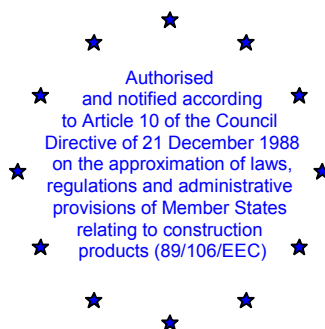


**INSTITUTO DE CIENCIAS DE
LA CONSTRUCCIÓN
EDUARDO TORROJA**

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EOTA MEMBER

European Technical Approval

ETA-12/0097

(English language translation, the original version is in Spanish language)

Nombre comercial:

Trade name:

LUSAN. Anti-twist FIXBOLT anchor bolt.

Beneficiario del DITE

Holder of approval:

LUSAN FIJACIONES Y ANCLAJES S.L.

Pol. Pla de la Bruguera. c/ Solsonés, 66
08211 Castellar del Vallés, Barcelona, Spain

Área genérica y uso del producto de construcción:

Generic type and use of construction product:

Anclaje de par controlado fabricado en acero galvanizado de medidas M6, M8, M10, M12 Y M16 para uso único en hormigón no fisurado

Torque controlled expansion anchor made of galvanized steel of sizes M6, M8, M10, M12 and M16 for use in non cracked concrete only

Validez desde / hasta :

Validity from / to:

04.04.2017 / 04.04.2022

Planta de fabricación:

Manufacturing plant:

LUSAN FIJACIONES Y ANCLAJES S.L.

Pol. Pla de la Bruguera. c/ Solsonés, 66
08211 Castellar del Vallés, Barcelona, Spain

El presente Documento de Idoneidad Técnica Europeo contiene:

This European Technical Approval contains:

15 páginas, incluyendo 7 anexos, los cuales forman parte del documento.

15 pages, including 7 annexes, which form an integral part of the document.



Organización Europea para la Idoneidad Técnica
European Organisation for Technical Approvals

I. LEGAL BASES AND GENERAL CONDITIONS

1. This European Technical Approval is issued *by the Instituto de Ciencias de la Construcción Eduardo Torroja* in accordance with:
 - Council Directive (89/106/EEC)¹ of 21 December 1988 on the approximation of laws, regulations and administrative provisions of Member States relating to construction products, modified by the Council Directive 93/68/EEC of July 1993².
 - *Real Decreto 1630/1992 de 29 de diciembre, por el que se dictan disposiciones para la libre circulación de productos de construcción en aplicación de la Directiva 89/106/CEE³. REAL DECRETO 1328/1995, de 28 de julio, por el que se modifican, en aplicación de la Directiva 93/68/CEE las disposiciones para la libre circulación, aprobadas por el Real Decreto 1630/1992, de 29 de diciembre. (B.O.E. 19.895) y la Orden CTE/2276/2002 de 4 de septiembre.*
 - Common Procedural Rules for Requesting, Preparing and the Granting of European Technical Approvals set out in the Annex of Commission Decision 94/23/EC⁴.
 - Guideline for European Technical Approval of Metal Anchors for use in Concrete“, Part 1 “Anchors in general“, and Part 2, “Torque-controlled expansion anchors”
2. The *Instituto de Ciencias de la Construcción Eduardo Torroja* is authorised to check whether the provisions of this European Technical Approval are met. Checking may take place in the manufacturing plant(s) (e.g. concerning the fulfilment of assumptions made in this European Technical Approval with regard to manufacturing). Nevertheless, the responsibility for the conformity of the products to the European Technical Approval and for their fitness for intended use remains with the holder of the European Technical Approval.
3. This European Technical Approval is not to be transferred to other manufacturers or agents of manufacturers other than those indicated on page 1, or manufacturing plants other than those indicated on page 1 laid down in the context of this European Technical Approval .
4. This European Technical Approval may be withdrawn by the *Instituto de Ciencias de la Construcción Eduardo Torroja* pursuant to Article 5.1 of the Council Directive 89/106/EEC.
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¹ Official Journal of the European Communities n° L 40, 11.2.1989, p.12

² Official Journal of the European Communities n° L 220, 30.8.1993, p.1

³ Boletín Oficial del Estado n° 34 9.11.93.

