INSTYTUT TECHNIKI BUDOWLANEJ
PL 00-611 WARSZAWA
ul. FILTROWA 1
tel.: (48 22) 825-04-71;
(48 22) 825-76-55;
fax: (48 22) 825-52-86;
www.itb.pl

Autoryzowany i notyfikowany zgodnie z art.10 dyrektywy Rady z 21 grudnia 1988 r. w sprawie zbliżenia ustaw i aktów wykonawczych państw członkowskich dotyczących wyrobów budowlanych (89/106/EWG)

Członek EOTA

European Technical Approval ETA-13/0932

(English language translation – the original version is in Polish language)

Nazwa handlowa *Trade name*	**Kotwy wklejane** **CHARCOT, CHARCOT–S i CHARCOT–W** *Système d'injection CHARCOT, CHARCOT–S and CHARCOT–W*
Właściciel aprobaty *Holder of approval*	**LEGALLAIS** **7 rue d'Atlante - Citis** **14200 Herouville-Saint-Clair** **France**
Rodzaj i przeznaczenie wyrobu *Generic type and use of construction products*	**Kotwy wklejane do wykonywania zamocowań w podłożach murowych** *Injection anchor for use in masonry*
Termin ważności **od** *Valid from*	**25. 06. 2013**
do *to*	**14. 05. 2018**
Zakład produkcyjny *Manufacturing plant*	**Zakład Produkcyjny nr 1** *Manufacturing Plant no. 1*

Niniejsza Europejska Aprobata Techniczna zawiera *This European Technical Approval contains*	30 stron, w tym 21 Załączników *30 pages including 21 Annexes*

I LEGAL BASES AND GENERAL CONDITIONS

1. This European Technical Approval is issued by Instytut Techniki Budowlanej in accordance with:

   - Council Directive 89/106/EEC of 21 December 1988 on the approximation of laws, regulations and administrative provisions of Member States relating to construction products[1], amended by the Council Directive 93/68/EEC of 22 July 1993[2];
   - ustawa z dnia 16 kwietnia 2004 r. o wyrobach budowlanych (law on construction products from 16th April 2004)[3];
   - rozporządzenie Ministra Infrastruktury z dnia 14 października 2004 r. w sprawie europejskich aprobat technicznych oraz polskich jednostek organizacyjnych upoważnionych do ich wydawania (regulation of the Ministry of Infrastructure of 14th October 2004 on the European Technical Approvals and Polish bodies entitled to issue them)[4];
   - Common Procedural Rules for Requesting, Preparing and the Granting of European Technical Approvals set out in the Annex of Commission Decision 94/23/EC[5];
   - Guideline for European Technical Approval of "*Metal injection anchors for use in masonry*", ETAG 029.

2. Instytut Techniki Budowlanej is authorized to check whether the provisions of this European Technical Approval are met. Checking may take place in the manufacturing plant. Nevertheless, the responsibility for the conformity of the products to the European Technical Approval and for their fitness for the intended use remains with the holder of the European Technical Approval.

3. This European Technical Approval is not to be transferred to manufacturers or agents of manufacturers other than those indicated on page 1, or manufacturing plants other than those indicated on page 1 of this European Technical Approval.

4. This European Technical Approval may be withdrawn by Instytut Techniki Budowlanej, in particular after information by the Commission on the basis of Article 5(1) of Council Directive 89/106/EEC.

5. Reproduction of this European Technical Approval including transmission by electronic means shall be in full. However, partial reproduction can be made with the written consent of Instytut Techniki Budowlanej. In this case partial reproduction has to be designated as such. Texts and drawings of advertising brochures shall not contradict or misuse the European Technical Approval.

6. The European Technical Approval is issued by the approval body in its official language. This version corresponds to the version circulated within EOTA. Translations into other languages have to be designated as such.

[1] Official Journal of the European Communities № L 40, 11.02.1989, p. 12
[2] Official Journal of the European Communities № L 220, 30.08.1993, p. 1
[3] Official Journal of Polish Republic № 92/2004, pos. 881
[4] Official Journal of Polish Republic № 237/2004, pos. 2375
[5] Official Journal of the European Communities № L 17, 20.01.1994, p. 34

II SPECIFIC CONDITIONS OF THE EUROPEAN TECHNICAL APPROVAL

1 Definition of product and intended use

1.1 Definition of product

The injection system CHARCOT, CHARCOT–S and CHARCOT–W is bonded anchor (injection type) consisting of a injection mortar cartridge, a perforated sleeve and an anchor rod with a hexagon nut and washer in a range of M8 to M16. Anchor rods are made of galvanized carbon steel or stainless steel A4-70 or A4-80: 1.4401, 1.4404, 1.4571 or high corrosion resistant stainless steel in strength class 70: 1.4529, 1.4565, 1.4547.

The anchor rod is placed into a drilled hole previously cleaned and filled with injection mortar and is anchored via the bond between steel element, injection mortar and masonry.

An illustration of the product and intended use is given in Annexes 1 and 2.

1.2 Intended use

The anchor is intended to be used for anchorages for which requirements for mechanical resistance and stability and safety in use in the sense of the Essential Requirements 1 and 4 of Council Directive 89/106/EEC shall be fulfilled and failure of anchorages made with these products would compromise the stability of the works, cause risk to human life and/or lead to considerable economic consequences.

The anchors is to be used only for anchorages subject to static or quasi-static loading in solid masonry (use category b), hollow or perforated masonry (use category c) and autoclaved aerated concrete masonry AAC (use category d) according to Annexes 10 and 11. The mortar strength class of masonry has to be M 2,5 according to EN 998-2 at minimum.

The anchor may be used in the following temperature range:

a) -40℃ to +40℃ (max. short term temperature +40° C and max. long term temperature +24℃),

b) -40℃ to +80℃ (max. short term temperature +80° C and max. long term temperature +50℃).

The anchor may be installed in dry and wet structures.

Regarding the injection mortar the anchor may be used in dry and wet structures (category w/w). Regarding the steel elements of the anchor following use conditions apply:

Elements made of electroplated or hot-dipped galvanized steel may be used in structures subject to dry internal conditions only.

Elements made of stainless steel may be used in structures subject to dry internal conditions and also in structures subject to external atmospheric exposure (including industrial and marine environment) or exposure in permanently damp internal conditions if no particular aggressive conditions exist. Such particular aggressive conditions are e.g. permanent, alternating immersion in seawater or the splash zone of seawater, chloride atmosphere of indoor swimming pools or atmosphere with

extreme chemical pollution (e.g. in desulphurization plants or road tunnels where de-icing materials are used).

Elements made of high corrosion resistant steel may be used in structures subject to dry internal conditions and also in structures subject to external atmospheric exposure or exposure in permanently damp internal conditions or in other particular aggressive conditions. Such particular aggressive conditions are e.g. permanent, alternating immersion in seawater or the splash zone of seawater, chloride atmosphere of indoor swimming pools or atmosphere with chemical pollution (e.g. in desulphurization plants or road tunnels where de-icing materials are used).

The provisions made in this European Technical Approval are based on an assumed intended working life of the anchor of 50 years. The indications given on the working life cannot be interpreted as a guarantee given by the producer or Approval Body, but are to be regarded only as a means for choosing the right products in relation to the expected economically reasonable working life of the works.

2 Characteristics of product and methods of verification

2.1 Characteristics of product

The anchors corresponds to the drawings and provisions given in Annexes 1 to 7. The characteristic material values, dimensions and tolerances of the anchors not indicated in Annexes shall correspond to the respective values laid down in the technical documentation[6] of this European Technical Approval.

The characteristic anchor values for the design of anchorages are given in Annexes 12 to 21.

The metal parts of the injection anchors are assumed to satisfy the requirements for the class A1 of the characteristic reaction to fire in accordance with the provision of EC decision 96/603/EC, amended by 2000/605/EC. In the end use application the bonding material in connection with the injection anchor does not make any contribution to fire growth or to the fully developed fire and they have no influence to the smoke hazard. Regarding resistance to fire no performance is determined.

2.2 Methods of verification

The assessment of fitness of the anchors for the intended use in relation to the requirements for mechanical resistance and stability and safety in use in the sense of the Essential Requirements 1 and 4 has been made in accordance with the Guideline for European Technical Approval of *"Metal injection anchors for use in masonry*", ETAG 029, based on use category b, c and d in respect of the base material and category w/w in respect of installation and use.

In addition to the specific clauses relating to dangerous substances contained in this European Technical Approval, there may be other requirements applicable to the products falling within its scope (e.g. transposed European legislation and national laws, regulations and administrative provisions). In order to meet the provisions of the Construction Products Directive, these requirements need also to be complied with, when and where they apply.

