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European Organisation for  
Technical Assessment  
Organisation Européenne pour  
l'évaluation technique

**European Technical Assessment      ETA 23/0116 of 28/03/2023**

**GENERAL PART**

Trade name of the construction product

Product family to which the construction product belongs

Manufacturer

Manufacturing plant

This European Technical Assessment contains:

This European Technical Assessment is issued in accordance with Regulation (EU) n° 305/2011, on the basis of

**GSD-GSE**

**PAC 33: FIXINGS  
Fastener of external wall claddings**

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**GE1, GE2<sup>1</sup>**

**19 pages, including 12 annexes which form an integral part of this assessment**  
Annex D contains confidential information and is not included in the European Technical Assessment when that assessment is publicly disseminated

**EAD 330030-00-0601 – Fastener of external wall claddings**

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<sup>1</sup> The meaning of the codes is reported in Annex D, which is confidential and which is to be communicated only to the Notified Body(ies) involved in the system of assessment and verification of the consistency of performance, where relevant, or to market surveillance authorities

## **SPECIFIC PARTS**

### **1. TECHNICAL DESCRIPTION OF THE PRODUCT**

The fasteners GSD-GSE consist of special fasteners (hereinafter anchors) for the rear fixing of façade panels in natural stone, and correspond to the description given hereafter and in Annexes A1-A3 of this ETA. GSD includes the following variants: GSD M6x10, GSD M8x15 and GSD M8x21; GSE includes the following variants: GSE M8x15 and GSE M8x21. Both are composed of two parts which, depending on whether it is the GSD or the GSE, are, respectively:

- in the GSD type anchors, a cylindrical sleeve with a circular groove close to the inner bottom edge, and a threaded bush with internal thread equipped with a circumferential lip on the outer bottom edge and two notches on the top edge;
- in the GSE type anchors, a cylindrical sleeve with a circular groove close to the inner bottom edge, and a threaded pin with cylindrical body and provided with a circumferential lip on the bottom edge and a hexagonal socket at the top of the thread.

The cylindrical sleeve is the same in both GSD and GSE, according to the variant.

The GSD-GSE anchors (in the variants GSD M6x10, GSD M8x15, GSD M8x21, GSE M8x15 and GSE M8x21) are made of stainless steel, with a threaded fastening element of nominal diameter  $d$  M6 or M8. The GSD-GSE anchors are installed in a deformation-controlled manner in undercut drill holes executed in the natural stone panel.

The GSD-GSE anchors are first inserted in an undercut drill hole on the back part of the natural stone façade panel; then, at the end of the external sleeve, in the point where the circular groove is, an annular deformation is produced by pushing the sleeve against the circumferential lip, through a specific pneumatic tool; the installation, performed by means of the pneumatic tool, takes place without applying a torque. Through this controlled deformation, with an annular protrusion which expands inside the circumferential undercut slot, the fastening of the anchor to the panel is achieved. After the installation, the anchor cylindrical body, in full contact with the sides of the hole, does not stand off the surface (see Annex A2 Figure A.3).

The façade panels and any other component of the façade system are outside the scope of this European Technical Assessment.

The product description, with reference to its components, is given in Annexes A1-A3.

### **2. SPECIFICATION OF THE INTENDED USE IN ACCORDANCE WITH EUROPEAN ASSESSMENT DOCUMENT N° 330030-00-0601 (hereinafter EAD)**

The GSD-GSE anchors are intended to be used for the rear fixing of natural stone façade panels in external wall claddings; the fixing of the façade panels may be either in vertical position or in horizontal position. The GSD-GSE anchors are installed in an undercut drill hole.

Concerning product packaging, transport and storage it is the responsibility of the manufacturer to undertake the appropriate measures and to advise his clients on the transport and storage, as he considers necessary in order to reach the declared performances.

The information about installation is provided with the technical documentation from the manufacturer and it is assumed that the product will be installed according to it or (in absence of such instructions) according to the usual practice of the building professionals.

The specifications and conditions given by the manufacturer, including the specifications of the panel material (natural stone) of the façade panels in which the GSD-GSE anchors are intended to be used, are summarized in Annexes B1-B6.

The performances assessed in this European Technical Assessment, according to the applicable EAD, are based on an assumed intended working life of at least 50 years provided that the conditions for packaging, transport, storage, installation as well as appropriate use, maintenance and repair are met. The indications given on the working life cannot be interpreted as a guarantee given by the manufacturer, 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.

### 3. PERFORMANCE OF THE PRODUCT AND REFERENCES TO THE METHODS USED FOR ITS ASSESSMENT

The tests for performance assessment of the GSD-GSE were carried out in compliance with EAD 330030-00-0601 according to the test methods reported herein, as well for what concerns sampling, conditioning and testing provisions.

The numbering (#) in the following tables corresponds to the numbering of Table 2.1 of EAD 330030-00-0601.

#### 3.1 MECHANICAL RESISTANCE AND STABILITY (BWR 1)

#	Essential characteristic	Performance
1	Characteristic resistance to breakout or pull-out failure under tension load	See Annex C1, Table C1
2	Characteristic resistance to breakout or pull-out failure under shear load	See Annex C1, Table C2
3	Characteristic resistance to breakout or pull-out failure under combined tension and shear load	<b>No performance assessed</b>
4	Edge distance and spacing	See Annex C2, Table C3
5	Durability	Corrosion Resistance Class (CRC) III
6	Characteristic resistance to steel failure under tension and shear load	See Annex C2, Table C4

#### 3.2 SAFETY IN CASE OF FIRE (BWR 2)

#	Essential characteristic	Performance
7	Reaction to fire	Class A1

**4. ASSESSMENT AND VERIFICATION OF CONSTANCY OF PERFORMANCE (AVCP) SYSTEM APPLIED, WITH REFERENCE TO ITS LEGAL BASE**

In accordance with the European Assessment Document EAD No. 330030-00-0601 the applicable European legal act is: **Commission Decision 97/161/EC**.

