Lead Assessor will submit all relevant information to the Scheme Manager for inclusion on the Register of Certified Companies. This may include the following information:

- Factory Production Control
- Execution of steel structures
- Structural design process
- Classification and designation
- Current product range
- Maximum handling size and weight
- Product evaluation (Initial Type Testing)
- ISO 3834 for welding
- Welding co-ordination personnel
- Weldability/welding processes
- Materials and thickness ranges
- Equipment (i.e. welding, forming, machining and cutting facilities)
- Major use and control of sub-contractors
- Sub-contracting (relevant to fabrication)
- NDT facilities
- Heat treatment facilities
- Personnel
- Constituent products used in manufacture
- Component Specification
- Non-conforming products
- UK or CE (UK)NI Marking
- Training facilities
- Transportation limitations

This information will be made publicly available on the Certificate and Schedule.

b) **Certification**

A company that has demonstrated compliance with these requirements shall be issued with a Certificate of Conformity and Schedule identifying the relevant information. This will be awarded by TWI Certification Ltd. For companies that export into Europe and require CE marking, certification will be issued by a European Notified Body in partnership with TWI Certification Ltd.

c) **Surveillance of Registered Companies**

Surveillance visits will be performed in accordance with Table B.3 of BS EN 1090-1.

Surveillance intervals between inspections, as listed in Table B.3 in BS EN 1090-1

Execution class	Intervals between inspections of manufacturer's FPC after the ITT (years)
EXC 1 and EXC 2	1 – 2 – 3 – 3
EXC 3 and EXC 4	1 – 1 – 2 – 3 – 3

11 NOTIFICATION OF CHANGE OF CAPABILITY

The registered company shall notify the Scheme Manager immediately when there is any reduction in the facilities or capabilities assessed. Changes of welding co-ordination personnel shall be notified and any new appointees' documentation will be reviewed for adequacy and a one-to-one discussion with a shop floor walk around will be required.

An increase in the capability may be approved between assessments or surveillance visits, and will be entered as provisional on the database, until verified, as per the requirements of BS EN ISO 1090-1 (appendix "B" Section 4.1)

12 SCHEME DOCUMENTATION

CAESAS/1 Scheme Description and Benefits

13 FURTHER INFORMATION

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Appendix 1

BS EN 1090-3 recommends that the choice of execution class should also depend on the service category (SC)

From BS EN 1090-3 Reference Section 4.1.2 guidance on Execution Classes

From BS EN 1999-1: 2007+A1 2009 Annex A Section A.5 Determination of execution class

1) The recommended procedure for determination of the execution class is the following:

- a) Determination of consequences class, expressed in terms of predictable consequences of a failure or collapse of a component, see EN 1990
- b) Determination of service category and production category, see Table A.1 and A.2
- c) Determination of execution class from the results of the operations a) and b) in accordance with the recommended matrix Table A.3

BS EN 1999-1-1 Table A.3. Required additional information, options to be specified and requirements for execution classes

Consequences Classes		CC 1		CC 2		CC 3	
Service Categories		SC1	SC2	SC1	SC2	SC1	SC2
Production Categories	PC 1	EXC 1	EXC 1	EXC 2	EXC 3	EXC 3 ^a	EXC 3 ^a
	PC 2	EXC 1	EXC 2	EXC 2	EXC 3	EXC 3 ^a	EXC 4

^a EXC 4 Should be applied to special structures or structures with extreme consequences of a structural failure also in the indicated categories as required by national provision

BS EN 1999-1-1 Table A.2 Criteria for production categories

Categories	Criteria
PC1	<ul style="list-style-type: none"> • Non welded components
PC2	<ul style="list-style-type: none"> • Welded components

BS EN 1999-1-1 Table A.1 Criteria for service categories

Categories	Criteria
SC1	<ul style="list-style-type: none"> • Structures subject to quasi static actions ^a
SC2	<ul style="list-style-type: none"> • Structures subject to repeated actions of such intensity that the inspection regime specified for components subject to fatigue is required ^b

^a Guidance is given in EN 1999-1-3 whether a component or structure may be regarded as subject to quasi static actions and classified in category SC1.