[6] The technical documentation of this European Technical Approval is deposited at Instytut Techniki Budowlanej and, as far as relevant for the tasks of the approved body involved in the attestation of conformity procedure, may be handed over only to the approved body involved.

3 Evaluation of Conformity and CE marking

3.1 System of attestation of conformity

According to Decision 97/177/EC of the European Commission[7] system 1 of attestation of conformity applies.

This system of attestation of conformity is defined as follows:

System 1: Certification of the conformity of the product by an approved certification body on a basis of:

(a) Tasks of the manufacturer:

(1) factory production control,

(2) further testing of samples taken at the factory by the manufacturer in accordance with a prescribed test plan;

(b) Tasks of the approved body:

(3) initial type-testing of the product,

(4) initial inspection of factory and of factory production control,

(5) continuous surveillance, assessment and approval of factory production control.

3.2 Responsibilities

3.2.1 Tasks of the manufacturer

3.2.1.1. Factory production control

The manufacturer shall exercises permanent internal control of production. All the elements, requirements and provisions adopted by the manufacturer shall be documented in a systematic manner in the form of written policies and procedures. This production control system shall ensure that the product is in conformity with the European Technical Approval.

The manufacturer shall only use raw materials stated in the technical documentation of this European Technical Approval.

The factory production control shall be in accordance with the control plan[8] which is a part of the technical documentation of this European Technical Approval. The control plan is laid down in the context of the factory production control system operated by the manufacturer and deposited at Instytut Techniki Budowlanej.

The results of factory production control shall be recorded and evaluated in accordance with the provisions of the control plan.

3.2.1.2. Other task of the manufacturer

The manufacturer shall, on the basis of the contract, involve a body which is approved for the tasks referred to in section 3.1 in the field of anchors in order to undertake the actions laid down in section 3.2.2. For this purpose, the control plan referred to in section 3.2.1.1 and 3.2.2 shall be handed over by the manufacturer to the approved body involved.

[7] Official Journal of the European Communities L 073 of 14.03.1997.
[8] The control plan is a confidential part of the European Technical Approval and may be handed over only to the approved body involved in the attestation of conformity procedure.

The manufacturer shall make a declaration of conformity, stating that the construction product is in conformity with the provision of this European Technical Approval.

3.2.2 Tasks of the approved body

3.2.2.1 Initial type-testing of the product

For initial type-testing the results of the tests performed as part of the assessment for the European Technical Approval shall be used unless there are changes in the production line or plant. In such cases the necessary initial type-testing has to be agreed between the Instytut Techniki Budowlanej and the approved body involved.

3.2.2.2 Initial inspection of factory and of factory production control

The approved body shall ascertain that, in accordance with the control plan, the factory, in particular the staff and equipment, and the factory production control are suitable to ensure continuous and orderly manufacturing of the anchor according to the specifications mentioned in clause 2.1 as well as to the Annexes to this European Technical Approval.

3.2.2.3 Continuous surveillance

Continuous surveillance and assessment of factory production control have to be performed according to the control plan.

The approved body shall visit the factory at least once a year for surveillance. It has to be verified that the system of factory production control and the specified automated manufacturing process are maintained taking account of the control plan.

The results of continuous surveillance shall be made available on demand by the approved body to Instytut Techniki Budowlanej. In cases where the provisions of the European Technical Approval and the control plan are no longer fulfilled the conformity certificate shall be withdrawn.

3.3 CE–marking

The CE marking shall be affixed on each packaging of the anchor. The letters “CE” shall be accompanied by the following information:

- identification number of the approved body,
- name and address of the producer (legal entity responsible for the manufacture),
- last two digits of the year in which the CE marking was affixed,
- number of the EC certificate of conformity,
- number of the European Technical Approval,
- number of the guideline for the European Technical Approval,
- use category (b, c, d and w/w),
- size.

4 Assumptions under which the fitness of the product for the intended use was favourably assessed

4.1 Manufacturing

The European Technical Approval is issued on the basis of agreed data/information, deposited with Instytut Techniki Budowlanej which identifies the product that has been assessed and judged. Changes to the product or production process, which could result in this deposited data/information being incorrect, should be notified to Instytut Techniki Budowlanej before the changes are introduced. Instytut Techniki Budowlanej will decide whether or not such changes affect the ETA and consequently the validity of the CE marking on the basis of the ETA and if so whether further assessment or alterations to the ETA shall be necessary.

4.2 Design of anchorages

The fitness of the anchor for the intended use is given under the following conditions:

- the anchorages are designed in accordance with ETAG 029 Technical Report 029 "*Metal injection anchors for use in masonry*, *Annex C: Design methods for anchorages*", *Design method A*, under the responsibility of an engineer experienced in anchorages and masonry work,
- verifiable calculation notes and drawings are prepared taking account of the relevant masonry in the region of anchorage (nature and strength of the base material), loads to be transmitted and their transmission to the supports of the structure,
- the position of the anchor is indicated on the design drawings (e.g. position of the anchor relative to support, etc.),
- the characteristic resistances for the use in solid masonry are only valid for the base material and the bricks according to Annexes 10 or larger brick size and larger compressive strength of the masonry unit,
- the characteristic resistances for the use in hollow or perforated masonry are only valid for the bricks and blocks according to Annexes 10 and 11 regarding base material, size of the units, compressive strength and configuration of the voids,
- for smaller brick size or smaller compressive strength in solid masonry or different bricks and blocks in hollow or perforated masonry on the construction site, the characteristic resistances of the anchor may be determined by job site tests according to ETAG 029 "*Metal injection anchors for use in masonry*, *Annex B: Recommendation for the tests to be carried out on the construction works"* under consideration of the β-factor according to Annex 20, Table 16.

4.3 Installation

The fitness for use of the anchors can only be assumed if the anchors are installed as follows:

- anchors installation carried out by appropriately qualified personnel and under the supervision of the person responsible for technical matters on the site,
- use of the anchor only as supplied by the manufacturer without exchanging the components of an anchor,

- anchors installation in accordance with manufacturer's specifications and drawings using the tools indicated in the technical documentation of this European Technical Approval,
- commercial standard threaded rods (in the case of rods made of galvanized steel – standard rods of the strength class ≤ 8.8 only), washers and hexagonal nuts may also be used if the following requirements are fulfilled:
  - material, dimensions and mechanical properties of the metal parts according to the specifications given in Annex 6,
  - confirmation of material and mechanical properties of the metal parts by inspection certificate 3.1 according to EN-10204:2004; the documents should be stored,
  - marking of the threaded rod with the envisaged embedment depth; this may be done by the manufacturer of the rod or the person on a job site,
- checks before placing the anchor to ensure that use category applies and the strength class, density etc. of the bade material is not lower than that of the concrete to which the characteristics loads apply,
- holes to be drilled perpendicular to the surface by using a rotary drilling or hammer drilling machine (Annexes 8 and 9),
- in case of aborted drill hole: the drill hole shall be filled with mortar,
- anchor installation in accordance with manufacturer's installation instruction (Annexes 8 and 9),
- keeping the installation parameters (Annex 7),
- keeping edge distance and spacing according to Annexes 20 and 21 without minus tolerances,
- observing the curing time according to Annex 6, Table 2 until the anchor may be loaded.

5 Indications to the manufacturer

5.1 Manufacturer’s responsibility

It is the manufacturer's responsibility to ensure that the information on the specific conditions according to 1, 2, 4.2, 4.3 as well as 5.2 is given to those who are concerned. This information may be made by reproduction of the respective parts of the European Technical Approval. In addition all installation data shall be shown clearly on the package and/or on an enclosed instruction sheet, preferably using illustration(s).

The minimum data required are:

- installation parameters according to Annex 7,
- material and property class of metal parts according to Annex 6,
- information on installation procedure, preferably by means of illustration,
- exact volume of injection mortar depend on the relevant installation,
- cartridge temperature, ambient temperature of the masonry, processing time (open time) of the cartridge and curing time until the anchor may be loaded according to Annex 6,
- identification of the manufacturing batch.

All the data shall be presented in a clear and explicit form.

