

Information sheet about the certification process / assessment of conformity of reinforcing steel acc. SIA 262:2013

1. General

The Empa certification section offers the evaluation, review and assessment of certain construction products according law and regulations in Switzerland. As an accredited lab Empa performs initial type tests as well as tests during the continuing surveillance.

The major focus of Empa CB is the assessment of conformity of prestressing steel.

According the working group decision Empa CB is involved in the assessment of conformity. That means the manufacturer provides the full and comprehensive documentation about the quality controls acc. prEN10138 to Empa CB. Test reports of accredited labs will be accepted. The evaluation will result in an Assessment of Conformity.

2. Basic informations according standards

Following standards and informations are applicable:

Standard SIA 262:2013 – concrete structures

- properties and requirements of prestressing steel are defined in article 3.3
- describes the quality assurance (article 3.3.3)
 - initial tests through an accredited testing lab
 - system of quality control through manufacturer (self-monitoring)
 - contractually regulated random testing by the manufacturers by an accredited conformity assessment body (external monitoring)

Standard SIA 262/1:2019 – concrete structures

- supplementary specifications

Standard prEN 10138-1* Prestressing steels - Part 1: General requirements

- defines requirements reg. self-control and external monitoring (kind of tests, number of tests, statistical evaluation)

Standard prEN 10138-2* Prestressing steels - Part 2: Wire

- defines the properties, labelling, tolerances and specific tests for wire

Standard prEN 10138-3* Prestressing steels - Part 3: Strand

- defines the properties, labelling, tolerances and specific tests for 3 and 7 wire strands

Standard prEN 10138-4* Prestressing steels - Part 4: Bar

- defines the properties, labelling, tolerances and specific tests for prestressing bars

Norm EN ISO 15630-3:2019 – Test methods prestressing steel products

- describes the test methods used for prestressing steel

* last draft is valid (at the moment FprEN 10138:2009)

3. Requirements and properties

Table 7 of SIA262:2013 recommends steel classes defines minimum requirements for prestressing steel products.

Table 7, SIA262:2013: Properties of prestressing steel

Erzeugnis	Durchmesser Ø [mm]	Querschnittsfläche A_p [mm ²]	Zugfestigkeit f_{pk} [N/mm ²]	Fließgrenze $f_{p0,1k}$ [N/mm ²]	Bezeichnung
Drähte	3,0	7,1	1860	1600	Y1860C-3,0
	4,0	12,6	1860	1600	Y1860C-4,0
	5,0	19,6	1860	1600	Y1860C-5,0
	6,0	28,3	1770	1520	Y1770C-6,0
	7,0	38,5	1670	1440	Y1670C-7,0
	8,0	50,3	1670	1440	Y1670C-8,0
	10,0	78,5	1570	1300	Y1570C-10,0
Litzen	12,9	100	1860	1600	Y1860S7-12,9
	15,3	140	1770	1520	Y1770S7-15,3
			1860	1600	Y1860S7-15,3
	15,7	150	1770	1520	Y1770S7-15,7
1860			1600	Y1860S7-15,7	
Stäbe (glatt oder gerippt)	20,0	314	1100	900	Y1100H-20,0
	26,0	531	1030	830	Y1030H-26,0
			1050	950	Y1050H-26,0
			1230	1080	Y1230H-26,0
	26,5	552	1030	830	Y1030H-26,5
			1050	950	Y1050H-26,5
			1230	1080	Y1230H-26,5
	32,0	804	1030	830	Y1030H-32,0
			1050	950	Y1050H-32,0
			1230	1080	Y1230H-32,0
36,0	1018	1030	830	Y1030H-36,0	
		1050	950	Y1050H-36,0	
		1230	1080	Y1230H-36,0	

Specific properties are defined in prEN10138. Requirements regarding relaxation, fatigue and corrosion tests are:

- class of relaxation R1
- Fatigue resistance class F1
- Stress corrosion resistance class C1

4. Certification process

The manufacturer must have experience in producing prestressing steel, must have an system of factory production quality control. The products must be known and not beyond the listed items in table 7 (in respect of strength class).