⁴ Official Journal of the European Communities n° L 17, 20.1.1994, p.34

II SPECIFIC CONDITIONS OF THE EUROPEAN TECHNICAL APPROVAL

1 Definition of product and intended use

1.1 Definition of product

The LUSAN FIXBOLT in the range of M6 to M16 is an anchor made of galvanized steel. It is placed into a drilled hole and anchored by torque-controlled expansion.

For the installed anchor see Figure given in Annex 1.

1.2 Intended use

The anchors are 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 anchor is to be used only for anchorages subject to static or quasi-static loading in reinforced or unreinforced normal weight concrete of strength class C20/25 to C50/60, according to ENV 206: 1990-03. It may be anchored in non-cracked concrete only.

The LUSAN FIXBOLT anchor may only be used in concrete subject to dry internal conditions.

The provisions made in this European Technical Approval are based on an assumed working life of the anchor of 50 years. The indications given on the working life can not be interpreted as a guarantee given by the producer, but are to be regarded only as a means for choosing the right product 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 LUSAN FIXBOLT anchor in the range of M6 to M16 corresponds to the drawings and provisions given in Annexes 1 to 4. The characteristic material values, dimensions and tolerances of the anchor not indicated in Annexes 1 to 4 shall correspond to the respective values laid down in the technical documentations ⁽⁵⁾ of this European Technical Approval. The characteristic anchor values for the design of anchorages are given in Annexes 5 to 9.

Each anchor is marked with its diameter size number and its clip external diameter, according to Annex 1.

The anchor shall only be packaged and supplied as a complete unit.

2.2 Methods of verification

The assessment of fitness of the anchor 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 Anchors

(5) The technical documentation of this European Technical Approval is deposited at the *Instituto de Ciencias de la Construcción Eduardo Torroja* (IETcc) and, as far as relevant for the tasks of the approved bodies involved in the attestation of conformity procedure, is handed over to the approved bodies.

for use in Concrete“, Part 1 “Anchors in general“, and Part 2, “Torque-controlled expansion anchors” on the basis of Option 12.

3. Evaluation of Conformity and CE marking

3.1 Attestation of conformity and CE marking

The system of attestation of conformity 2 (i) (referred to as system 1) according to Council Directive 89/106/EEC Annex III laid down by the European Commission provides:

- a) tasks for 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 for 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; factory production control

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

The manufacturer shall only use raw materials supplied with the relevant inspection documents as laid down in the prescribed test plan ⁽⁵⁾. The incoming raw materials shall be subject to controls and tests by the manufacturer before acceptance. Check of such as nuts, washers, wire for bolts and metal band for expansion clip shall include control of the inspection documents presented by suppliers (comparison with nominal values) by verifying dimension and determining material properties, e.g. tensile strength, hardness, surface finish.

The manufactured components of the anchor shall be subjected to the following tests:

⁵ The prescribed test plan has been deposited at the *Instituto de Ciencias de la Construcción Eduardo Torroja* (IETcc) and is only made available to the approved bodies involved in the conformity attestation procedure.

Component	Characteristics
Body	Zinc plated coating thickness (*)
	Steel mechanical characteristics (*)
	Steel chemical composition (*)
	Geometry (diameter and length)
	Vickers Hardness (*)
Washer	Zinc plated coating thickness (*)
	Steel mechanical characteristics (*)
	Steel chemical composition (*)
	Geometry (diameter and thickness)
Nut	Zinc plated coating thickness (*)
	Steel mechanical characteristics (*)
	Steel chemical composition (*)
	Geometry (diameter and length)
	Vickers Hardness (*)
Clip	Zinc plated coating thickness (*)
	Steel mechanical characteristics (*)
	Steel chemical composition (*)
	Geometry (diameter and thickness)

(*) Test to be carried out only in case of new supplier

During the manufacture process, the anchor shall be subjected to visual control of correct assemblage and of completeness of the anchor.

The finished anchor shall be subjected to the control of tensile strength test of individual anchor.

The frequency of controls and tests conducted during production and on the assembled anchor is laid down in the prescribed test plan taking account of the automated manufacturing process of the anchor.