5.2 Recommendations on packaging, transport and storage

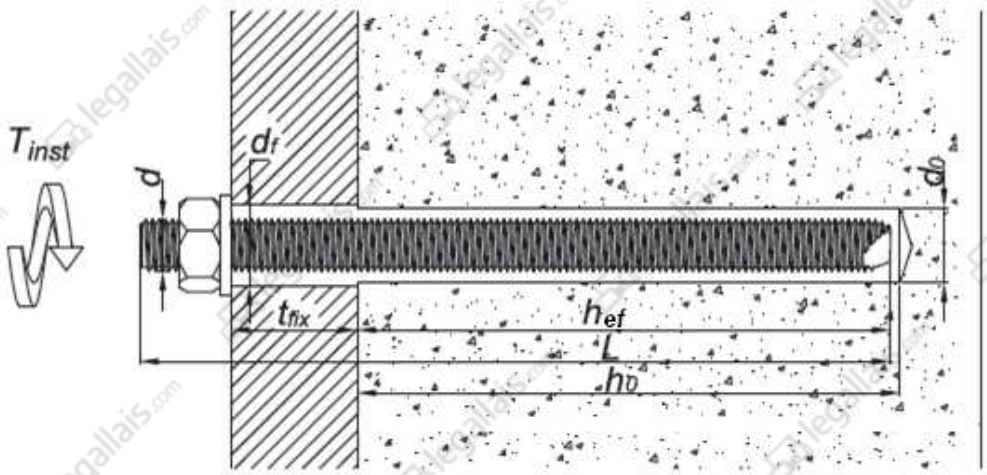
The injection mortar cartridges shall be protected against sun radiation and shall be stored according to the manufacturer's instructions in dry conditions at temperatures of at least +5℃ to not more than +25℃.

Mortar cartridges with expired shelf life must no longer be used.

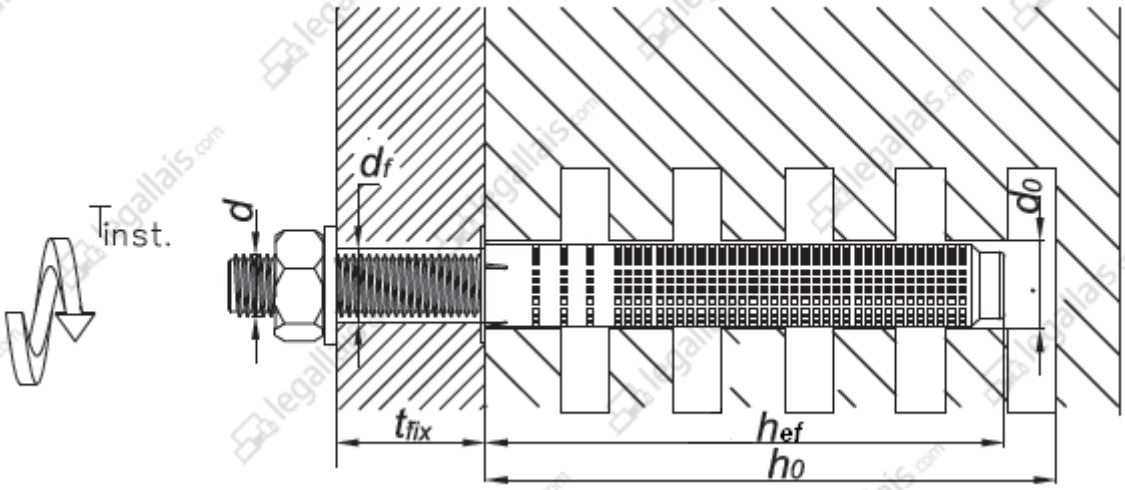
On behalf of Instytut Techniki Budowlanej

Jan Bobrowicz
Director of ITB

Anchor rod without perforated sleeve – installation in solid masonry



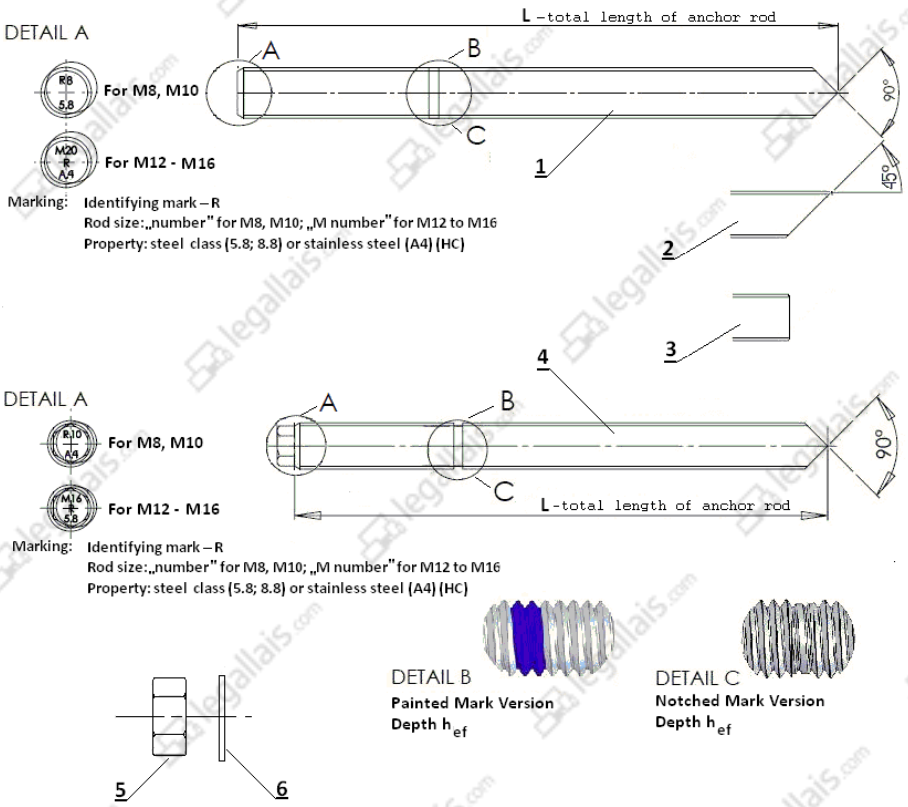
Anchor rod with perforated sleeve – installation in perforated masonry



Base material	use categories b, c and d (solid, hollow or perforated masonry, AAC)
Installation and use	category w/w (installation and use in dry and wet structures)
Service temperature range	-40℃ to +40℃ (max. short term temperature +40℃ a nd max. long term temperature +24℃) -40℃ to +80℃ (max. short term temperature +80℃ a nd max. long term temperature +50℃)

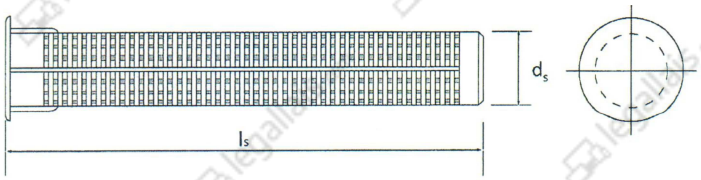
Système d'injection CHARCOT, CHARCOT–S and CHARCOT–W	**Annex 1** of European Technical Approval ETA-13/0932
Intended use and use categories	

Anchor rods



1. Anchor rod R-STUDS–(88),(A4),(HC)-FL
2. 45° shape with anchor rod
3. The flat end of anchor rod
4. Anchor rod R-STUDS–(88),(A4),(HC) with the hexagonal tip
5. Hexagonal nut
6. Washer

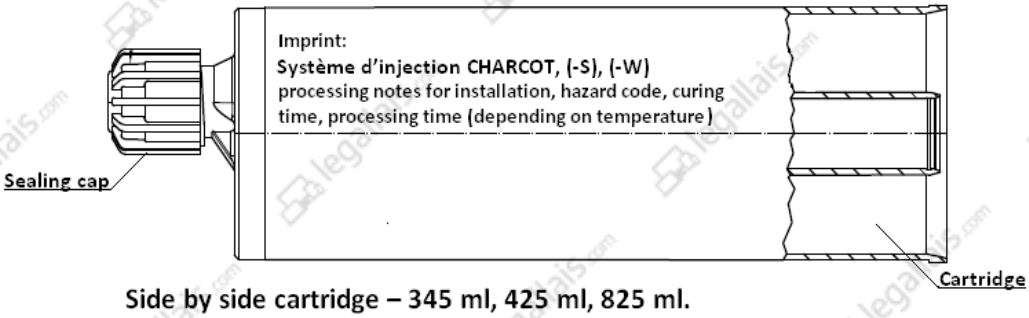
Perforated plastic or metal sleeve



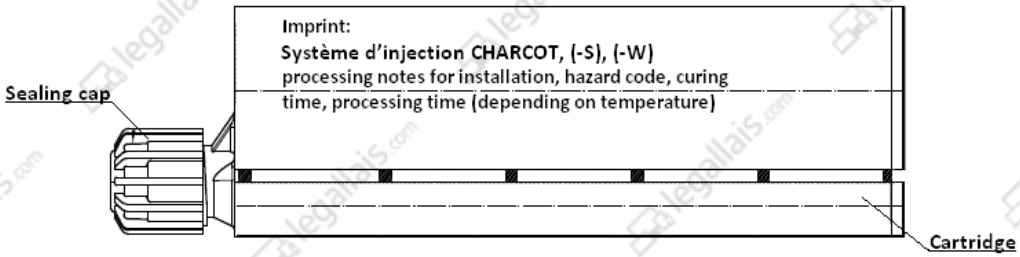
Size of rod			M8	M8	M10	M10	M12	M12	M16
Size of sleeve	d_sxl_s	[mm]	12x50	12x80	15x85	15x125	15x85	15x125	20x85