In order to apply the assessment of conformity it is required that the manufacturer is external controlled by an accepted institute or organisation (system 1+ is required).

Manufacturer that cannot show evidence according prEN10138 have to start a full certification program as foreseen in prEN10138.

5. Initial type testing

The manufacturer has to be prepared for initial type tests if assessment of conformity acc. 4. cannot applied. For that the requirements acc. prEN10138-1, chapt. 8.2, table 3 are valid.

STS0053 of Empa will be involved in the type tests. Certain tests can be subcontracted.

Table 3 of prEN10138-1: Type and number of tests for the initial type testing

Type and number of tests					
Geometrical and mechanical properties	Special properties				
	Stress-relaxation	Fatigue resistance	Deflected tensile behaviour ^a	Stress-corrosion resistance solution A ^b	Stress-corrosion resistance solution B ^c
16 tests (2 samples × 4 units per heat)	2 tests (1 per heat)	4 tests (2 per heat)	2 tests series (1 per heat)	2 test series (1 per heat)	2 test series (1 per heat)
^a Only for 7-wire strand and 7-wire compacted strand with a nominal diameter ≥ 12,5 mm. ^b Stress corrosion resistance tested with solution A according to EN ISO 15630-3 (Reference test). ^c See 8.2.					

6. Factory production control (FPC)

Provisions of factory production control have to fulfil prEN10138-1, chapter 8.3. The minimum frequency must be acc. table 5-7 of prEN10138-1 and has to presented to Empa CB.

7. External monitoring

The manufacturer must have an permanent external surveillance. Chapter 8.4 of prEN10138 applies. The minimum frequency must be according table 9.

Table 9 of prEN10138-1: Type and number of tests for the continuous surveillance

Frequency	Type and number of tests				
	Geometrical and mechanical properties	Special properties			
		Stress-relaxation	Fatigue resistance	Deflected tensile behaviour ^a	Stress-corrosion resistance solution A
Quarterly for each product type	8 tests	1 test	1 test	1 test series	1 test series
^a Only for 7-wire strand and 7-wire compacted strand with nominal diameter $\geq 12,5$ mm.					

The audit/inspection must take place at least twice a year (! ZA.2.2.2 of prEN10138, requires quarterly inspections !). The factory production is checked, samples for independent testing are taken. Empa accept external monitoring if all requirements of prEN10138 are met. The documentation for receiving an assessment of conformity must be clear and well organized to present it to Empa CB.

8. Assessment of conformity

The assessment of conformity is based on reporting the FPC to Empa CB and the verification of the external monitoring under the responsibility of the manufacturer.

Empa CB performs the assessment. Missing documents might be requested after 1st evaluation. The manufacturer is obliged to provide missing documents within 1 month after requesting. Otherwise the process will stop.

The institute responsible for the independent testing and inspections might be contacted during the process.

The letter of conformity close down the process of evaluation for the surveillance period (1 year). Once the letter is submitted clients (processors of prestressing steel) using the products do not have to show evidence to Empa CB in respect to the prestressing steel again.

If non-conformities are recognized Empa CB will not proceed with the process. In coordination with the manufacturer and the external inspector the non-conformities have to be eliminated first before proceeding the process.

9. Costs

Costs for the assessment and possibly tests are according Empa standard rates (minimum charges see Table 2). Invoices have to be paid within 30 days.

An cost estimation is being sent to the manufacturer before the assessment starts.

Table 2: Actual rates (2020) excl. VAT

Conformity assessment on	Minimum service fee
1 Product / type of product	1850,- CHF
2 Product / type of product	2500,- CHF
3 Product / type of product	3500,- CHF
Note	Tests at Empa will be invoiced as a separate dossier !