The results of factory production control are recorded and evaluated. The records include at least the following information

- Designation of the product, basic material and components;
- Type of control or testing;
- Date of manufacture of the product and date of testing of the product or basic material and components;
- Result of control and testing and, if appropriate, comparison with requirements;
- Signature of person responsible for factory production control.

The records shall be presented to the inspection body during the continuous surveillance. On request they shall be presented to the Instituto de Ciencias de la Construcción Eduardo Torroja (IETcc).

Details of the extent, nature and frequency of testing and controls to be performed within the factory production control shall correspond to the prescribed test plan which is part of the technical documentation of this European Technical Approval.

3.2.2. Tasks of approved bodies

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 Instituto de Ciencias de la Construcción Eduardo Torroja (IETcc) and the approved bodies involved.

3.2.2.2. Initial inspection of factory and factory production control

The approved body shall ascertain that, in accordance with the prescribed test plan, the factory, in particular, 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 2.1. as well as in the Annexes to the European Technical Approval, in accordance with the prescribed test plan.

3.2.2.3. Continuous surveillance

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

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

The results of product certification and continuous surveillance shall be made available on demand by the certification body or inspection body, respectively, to the Instituto de Ciencias de la Construcción Eduardo Torroja (IETcc).

In cases where the provisions of the European Technical Approval and the prescribed test 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 anchors. The symbol “CE” shall be accompanied by the following information:

- Identification number of the certification body.
- Name or identifying mark of the producer and manufacturing plant.
- The 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.
- Use category (ETAG 001-1 Option 12).
- Size.

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

4.1 Manufacturing

The anchor is manufactured in accordance with the provisions of the European Technical Approval using the automated manufacturing process as identified during the inspection of the plant by the Instituto de Ciencias de la Construcción Eduardo Torroja (IETcc) and the approved body and laid down in the technical documentation.

4.2 Installation

4.2.1. Design of anchorages

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

The anchorages are designed in accordance with the “Guideline for European Technical Approval of Metal Anchors for Use in Concrete” ETAG 001, Annex C, Method C, for torque controlled expansion anchors under the responsibility of an engineer experienced in anchorages and concrete work.

Verifiable calculation notes and drawings are prepared taking account of the loads to be anchored.

The position of the anchor is indicated on the design drawings (e.g. position of the anchor relative to reinforcement or to support, etc.).

4.2.2. Installation of anchors

The fitness for use of the anchor can only be assumed if the anchor is installed as follows:

- Anchor 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.
- Anchor installation in accordance with the manufacturer's specifications and drawings prepared for that purpose and using the appropriate tools.
- Thickness of the fixture corresponding to the range of required thickness values for the type of anchor
- Checks before placing the anchor to ensure that the strength class of the concrete in which the anchor is to be placed is in the range given and is not lower than that of the concrete to which the characteristic loads apply.
- Check of concrete being well compacted, e.g. without significant voids.
- Clearing the hole of drilling dust.
- Anchor installation ensuring the specified embedment depth, that is the appropriate depth marking of the anchor not exceeding the concrete surface or embedment depth control.
- Keeping of the edge distance and spacing to the specified values without minus tolerances.
- Positioning of the drill holes without damaging the reinforcement.
- In case of aborted hole: new drilling at a minimum distance away of twice the depth of the aborted hole or smaller distance if the aborted drill hole is filled with high strength mortar and if under shear or oblique tension load it is not in the direction of load application.
- Application of the torque moment given in Annex 3 using a calibrated torque wrench.

4.2.3. Responsibility of the manufacturer

It is the manufacturer's responsibility to ensure that the information on the specific conditions according to 1 and 2 including Annexes referred to in 4.2.1 and 4.2.2 is given to those who are concerned. This information may be made by 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:

- drill bit diameter,
- thread diameter,
- maximum thickness of the fixture,
- minimum installation depth,

- minimum hole depth,
- required torque moment,
- information on the installation procedure,
including cleaning of the hole, preferably by means of an illustration,
- reference to any special installation equipment needed,
- identification of the manufacturing batch.