Système d'injection CHARCOT, CHARCOT–S and CHARCOT–W	Annex 2 of European Technical Approval ETA-13/0932
Product	

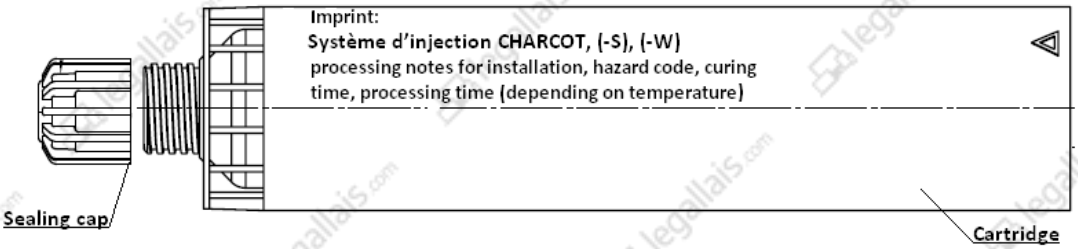
Coaxial cartridge –
150 ml, 280 ml, 300 ml, 310 ml, 330 ml, 380 ml, 400 ml, 410 ml, 420 ml.



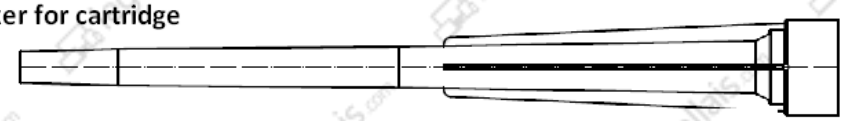
Side by side cartridge – 345 ml, 425 ml, 825 ml.



Cartridge a single component for two part foil capsules –
150 ml, 175 ml, 280ml, 300 ml, 310 ml, 380 ml, 400 ml, 550 ml, 600 ml.



Mixer for cartridge



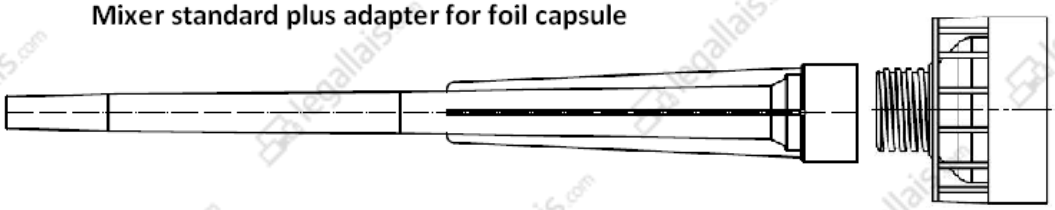
Système d'injection CHARCOT, CHARCOT–S and CHARCOT–W	**Annex 3** of European Technical Approval ETA-13/0932
Mortar cartridge types and sizes (1)	

Foil capsule –

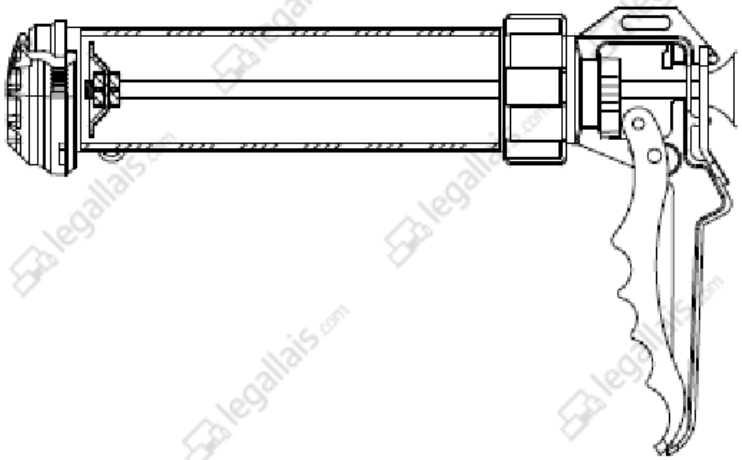
150 ml, 175 ml, 280ml, 300 ml, 310 ml, 380 ml, 400 ml, 550 ml, 600 ml.

Mixer for foil capsule

Mixer standard plus adapter for foil capsule

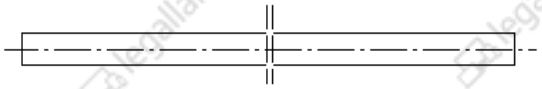


Gun for foil capsule



Système d'injection CHARCOT, CHARCOT–S and CHARCOT–W	**Annex 4** of European Technical Approval ETA-13/0932
Mortar cartridge types and sizes (2)	

Additional mixer extension



*Variable length from 300mm up to 1000mm.

Manual blower pump

Steel brush

Brush diameter for solid masonry

Size of rod			**M8**	**M10**	**M12**	**M16**
Brush diameter	**d_b**	**[mm]**	12	14	16	20

Brush diameter for hollow or perforated masonry

Size of rod			**M8**	**M10**	**M12**	**M16**
Brush diameter	**d_b**	**[mm]**	12	16	16	20

Système d'injection CHARCOT, CHARCOT–S and CHARCOT–W	**Annex 5** of European Technical Approval ETA-13/0932
Tools	

Table 1: Materials

Part	Designation		
	Steel, zinc plated	**Stainless steel**	**High corrosion resistance stainless steel**
Anchor rod	Steel, property class 5.8 to 12.9, acc. to EN ISO 898-1; zinc plated ≥ 5 µm acc. to EN ISO 4042 or hot-dip galvanized ≥ 45 µm acc. to EN ISO 10684	Material 1.4401, 1.4404, 1.4571 acc. to EN 10088; property class 70 and 80 (A4-70 and A4-80) acc. to EN ISO 3506	Material 1.4529, 1.4565, 1.4547 acc. to EN 10088; property class 70 acc. to EN ISO 3506
Hexagon nut	Steel, property class 5 to 12, acc. to EN 20898-2; zinc plated ≥ 5 µm acc. to EN ISO 4042 or hot-dip galvanized ≥ 45 µm acc. to EN ISO 10684	Material 1.4401, 1.4404, 1.4571 acc. to EN 10088; property class 70 and 80 (A4-70 and A4-80) acc. to EN ISO 3506	Material 1.4529, 1.4565, 1.4547 acc. to EN 10088; property class 70 acc. to EN ISO 3506
Washer	Steel, acc. to EN ISO 7089; zinc plated ≥ 5 µm acc. to EN ISO 4042 or hot-dip galvanized ≥ 45 µm acc. to EN ISO 10684	Material 1.4401, 1.4404, 1.4571 acc. to EN 10088; corresponding to anchor rod material	Material 1.4529, 1.4565, 1.4547 acc. to EN 10088; corresponding to anchor rod material
Injection mortar	Bonding agent: polyester resin styrene free Hardener: dibenzoyl peroxide Additive: quartz sand Delivered in three colours: standard, grey (Ton Gris) and stone (Ton Pierre)		

Commercial standard threaded rods (in the case of rods made of galvanized steel – standard rods of the strength class ≤ 8.8 only) with:
- material and mechanical properties according to Table 1,
- confirmation of material and mechanical properties by inspection certificate 3.1 according to EN-10204,
- marking of the threaded rod with the embedment depth.