Attachment 1

A1. Checklist about required tests and controls

A. Control of the factory production control

A1. Control, properties and verifications

- Chemical analysis (C, Mn, Si, P and S and other elements)
- Profile / rib surface / thread / lay length / straightness / bending
- Characteristic values from tensile test for each unit of manufacture

A2. Suitability and condition of the test equipment

- Suitability of the test equipment
- Calibrating protocols
- Adjust the reading of the instruments

A3. Assessment of the tests

- Personal, education and experience
- Test set up and compliance with the standards

A4. Storage and traceability

- Suitability and condition of the depot
- labelling (name of the manufacturer, amount, cross section, quality, ...)
- Correct name of the prestressing steel / mistaken identity
- Traceability; heat and coil numbers

B. Check of the statically evaluation (longer period)

- Dimensions, sections and tolerances on sizes, characteristic values, min, max values
- 0.1% yield strength; min. values and 5% fractile
- Tensile strength, min, max, and 5% fractile
- Min. value A_{gt} (elongation at max load)

C. Sampling due external surveillance

- Scope according standards (with protocol)

D. Tests at the independent testing lab or at the manufacturer (witnessed)

- Common properties and features
- Tensile tests with assessment of mechanical properties
- Deflected tensile strength at strands $\varnothing \geq 12.5$ mm - max. D-value 28%
- Fatigue - class F1
- Relaxation - class R1
- Durability (corrosion) - class C1

E. Summary of the

- Factory production control
- Statistical evaluation
- Test results of external/independent testing
- Assessment of conformity

Attachment 2 – Empa Service GTC (02.2017, V1.3)

General Terms and Conditions for Empa Services (Empa Services GTC)

1. General

These General Terms and Conditions (GTC) regulate the completion, content and settlement of services between Empa and the Contractual Partner.

Alternative or additional regulations are valid only if agreed in writing and signed by both Empa and the Contractual Partner.

2. Conclusion of contract

The offer made by Empa to the Contractual Partner shall be regarded as an application. As soon as the Contractual Partner accepts the offer, the contract shall become valid. Empa shall send the Contractual Partner written confirmation of the contract.

3. Nature and scope of services

The services to be provided by Empa shall involve either

consulting, whereby Empa shall provide advice and support for the Contractual Partner regarding technological and scientific matters and provide its expert opinion

or

studies, such as tests of the Contractual Partner's materials, devices and procedures, improvements based on these tests, analytical studies and damage investigations.

The scope of services to be provided by Empa shall be determined by the offer and confirmation of the contract, including any annexes.

4. Reporting

4.1 The results of a service shall usually be summarised in a report. The report shall usually be written in German. If the Contractual Partner wishes to receive the report in another Swiss language or in English, it must notify Empa of this in writing before the latter starts its work.

4.2 Translations into any language other than those listed above are subject to special agreement. The associated extra costs shall be charged to the Contractual Partner.

5. Test materials/samples

Before Empa starts its work, the Contractual Partner must expressly instruct the latter as to whether or not the Contractual Partner wishes to receive back the test materials/samples provided (test materials, products, devices, etc.) after Empa has finished its work. If the Contractual Partner does not give any such express instructions, Empa shall be entitled to use these test materials/samples as it sees fit or to destroy them one (1) year after having finished its work. The Contractual Partner shall bear all transportation costs of test materials/samples (to and from Empa) and any test material/sample disposal costs incurred by Empa.

6. Deadlines

Agreed deadlines for providing a service are valid except in cases of force majeure. The deadlines apply only on condition that the Contractual Partner provides Empa punctually with the documents or test materials/samples required for the services to be provided.

7. Advertising using Empa reports

The use of Empa reports for any advertising purposes, including mere reference to the report, must be approved by Empa and is subject to a fee. This permission may be subject to conditions or constraints. Within the scope of the advertising authorisation given, Empa shall be released from its confidentiality obligation. Further details are provided in a special Empa information sheet ("Instructions for the use of Empa test reports for advertising purposes and when publishing their contents")

8. Confidentiality

8.1 Empa and the Contractual Partner undertake to treat as confidential both parties' commercial and business secrets that are revealed to them during the execution of the contract or made accessible to them in any other way, and not to pass contractual documents on to third parties. This duty of confidentiality applies for three (3) years after the start date of the relevant contract.

8.2 All information and data contained in the report pursuant to Section 4 is exempt from this obligation. The Contractual Partner is entitled to use such a report for its own purposes without any duties of confidentiality. On the other hand, Empa is obliged to treat such a report as confidential for an indefinite period of time, unless doing so is in serious breach of the public interest or of statutory provisions. In such a case, Empa is entitled to notify the responsible authorities.