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



Instituto de Ciencias de la Construcción Eduardo Torroja
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www.ietcc.csic.es

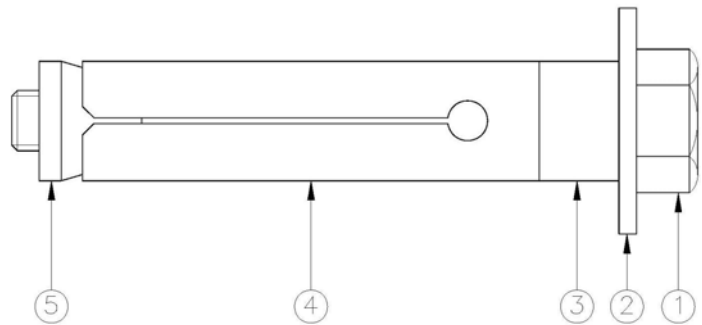
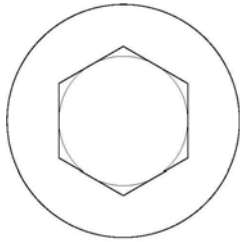


On behalf of the Instituto de Ciencias de la Construcción Eduardo Torroja
Madrid, 04th April 2017
The Director of the INSTITUTO DE CIENCIAS
DE LA CONSTRUCCIÓN EDUARDO TORROJA

A handwritten signature in blue ink, appearing to read 'Ángel Arteaga Iriarte'.

Mr. Ángel Arteaga Iriarte

Assembled anchor

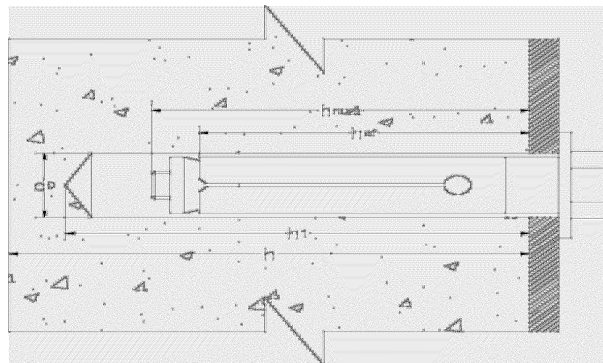


- 1.- Body
- 2.- Washer
- 3.- Plastic ring
- 4.- Expansion clip
- 5.- Cone

Identification on anchor:

Each anchor is marked with its diameter size number and its clip outer anchoring diameter (with the exception of M16 anchors).

Scheme of the anchor in use



- h_{ef} : Effective anchorage depth
- h_1 : Drilling hole depth
- h_c : Minimum concrete depth
- t_{fix} : Fixture thickness
- d_0 : Drill bit
- d_f : Diameter of clearance hole on fixture

LUSAN FIXBOLT anchor	Annex 1 of European Technical Approval ETA-12/0097
Product and intended use	

Table 1. Materials

Item	Designation	FIXBOLT ZINC PLATED
1	Body	Steel class 8.8 ISO 898-1
2	Washer	Especial washer Type DIN 125-L
3	Plastic ring	PVC
4	Expansion clip	Steel slab
5	Cone	Carbon steel EN 10277-3

LUSAN FIXBOLT anchor

Materials of anchors

Annex 2
of European
Technical Approval

ETA-12/0097

Table 2. Installation data

LUSAN FIXBOLT			M6	M8	M10	M12	M16
Nominal drill bit diameter	d_0	[mm]	8	10	12	16	20
Diameter of clearance hole of fixture	d_f	[mm]	9	12	14	18	22
Torque required	T_{ins}	[Nm]	15	25	35	50	80
Total length	L_{min}	[mm]	45	60	70	80	110
	L_{max}	[mm]	60	80	100	110	140
Minimum thickness of concrete element	h_{min}	[mm]	100	100	100	110	160
Hole depth	h_1	[mm]	50	65	75	85	115
Total depth of anchor bolt inside concrete	h_{nom}	[mm]	40	55	66,5	77	103,5
Effective depth	$h_{ef, std}$	[mm]	30	40	50	53	78
Maximum thickness of fixture (from-to)	$t_{fix, max}$	[mm]	5-20	5-25	5-35	10-35	10-40
Minimum admissible spacing	s_{min}	[mm]	90	120	150	165	240
Minimum admissible edge distance	c_{min}	[mm]	45	60	75	85,5	120

LUSAN FIXBOLT anchor

Installation data

Annex 3
 of European
 Technical Approval
ETA-12/0097

Table 3. Characteristic resistance values for tensile loads, design method C.