Table 2: Processing time and curing time

Mortar temperature	Base material temperature	Processing time [minutes]			Minimum curing time [minutes]		
		CHARCOT	CHARCOT -S	CHARCOT -W	CHARCOT	CHARCOT -S	CHARCOT -W
5℃	-20℃	-	-	45	-	-	1440
5℃	-15℃	-	-	30	-	-	1080
5℃	-10℃	-	-	20	-	-	480
5℃	-5℃	70	180	11	480	1440	300
5℃	0℃	45	120	7	240	1080	120
5℃	5℃	25	60	5	120	720	60
10℃	10℃	15	45	2	90	480	45
15℃	15℃	9	25	1,5	60	360	30
20℃	20℃	5	15	1	45	240	15
25℃	30℃	2	7	-	30	90	-
25℃	35℃	-	6	-	-	60	-
25℃	40℃	-	5	-	-	45	-

Système d'injection CHARCOT, CHARCOT–S and CHARCOT–W	**Annex 6** of European Technical Approval ETA-13/0932
Materials, curing time and processing time	

Table 3: Installation parameters of anchor rods in solid masonry and AAC (without perforated sleeves)

Size of rod				M8	M10	M12	M16
Diameter of rod		d	[mm]	8	10	12	16
Drilling diameter		d_0	[mm]	10	12	14	18
Diameter of the hole in the fixture		d_{fix}	[mm]	9	12	14	18
Depth of the drilling hole		h_0	[mm]	85	90	100	110
Embedment depth		h_{ef}	[mm]	80	85	95	105
Torque moment	solid masonry	max. T_{inst}	[Nm]	5	8	10	15
	AAC			3	4	6	10
Minimum spacing and edge distance							
Minimum spacing		s_{min}	[mm]	50	50	50	54
Minimum edge distance		c_{min}	[mm]	50	50	50	54

Table 4: Installation parameters of anchor rods with perforated sleeves in hollow or perforated masonry

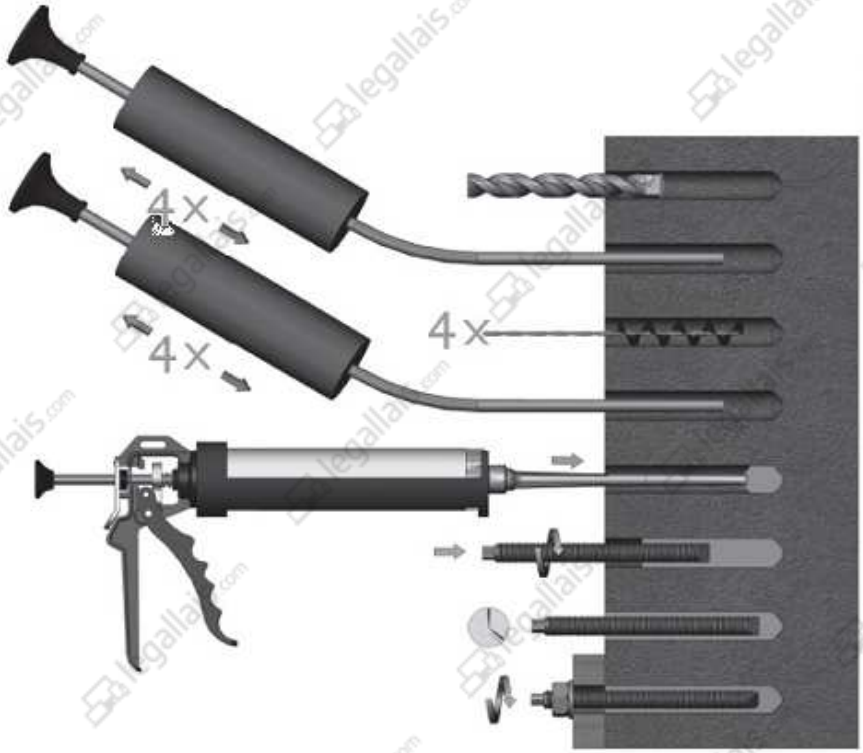
Size of rod			M8	M8	M10	M10	M12	M12	M16
Size of sleeve	$d_s x l_s$	[mm]	12x50	12x80	15x85	15x125	15x85	15x125	20x85
Diameter of rod	d	[mm]	8	8	10	10	12	12	16
Drilling diameter	d_0	[mm]	12	12	16	16	16	16	20
Diameter of the hole in the fixture	d_{fix}	[mm]	9	9	12	12	14	14	18
Depth of the drilling hole	h_0	[mm]	55	85	90	130	90	130	90
Embedment depth	h_{ef}	[mm]	50	80	85	125	85	125	85
Torque moment	max. T_{inst}	[Nm]	3	3	4	4	6	6	10
Minimum spacing and edge distance									
Minimum spacing	s_{min}	[mm]	100	100	100	100	100	100	120
Minimum edge distance	c_{min}	[mm]	100	100	100	100	100	100	120

Système d'injection CHARCOT, CHARCOT–S and CHARCOT–W

Installation parameters

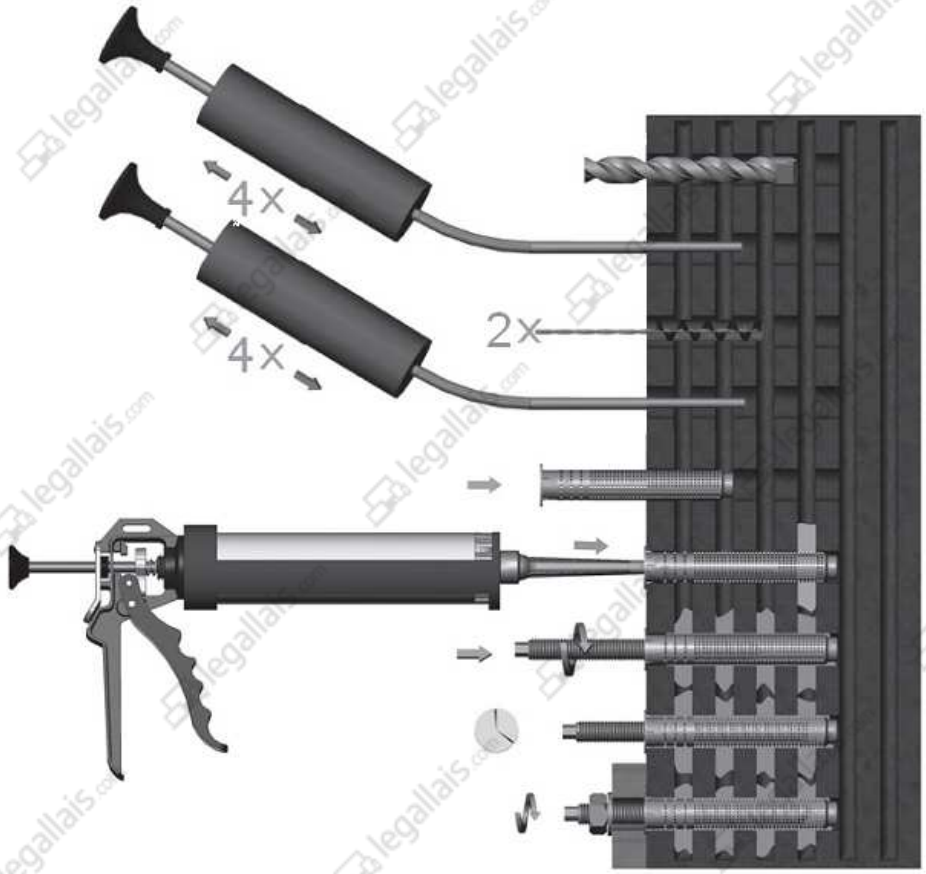
Annex 7

of European Technical Approval ETA-13/0932



1. Drill the hole to the required diameter and depth (hammer drilling for solid masonry and rotary drilling for AAC).
2. Clean the hole with brush and hand pump: at least four blowing operations then four brushing operations followed again by four blowing operations.
3. Insert cartridge into gun and attach nozzle. Dispense to waste until an even colour is obtained. Insert the mixing nozzle to the far end the hole and inject the resin, slowly withdrawing the nozzle as the hole is filled to 70% of its depth.
4. Immediately insert the stud, slowly and with slight twisting motion. Remove any excess resin around the hole before it sets.
5. Leave the fixing undisturbed until the curing time elapses.
6. Attach the fixture and tighten the nut (max. torque acc. to Table 3).

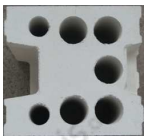
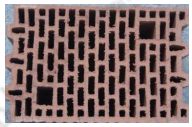
Système d'injection CHARCOT, CHARCOT–S and CHARCOT–W	**Annex 8** of European Technical Approval ETA-13/0932
Installation instruction – solid masonry and AAC	



1. Drill the hole to the required diameter and depth using a rotary machine.
2. Clean the hole with brush and hand pump: at least four blowing operations then two brushing operations followed again by four blowing operations.
3. Introduce the perforated sleeve of suitable dimension.
4. Insert cartridge into gun and attach nozzle. Dispense to waste until an even colour is obtained. Insert the nozzle to the end of the sleeve and inject the resin so long till the sleeve will fill into 100% of depth.
5. Immediately insert the stud, slowly and with slight twisting motion. Remove any excess resin around the hole before it sets.
6. Leave the fixing undisturbed until minimum curing time elapses.
7. Attach the fixture and tighten the nut (max. torque acc. to Table 4).