9. Intellectual property

9.1 Any knowledge and skills provided by Empa (specifically, IP rights, know-how, analysis, methods, etc.) that it already possessed before the start of the contract shall remain Empa's exclusive intellectual property. Unless agreed otherwise, the knowledge and skills provided by Empa can be used by the Contractual Partner within its field of application, non-exclusively and free of charge, provided that this is necessary for the Contractual Partner to implement the results obtained.

9.2 The results contained in the report pursuant to Section 4 are the joint property of the Contractual Partner and Empa. These results can be used by the Contractual Partner within its field of business.

9.3 Empa is entitled to use these results, subject to its confidentiality obligation, within its teaching, research and development activities.

9.4 If the results can be patented, Empa and the Contractual Partner shall enter into a separate agreement concerning the modalities of the patent application, the allocation of costs, their respective rights of use, and appropriate compensation for Empa if the Contractual Partner exploits the patent commercially.

9.5 If, in providing its services, Empa makes new discoveries in the field of analysis (in particular, measuring techniques, sample preparation and evaluation methods), these shall remain Empa's property.

10. Publication

Empa is entitled to publish the results obtained by agreement with the Contractual Partner.

11. Duties and Rights of Cooperation of Contractual Partner

The Contractual Partner undertakes to provide Empa, punctually and in full, with all documents and information and any test materials/samples necessary for the provision of the services required. While maintaining commercial and business secrets of Empa as well as Empa's safety instructions, the Contractual Partner is entitled to claim access to the relevant laboratories in order to be present during the implementation of testing and calibrations.

12. Standards to be observed

When establishing the contract, the Contractual Partner must inform Empa of the standards that the latter must observe while providing its services. In the absence of this information, the services shall be executed pursuant to the provisions of Swiss law - specifically, the provisions of the Swiss Association for Standards (SN Standards).

13. Payment

13.1 Unless agreed otherwise, Empa's fee for the contractually agreed services shall be proportional to the time taken to execute them. The respective valid Empa hourly rates apply. The hourly rates apply to work carried out during normal business hours. For urgent work that must be carried out outside normal business hours by agreement with the Contractual Partner, a 50% surcharge shall be levied.

13.2 If there is a fixed price, this shall be based on the fundamentals known when the contract is concluded, and provided that all preconditions agreed at that time are fulfilled. If these fundamentals or prerequisites change, Empa is entitled to demand that the contract and the agreed fixed price be amended accordingly.

13.3 Empa is entitled to demand an advance payment before starting work. It is understood that the agreed fees do not include any ancillary expenses (e.g. taxes and fees). Unless agreed otherwise, all ancillary expenses shall be charged to the Contractual Partner. 75% of the valid hourly rates must be paid for travelling time.

13.4. Empa invoices must be paid within thirty (30) days of the invoice date. Offsetting is not permitted.

14. Material warranty and warranty of title

14.1 Empa guarantees that it shall execute the services to be provided carefully and using the latest scientific knowledge and technology. For testing, measuring and analytical services, the test results shall always refer only to the test materials/samples provided by the Contractual Partner/examined by Empa. Empa does not guarantee that the test results shall be the same for other deliveries of the same material, substance etc.

14.2 The warranty is valid for one (1) year. Empa must be notified in writing of any defects within ten (10) days after they occur or are detected. Genuine defects shall be repaired by Empa. Empa does not, however, provide any warranty of title.

15. Liability

15.1 Empa is liable for any damages resulting from unlawful intent or gross negligence, subject to the limitations stipulated in the following paragraph.

15.2 Empa expressly refuses to accept any further liability, whatever its legal basis, particularly for minor negligence, indirect damages and consequential damages, insofar as this is legally permissible.

16. Recruitment of employees

For the duration of the contract, neither party is permitted to recruit the other's employees except by mutual written consent.

17. Final provisions

The place of performance is one of the Empa sites (Dübendorf, St. Gallen or Thun), depending on where the contract is fulfilled.

The place of jurisdiction is the competent court for **Dübendorf (Switzerland)**.

Only **Swiss law** applies.