LUSAN FIXBOLT			M6	M8	M10	M12	M16
Steel failure							
Characteristic resistance	$N_{Rk,s}$	[kN]	10,1 ¹⁾	19,1	34,3	49,6	85,9
Partial safety factor	$\gamma_{M,s}$	[-]	1,68	1,68	1,68	1,68	1,68
Pull-through failure							
Characteristic resistance, non-cracked concrete C20/25 to C50/60	$N_{Rk,p}$	[kN]	5 ¹⁾	7,5	9	12	20
Partial safety factor	$\gamma_{M,p}$	[-]	1,8	1,5	1,5	1,5	1,8
Concrete cone and splitting failures							
Effective depth	$h_{ef, std}$	[mm]	30	40	50	53	78
Characteristic resistance, non-cracked concrete C20/25 to C50/60	$N_{Rk,c}$	[kN]	6,30 ¹⁾	10,44	12,75	17,82	29,52
Partial safety factor	$\gamma_{M,c} = \gamma_{M,sp}$	[-]	1,8	1,5	1,5	1,5	1,8
Spacing	$s_{cr,N}$	[mm]	90	120	150	159	234
	$s_{cr,sp}$	[mm]	160	192	220	260	336
Edge distance	$c_{cr,N}$	[mm]	45	60	75	79,5	117
	$c_{cr,sp}$	[mm]	80	96	110	130	168

⁽¹⁾ Use restricted to anchoring of structural components which are statically indeterminate

LUSAN FIXBOLT anchor

Characteristic resistance values for tensile loads, design method A.

Annex 4
 of European
 Technical Approval
ETA-12/0097

Table 4. Displacements under tensile loads.

LUSAN FIXBOLT				M6	M8	M10	M12	M16
Tensile loads in non-cracked concrete C20/25 to C50/60			[kN]	2,4	4,3	5,7	7,6	11,5
Displacements	Short term	δ_{N0}	[mm]	0,09	0,08	0,05	0,02	0,06
	Long term	$\delta_{N\infty}$	[mm]	1,59	1,59	1,59	1,59	1,59

LUSAN FIXBOLT anchor

Displacements under tensile loads

Annex 5
 of European
 Technical Approval

ETA-12/0097

Table 5. Characteristic values

LUSAN FIXBOLT			M6	M8	M10	M12	M16	
Steel failure without lever arm								
Characteristic resistance	$V_{Rk,s}$	[kN]	7,5 ³⁾	13,8	22,0	32,0	60,1	
Partial safety factor	$\gamma_{M,s}$	[-]	1,25	1,25	1,25	1,25	1,25	
Pry-out failure								
h_{ef}	k	[-]	1,0 ³⁾	1,0	1,0	1,0	2,0	
Partial safety factor	$\gamma_{M,pr}$ ¹⁾²⁾	[-]	1,8	1,5	1,5	1,5	1,8	
Concrete cone failure in non-cracked concrete								
Effective anchoring length under shear loads	h_{ef}	l_f	[mm]	30	40	50	53	78
Outer anchoring diameter		d_{nom}	[mm]	8 ³⁾	10	12	16	20
Partial safety factor		$\gamma_{M,c}$ ¹⁾²⁾	[-]	1,8	1,5	1,5	1,5	1,8

⁽¹⁾In the absence of other national regulations.

⁽²⁾ Partial safety factor $\gamma_2 = 1,0$ included..

⁽³⁾ Use restricted to anchoring of structural components which are statically indeterminate

LUSAN FIXBOLT anchor

Characteristic values

Annex 6
 of European
 Technical Approval

ETA-12/0097

Table 6. Displacements under shear loads

LUSAN FIXBOLT				M6	M8	M10	M12	M16
Shear loads in non-cracked concrete C20/25 to C50/60		V	[kN]	4,3	6,9	11,4	16,6	34,3
Displacements	Short term	δ_{V0}	[mm]	0,5	1,8	3,3	5,8	5,3
	Long term	$\delta_{V\infty}$	[mm]	0,75	2,70	4,95	8,70	7.95

LUSAN FIXBOLT anchor

Displacements under shear loads

Annex 7
 of European
 Technical Approval

ETA-12/0097