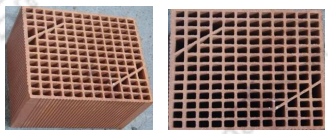
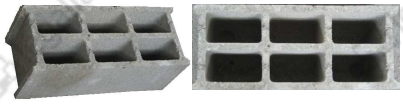
Système d'injection CHARCOT, CHARCOT–S and CHARCOT–W	**Annex 9** of European Technical Approval ETA-13/0932
Installation instruction – hollow or perforated masonry	

Table 5: Base materials – blocks and bricks

Type and dimensions of blocks and bricks	Standard
Brick No. 1. Solid clay bricks: 240 x 115 x 71 mm (e.g. Wienerberger Mz 20/2.0) $f_b \geq 20$ N/mm^2; $\rho_m \geq 2{,}0$ kg/dm^3 	EN 771-1
Brick No. 2. Autoclaved aerated concrete blocks AAC 7: 599 x 199 x 240 mm $f_b \geq 6$ N/mm^2; $\rho_m \geq 0{,}65$ kg/dm^3 	EN 771-4
Brick No. 3. Solid silicate bricks: 240 x 115 x 71 mm (e.g. KS NF 20/2.0) $f_b \geq 20$ N/mm^2; $\rho_m \geq 2{,}0$ kg/dm^3 	EN 771-2
Brick No. 4. Silicate hollow blocks: 248 x 240 x 238 mm (e.g. KS Ratio Block 8 DF 12/1.4) $f_b \geq 12$ N/mm^2; $\rho_m \geq 1{,}4$ kg/dm^3  	EN 771-2
Brick No. 5. Perforated ceramic blocks: 373 x 240 x 249 mm (e.g. Poroton Hlz 12/0.9 DF) $f_b \geq 12$ N/mm^2; $\rho_m \geq 0{,}9$ kg/dm^3  	EN 771-1
Brick No. 6. Perforated ceramic blocks: 373 x 238 x 250 mm (e.g. Wienerberger Porotherm 25 P+W); $f_b \geq 15$ N/mm^2; $\rho_m \geq 0{,}8$ kg/dm^3  	EN 771-1
Brick No. 7. Perforated ceramic blocks: 380 x 250 x 238 mm (e.g. Leier Thermopor 38 P+W) $f_b \geq 10$ N/mm^2; $\rho_m \geq 0{,}7$ kg/dm^3 	EN 771-1

Système d'injection CHARCOT, CHARCOT–S and CHARCOT–W	**Annex 10** of European Technical Approval ETA-13/0932
Types and dimensions of blocks and bricks (1)	

Table 6: Base materials

Type and dimensions of blocks and bricks	Standard
Brick No. 8. Perforated ceramic blocks: 375 x 250 x 238 mm (e.g. Kozłowice MEGA-MAX 250/238 P+W); $f_b \geq 15$ N/mm^2; $\rho_m \geq 0{,}8$ kg/dm^3 	EN 771-1
Brick No. 9. Perforated ceramic blocks: 300 x 375 x 212 mm (e.g. LS Tableau Mono Rect) $f_b \geq 6$ N/mm^2; $\rho_m \geq 0{,}93$ kg/dm^3 	EN 771-1
Brick No. 10. Perforated ceramic blocks: 500 x 200 x 314 mm (e.g. LS Tableau Rect) $f_b \geq 6$ N/mm^2; $\rho_m \geq 0{,}75$ kg/dm^3 	EN 771-1
Brick No. 11. Perforated ceramic blocks: 300 x 300 x 212 mm (e.g. LS Monomur 30) $f_b \geq 6$ N/mm^2; $\rho_m \geq 0{,}865$ kg/dm^3 	EN 771-1
Brick No. 12. Perforated ceramic blocks: 500 x 200 x 314 mm (e.g. SM BGV Thermo) $f_b \geq 6$ N/mm^2; $\rho_m \geq 0{,}659$ kg/dm^3 	EN 771-1
Brick No. 13. Perforated ceramic blocks: 500 x 200 x 314 mm (e.g. SM BGV Thermo Plus) $f_b \geq 6$ N/mm^2; $\rho_m \geq 0{,}755$ kg/dm^3 	EN 771-1
Brick No. 14. Lightweight concrete hollow blockS Hbl: 245 x 245 x 300 mm $f_b \geq 2$ N/mm^2; $\rho_m \geq 0{,}8$ kg/dm^3 	EN 771-3

Système d'injection CHARCOT, CHARCOT–S and CHARCOT–W	**Annex 11** of European Technical Approval ETA-13/0932
Types and dimensions of blocks and bricks (2)	

Table 7: Characteristic tension load and shear load values

Density / compressive strength	Sleeve	Anchor size	Effective anchorage depth	Characteristic resistance	Characteristic resistance
ρ_m / f_b	$\phi d_s x l_s$	M	h_{ef}	N_{Rk} [1]	V_{Rk} [2]
[kg/dm^3] / [N/mm^2]	[-]	[-]	[mm]	[kN]	[kN]
Brick No. 1					
$\rho_m \geq 2,0$ $f_b \geq 20$	without	M8	80	6,0	3,5
		M10	85	7,0	5,0
		M12	95	7,0	7,0
		M16	105	7,0	7,0
Brick No. 2					
$\rho_m \geq 0,65$ $f_b \geq 6$	without	M8	80	1,5	1,5
		M10	85	2,0	2,0
		M12	95	2,5	2,5
		M16	105	3,0	2,5
Brick No. 3					
$\rho_m \geq 2,0$ $f_b \geq 20$	without	M8	80	5,0	3,5
		M10	85	5,0	5,0
		M12	95	5,0	5,0
		M16	105	5,0	5,0
Brick No. 4					
$\rho_m \geq 1,4$ $f_b \geq 12$	ϕ12x50	M8	50	2,5	2,5
	ϕ12x80	M8	80	2,5	2,5
	ϕ15x85	M10	85	2,5	2,5
	ϕ15x125	M10	125	3,5	2,5
	ϕ15x85	M12	85	3,0	2,5
	ϕ15x125	M12	125	3,0	2,5
	ϕ20x85	M16	85	3,0	2,5
Brick No. 5					
$\rho_m \geq 0,9$ $f_b \geq 12$	ϕ12x50	M8	50	2,0	2,0
	ϕ12x80	M8	80	2,5	2,5
	ϕ15x85	M10	85	3,0	2,5
	ϕ15x125	M10	125	3,5	2,5
	ϕ15x85	M12	85	3,5	2,5
	ϕ15x125	M12	125	4,0	2,5
	ϕ20x85	M16	85	4,0	2,5
Partial safety factor γ_M = 2,0 for AAC (brick No. 2) and γ_M = 2,5 for other base materials (in the absence of national regulation)					

[1] For design according to ETAG 029, Annex C: $N_{Rk} = N_{Rk,p} = N_{Rk,b} = N_{R,pb} = N_{Rk,s}$
[2] For design according to ETAG 029, Annex C: $V_{Rk} = V_{Rk,b} = V_{Rk,c} = V_{Rk,s}$
For solid masonry (Brick No. 1, 2 and 3) $V_{Rk,c}$ shall be calculated acc. to ETAG 029, Annex C, equation C.5.7.

Système d'injection CHARCOT, CHARCOT–S and CHARCOT–W	**Annex 12** of European Technical Approval ETA-13/0932
Characteristic tension load and shear load values (1)	

Table 8: Characteristic tension load and shear load values

Density / Compressive strength	Sleeve	Anchor size	Effective anchorage depth	Characteristic resistance[1]	Characteristic resistance[2]
ρ_m / f_b	$\phi d_s x l_s$	M	h_{ef}	N_{Rk}	V_{Rk}
[kg/dm^3] / [N/mm^2]	[-]	[-]	[mm]	[kN]	[kN]
Brick No. 6					
$\rho_m \geq 0,8$ $f_b \geq 15$	ϕ12x50	M8	50	1,5	1,5
	ϕ12x80	M8	80	2,0	2,0
	ϕ15x85	M10	85	2,5	2,0
	ϕ15x125	M10	125	2,5	2,5
	ϕ15x85	M12	85	3,5	2,5
	ϕ15x125	M12	125	3,5	2,5
	ϕ20x85	M16	85	2,5	2,5
Brick No. 7					
$\rho_m \geq 0,7$ $f_b \geq 10$	ϕ12x50	M8	50	1,5	1,5
	ϕ12x80	M8	80	2,0	2,0
	ϕ15x85	M10	85	2,0	2,0
	ϕ15x125	M10	125	2,5	2,5
	ϕ15x85	M12	85	2,5	2,5
	ϕ15x125	M12	125	3,5	2,5
	ϕ20x85	M16	85	3,0	2,5
Brick No. 8					
$\rho_m \geq 0,8$ $f_b \geq 15$	ϕ12x50	M8	50	2,0	2,0
	ϕ12x80	M8	80	2,5	2,5
	ϕ15x85	M10	85	3,5	2,5
	ϕ15x125	M10	125	3,5	2,5
	ϕ15x85	M12	85	4,0	2,5
	ϕ15x125	M12	125	4,0	2,5
	ϕ20x85	M16	85	4,0	2,5
Brick No. 9					
$\rho_m \geq 0,93$ $f_b \geq 6$	ϕ12x50	M8	50	0,9	0,9
	ϕ12x80	M8	80	0,9	0,9
	ϕ15x85	M10	85	2,0	1,5
	ϕ15x125	M10	125	2,0	2,0
	ϕ15x85	M12	85	2,0	2,0
	ϕ15x125	M12	125	2,0	2,0
	ϕ20x85	M16	85	1,5	1,2
Partial safety factor γ_M = 2,5 (in the absence of national regulation)					