^b Service category SC2 should be used for cases not covered by SC1.

Table B.1 Definition of consequences classes

Consequences Classes	Description	Examples of buildings and civil engineering works
CC3	High consequence for loss of human life, or economic, social or environmental consequences very great	Grandstand, public buildings where consequences of failure are high (e.g. a concert hall)
CC2	Medium consequence for loss of human life, or economic, social or environmental consequences considerable	Residential and office buildings, public buildings where consequences of failure are medium (e.g. an office building)
CC1	Low consequence for loss of human life, or economic, social or environmental consequences small or negligible	Agricultural buildings where people do not normally enter (e.g. storage buildings), greenhouses

Appendix 2

Technical Knowledge of the Coordination Personnel – Structural Carbon Steels

EXC	Steels (Steel group)	Reference Standards	Thickness (mm)		
			t ≤ 25 ^a	25 < t ≤ 50 ^b	t ≥ 50
EXC2	S235 to S355 (1.1, 1.2, 1.4)	EN 10025-2, EN 10025-3, EN 10025-4 EN 10025-5, EN 10149-2, EN 10149-3 EN 10210-1, EN 10219-1	B	S	C ^c
	S420 to S700 (1.3, 2, 30)	EN 10025-3, EN 10025-4, EN 10025-6 EN 10149-2, EN 10149-3 EN 10210-1, EN 10219-1	S	C ^d	C
EXC3	S235 to S355 (1.1, 1.2, 1.4)	EN 10025-2, EN 10025-3, EN 10025-4 EN 10025-5, EN 10149-2, EN 10149-3 EN 10210-1, EN 10219-1	S	C	C
	S420 to S700 (1.3, 2, 30)	EN 10025-3, EN 10025-4, EN 10025-6, EN 10149-2, EN 10149-3 EN 10210-1, EN 10219-1	C	C	C
EXC4	All	All	C	C	C

^a Column base plates and end plates ≤ 50mm
^b Column base plates and end plates ≤ 75mm
^c For steels up to and including S275, level S is sufficient
^d For steels, N, NL, ML, level S is sufficient

Technical Knowledge of the Coordination Personnel - Austenitic and Ferritic/Austenitic Stainless Steels

EXC	Steels (Steel group)	Reference Standards	Thickness (mm)		
			t ≤ 25	25 < t ≤ 50	t ≥ 50
EXC2	Austenitic (8) Ferritic (7.1)	EN 10088-4:2009, Table 3 EN 10088-5:2009, Table 4 EN 10296-2:2005, Table 1 EN 10297-2:2005, Table 2	B	S	C
	Austenitic-Ferritic (10)	EN 10088-4:2009, Table 4 EN 10088-5:2009, Table 5 EN 10296-2:2005, Table 1 EN 10297-2:2005, Table 3	S	C	C
EXC3	Austenitic (8) Ferritic (7.1)	EN 10088-4:2009, Table 3 EN 10088-5:2009, Table 4 EN 10296-2:2005, Table 1 EN 10297-2:2005, Table 2	S	C	C
	Austenitic-Ferritic (10)	EN 10088-4:2009, Table 4 EN 10088-5:2009, Table 5 EN 10296-2:2005, Table 1 EN 10297-2:2005, Table 3	C	C	C
EXC4	All	All	C	C	C

Technical Knowledge of the Coordination Personnel – Aluminium

EXC	Parent Material	Type of Welding Consumables			
		Type 3, Type 4		Type 5	
		Nominal thickness of material in mm		Nominal thickness of material in mm	
		$t \leq 12^{a=}$	$t > 12$	$t \leq 12^{a=}$	$t > 12$
EXC2	3XXX, 5,XXX	B	S	B	S
	Other			S	
EXC3	3XXX, 5,XXX	S	S	S	C
	Other		C	C	
EXC4	All	C			

B = Basic technical knowledge according to EN ISO 14731

S = Specific technical knowledge according to EN ISO 14731

C = Comprehensive technical knowledge according to EN ISO 14731