[1] For design according to ETAG 029, Annex C: $N_{Rk} = N_{Rk,p} = N_{Rk,b} = N_{R,pb} = N_{Rk,s}$

[2] For design according to ETAG 029, Annex C: $V_{Rk} = V_{Rk,b} = V_{Rk,c} = V_{Rk,s}$

Système d'injection CHARCOT, CHARCOT–S and CHARCOT–W

Characteristic tension load and shear load values (2)

Annex 13

of European Technical Approval ETA-13/0932

Table 9: Characteristic tension load and shear load values

Density / Compressive strength	Sleeve	Anchor size	Effective anchorage depth	Characteristic resistance[1]	Characteristic resistance[2]
ρ_m / f_b	$\phi d_s x l_s$	M	h_{ef}	N_{Rk}	V_{Rk}
[kg/dm^3] / [N/mm^2]	[-]	[-]	[mm]	[kN]	[kN]
Brick No. 10					
$\rho_m \geq 0,75$ $f_b \geq 6$	ϕ12x50	M8	50	1,2	0,9
	ϕ12x80	M8	80	1,2	1,2
	ϕ15x85	M10	85	1,5	1,5
	ϕ15x125	M10	125	1,5	1,5
	ϕ15x85	M12	85	2,0	1,5
	ϕ15x125	M12	125	2,0	2,0
	ϕ20x85	M16	85	1,5	1,5
Brick No. 11					
$\rho_m \geq 0,865$ $f_b \geq 6$	ϕ12x50	M8	50	0,9	0,9
	ϕ12x80	M8	80	0,9	0,9
	ϕ15x85	M10	85	1,5	1,2
	ϕ15x125	M10	125	1,5	1,5
	ϕ15x85	M12	85	1,5	1,5
	ϕ15x125	M12	125	1,5	1,5
	ϕ20x85	M16	85	1,5	1,5
Brick No. 12					
$\rho_m \geq 0,659$ $f_b \geq 6$	ϕ12x50	M8	50	0,9	0,9
	ϕ12x80	M8	80	0,9	0,9
	ϕ15x85	M10	85	1,5	1,5
	ϕ15x125	M10	125	1,5	1,5
	ϕ15x85	M12	85	1,5	1,5
	ϕ15x125	M12	125	1,5	1,5
	ϕ20x85	M16	85	1,5	1,5
Brick No. 13					
$\rho_m \geq 0,755$ $f_b \geq 6$	ϕ12x50	M8	50	1,2	0,9
	ϕ12x80	M8	80	1,2	1,2
	ϕ15x85	M10	85	1,2	0,9
	ϕ15x125	M10	125	1,2	0,9
	ϕ15x85	M12	85	1,2	1,2
	ϕ15x125	M12	125	1,5	1,5
	ϕ20x85	M16	85	1,2	1,2
Partial safety factor γ_M = 2,5 (in the absence of national regulation)					

[1] For design according to ETAG 029, Annex C: $N_{Rk} = N_{Rk,p} = N_{Rk,b} = N_{R,pb} = N_{Rk,s}$
[2] For design according to ETAG 029, Annex C: $V_{Rk} = V_{Rk,b} = V_{Rk,c} = V_{Rk,s}$

Système d'injection CHARCOT, CHARCOT–S and CHARCOT–W

Annex 14
of European Technical Approval ETA-13/0932

Characteristic tension load and shear load values (3)

Table 10: Characteristic tension load and shear load values

Density / Compressive strength	Sleeve	Anchor size	Effective anchorage depth	Characteristic resistance[1]	Characteristic resistance[2]
ρ_m / f_b	$\phi d_s x l_s$	M	h_{ef}	N_{Rk}	V_{Rk}
[kg/dm^3] / [N/mm^2]	[-]	[-]	[mm]	[kN]	[kN]
Brick No. 14					
$\rho_m \geq 0,8$ $f_b \geq 2$	ϕ12x50	M8	50	1,2	1,2
	ϕ12x80	M8	80	1,5	1,5
	ϕ15x85	M10	85	2,5	2,5
	ϕ15x125	M10	125	2,5	2,0
	ϕ15x85	M12	85	2,5	2,5
	ϕ15x125	M12	125	2,5	2,5
	ϕ20x85	M16	85	2,5	2,5
Partial safety factor γ_M = 2,5 (in the absence of national regulation)					

[1] For design according to ETAG 029, Annex C: $N_{Rk} = N_{Rk,p} = N_{Rk,b} = N_{R,pb} = N_{Rk,s}$
[2] For design according to ETAG 029, Annex C: $V_{Rk} = V_{Rk,b} = V_{Rk,c} = V_{Rk,s}$

Table 11: Characteristic bending moments

Size of rod				M8	M10	M12	M16
Characteristic bending moments	$M_{Rk,s}$	Nm	5.8	19	37	65	166
			6.8	22	45	79	200
			A4-70	26	52	92	232
Partial safety factor	γ_{Ms}	-	5.8	1,25			
			6.8	1,25			
			A4-70	1,56			

Système d'injection CHARCOT, CHARCOT–S and CHARCOT–W

Annex 15
of European Technical Approval ETA-13/0932

Characteristic tension load and shear load values (4).
Characteristic bending moments

Table 12: Displacement under tension load

Brick No. 1					
Size of rod		M8	M10	M12	M16
δ_{N0}	[mm]	0,11	0,12	0,15	0,16
$\delta_{N\infty}$	[mm]	0,36	0,36	0,36	0,36
Brick No. 2					
Size of rod		M8	M10	M12	M16
δ_{N0}	[mm]	0,05	0,07	0,10	0,11
$\delta_{N\infty}$	[mm]	0,19	0,19	0,20	0,22
Brick No. 3					
Size of rod		M8	M10	M12	M16
δ_{N0}	[mm]	0,13	0,15	0,15	0,18
$\delta_{N\infty}$	[mm]	0,36	0,36	0,36	0,36
Brick No. 4					
Size of rod		M8	M10	M12	M16
δ_{N0}	[mm]	0,10	0,13	0,15	0,18
$\delta_{N\infty}$	[mm]	0,36	0,36	0,36	0,36
Brick No. 5					
Size of rod		M8	M10	M12	M16
δ_{N0}	[mm]	0,14	0,13	0,24	0,18
$\delta_{N\infty}$	[mm]	0,36	0,36	0,48	0,36
Brick No. 6					
Size of rod		M8	M10	M12	M16
δ_{N0}	[mm]	0,09	0,27	0,14	0,16
$\delta_{N\infty}$	[mm]	0,36	0,54	0,36	0,36
Brick No. 7					
Size of rod		M8	M10	M12	M16
δ_{N0}	[mm]	0,05	0,16	0,30	0,28
$\delta_{N\infty}$	[mm]	0,36	0,36	0,60	0,56

Equation $N = N_{Rk} / \gamma_F \times \gamma_M$, with $\gamma_F = 1,4$

Système d'injection CHARCOT, CHARCOT–S and CHARCOT–W	**Annex 16** of European Technical Approval ETA-13/0932
Displacement under tension load (1)	

Table 13: Displacement under tension load

Brick No. 8					
Size of rod		M8	M10	M12	M16
δ_{N0}	[mm]	0,08	0,10	0,10	0,27
$\delta_{N\infty}$	[mm]	0,36	0,36	0,36	0,54
Brick No. 9					
Size of rod		M8	M10	M12	M16
δ_{N0}	[mm]	0,06	0,04	0,07	0,10
$\delta_{N\infty}$	[mm]	0,36	0,36	0,36	0,36
Brick No. 10					
Size of rod		M8	M10	M12	M16
δ_{N0}	[mm]	0,04	0,05	0,08	0,12
$\delta_{N\infty}$	[mm]	0,36	0,36	0,36	0,36
Brick No. 11					
Size of rod		M8	M10	M12	M16
δ_{N0}	[mm]	0,04	0,05	0,08	0,12
$\delta_{N\infty}$	[mm]	0,36	0,36	0,36	0,36
Brick No. 12					
Size of rod		M8	M10	M12	M16
δ_{N0}	[mm]	0,06	0,08	0,08	0,15
$\delta_{N\infty}$	[mm]	0,36	0,36	0,36	0,36
Brick No. 13					
Size of rod		M8	M10	M12	M16
δ_{N0}	[mm]	0,04	0,04	0,10	0,07
$\delta_{N\infty}$	[mm]	0,36	0,36	0,36	0,36
Brick No. 14					
Size of rod		M8	M10	M12	M16
δ_{N0}	[mm]	0,22	0,25	0,30	0,20
$\delta_{N\infty}$	[mm]	0,44	0,50	0,60	0,40

Equation $N = N_{Rk} / \gamma_F \times \gamma_M$, with $\gamma_F = 1,4$

Système d'injection CHARCOT, CHARCOT–S and CHARCOT–W	**Annex 17** of European Technical Approval ETA-13/0932
Displacement under tension load (2)	

Table 14: Displacement under shear load

Brick No. 1					
Size of rod		M8	M10	M12	M16
δ_{V0}	[mm]	0,29	0,33	0,34	0,42
$\delta_{V\infty}$	[mm]	0,44	0,50	0,51	0,63
Brick No. 2					
Size of rod		M8	M10	M12	M16
δ_{V0}	[mm]	0,15	0,16	0,22	0,23
$\delta_{V\infty}$	[mm]	0,23	0,24	0,33	0,35
Brick No. 3					
Size of rod		M8	M10	M12	M16
δ_{V0}	[mm]	0,21	0,22	0,25	0,25
$\delta_{V\infty}$	[mm]	0,32	0,33	0,38	0,38
Brick No. 4					
Size of rod		M8	M10	M12	M16
δ_{V0}	[mm]	0,10	0,13	0,16	0,20
$\delta_{V\infty}$	[mm]	0,15	0,20	0,24	0,30
Brick No. 5					
Size of rod		M8	M10	M12	M16
δ_{V0}	[mm]	0,18	0,22	0,25	0,25
$\delta_{V\infty}$	[mm]	0,27	0,33	0,38	0,38
Brick No. 6					
Size of rod		M8	M10	M12	M16
δ_{V0}	[mm]	0,18	0,21	0,23	0,19
$\delta_{V\infty}$	[mm]	0,27	0,32	0,35	0,29
Brick No. 7					
Size of rod		M8	M10	M12	M16
δ_{V0}	[mm]	0,24	0,2	0,34	0,26
$\delta_{V\infty}$	[mm]	0,36	0,30	0,51	0,39

Equation $V = V_{Rk} / \gamma_F \times \gamma_M$, with $\gamma_F = 1,4$

Système d'injection CHARCOT, CHARCOT–S and CHARCOT–W	**Annex 18** of European Technical Approval ETA-13/0932
Displacement under shear load (1)	

Table 15: Displacement under shear load

Brick No. 8					
Size of rod		M8	M10	M12	M16
δ_{V0}	[mm]	0,11	0,13	0,36	0,27
$\delta_{V\infty}$	[mm]	0,17	0,20	0,54	0,41
Brick No. 9					
Size of rod		M8	M10	M12	M16
δ_{V0}	[mm]	0,12	0,15	0,22	0,21
$\delta_{V\infty}$	[mm]	0,18	0,23	0,33	0,32
Brick No. 10					
Size of rod		M8	M10	M12	M16
δ_{V0}	[mm]	0,11	0,14	0,15	0,25
$\delta_{V\infty}$	[mm]	0,17	0,21	0,23	0,38
Brick No. 11					
Size of rod		M8	M10	M12	M16
δ_{V0}	[mm]	0,14	0,15	0,25	0,20
$\delta_{V\infty}$	[mm]	0,21	0,23	0,38	0,30
Brick No. 12					
Size of rod		M8	M10	M12	M16
δ_{V0}	[mm]	0,09	0,11	0,24	0,26
$\delta_{V\infty}$	[mm]	0,14	0,17	0,36	0,39
Brick No. 13					
Size of rod		M8	M10	M12	M16
δ_{V0}	[mm]	0,1	0,14	0,17	0,21
$\delta_{V\infty}$	[mm]	0,15	0,21	0,26	0,32
Brick No. 14					
Size of rod		M8	M10	M12	M16
δ_{V0}	[mm]	0,24	0,35	0,32	0,34
$\delta_{V\infty}$	[mm]	0,36	0,53	0,48	0,51

Equation $V = V_{Rk} / \gamma_F \times \gamma_M$, with $\gamma_F = 1,4$

Système d'injection CHARCOT, CHARCOT–S and CHARCOT–W	**Annex 19** of European Technical Approval ETA-13/0932
Displacement under shear load (2)	

Table 16: β-factor for job site tests according to ETAG 029, Annex B

Base material	Size of rod	β-factor
Brick No. 1	M8 to M16	0,71
Brick No. 2	M8 to M16	0,59
Brick No. 3 to 14	M8 to M16	0,71

Table 17: Brick No. 1, 2 and 3 - edge distances and spacing for tension load

d_{nom}	$s_{cr,N}$	$c_{cr,N}$	$s_{cr,min}$	$c_{cr,min}$
[mm]	**[mm]**	**[mm]**	**[mm]**	**[mm]**
8	20 x d_{nom}	10 x d_{nom}	50	50
10	20 x d_{nom}	10 x d_{nom}	50	50
12	20 x d_{nom}	10 x d_{nom}	50	50
16	20 x d_{nom}	10 x d_{nom}	54	54

Table 18: Brick No. 4 to 14 - edge distances and spacing for tension load

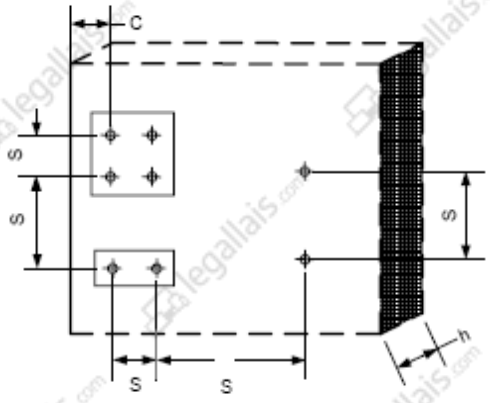
$d_{nom} + \phi d_S x L_S$	$s_{cr,N}$	$c_{cr,N}$	$s_{cr,min}$	$c_{cr,min}$
[mm]	[mm]	[mm]	[mm]	[mm]
8 + ϕ12x50	$l_{unit,max}$	0,5 x $l_{unit,max}$	100	100
8 + ϕ12x80	$l_{unit,max}$	0,5 x $l_{unit,max}$	100	100
10 + ϕ15x85	$l_{unit,max}$	0,5 x $l_{unit,max}$	100	100
10 + ϕ15x125	$l_{unit,max}$	0,5 x $l_{unit,max}$	100	100
12 + ϕ15x85	$l_{unit,max}$	0,5 x $l_{unit,max}$	100	100
12 + ϕ15x125	$l_{unit,max}$	0,5 x $l_{unit,max}$	100	100
16 + ϕ20x85	$l_{unit,max}$	0,5 x $l_{unit,max}$	120	120

$l_{unit,max}$ – max. length of masonry unit

Table 19: Brick No. 4 to 14 - edge distances and spacing for shear load

$d_{nom} + \phi d_S x L_S$	$s_{cr,cv}$	$c_{cr,cv}$
[mm]	[mm]	[mm]
8 + ϕ12x50	$l_{unit,max}$	$l_{unit,max}$
8 + ϕ12x80	$l_{unit,max}$	$l_{unit,max}$
10 + ϕ15x85	$l_{unit,max}$	$l_{unit,max}$
10 + ϕ15x125	$l_{unit,max}$	$l_{unit,max}$
12 + ϕ15x85	$l_{unit,max}$	$l_{unit,max}$
12 + ϕ15x125	$l_{unit,max}$	$l_{unit,max}$
16 + ϕ20x85	$l_{unit,max}$	$l_{unit,max}$

$l_{unit,max}$ – max. length of masonry unit



Système d'injection CHARCOT, CHARCOT–S and CHARCOT–W

Annex 21

of European Technical Approval ETA-13/0932

Edge distance and spacing