The system of assessment and verification of constancy of performance (AVCP) is: **2 +**.

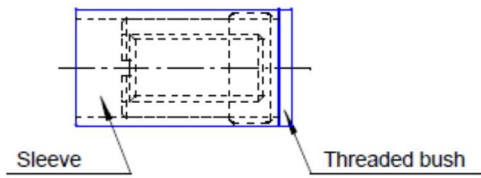
**5. TECHNICAL DETAILS NECESSARY FOR THE IMPLEMENTATION OF THE AVCP SYSTEM, AS PROVIDED FOR IN EAD 330030-00-0601**

Technical details necessary for the implementation of the AVCP system are laid down in the Control Plan deposited at ITC-CNR.

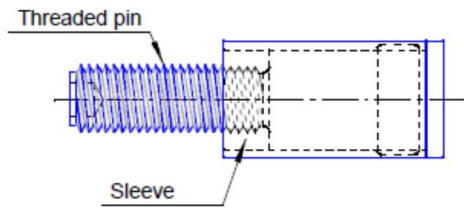
**Issued in San Giuliano Milanese, Italy on 28/03/2023  
by ITC – CNR**

**Mr. Antonio Bonati  
Acting Director of ITC-CNR**

GSD - Type M6 or M8



GSE - Type M8



Designation system, examples:

GSD M8x15  
 — Thread diameter  
 — Deformed anchor depth  
 — GS ENGINEERING female undercut anchor

GSE M8x15  
 — Thread diameter  
 — Deformed anchor depth  
 — GS ENGINEERING male undercut anchor

Figure A.1 – GSD-GSE anchors

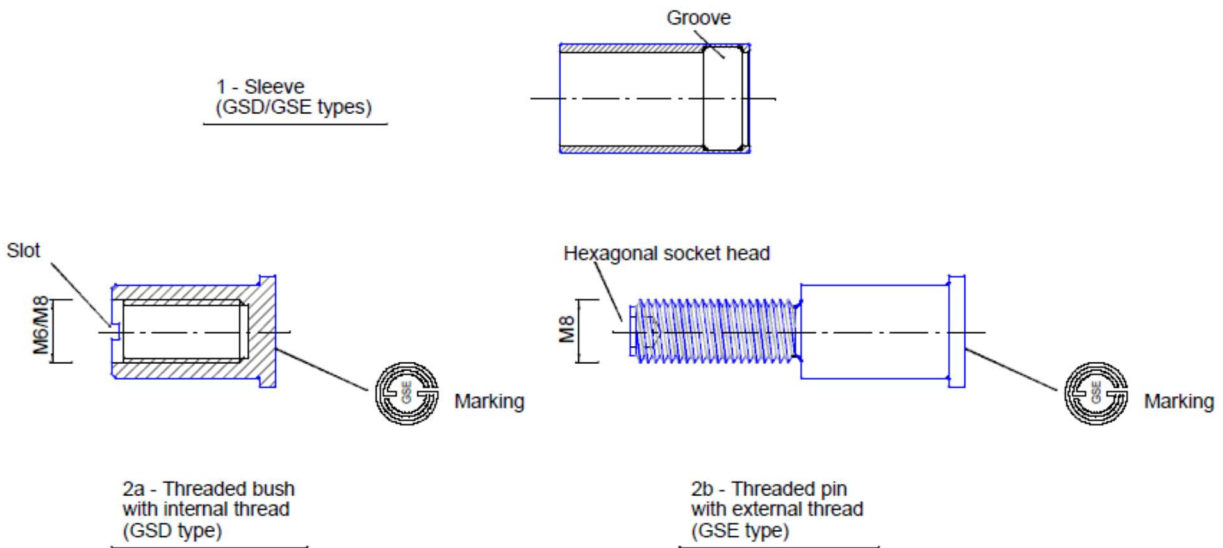


Figure A.2 – Anchor parts

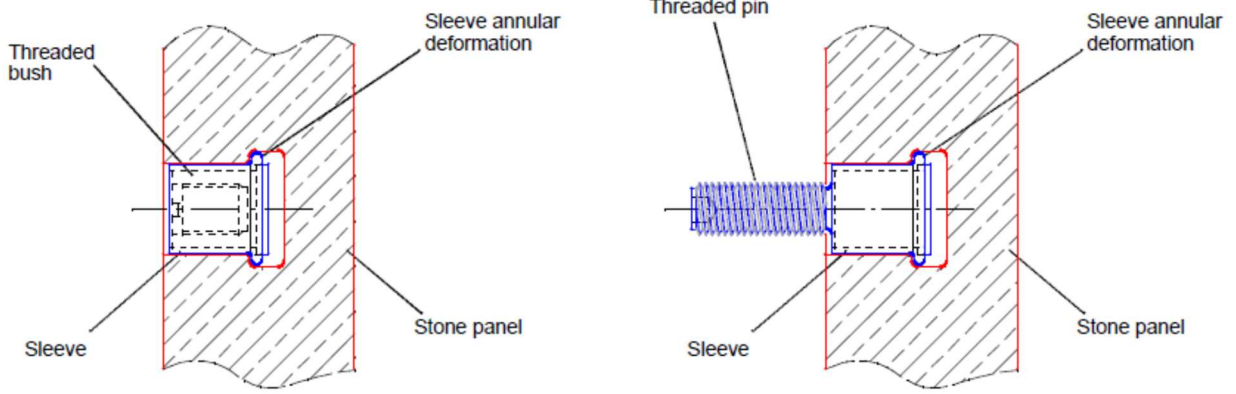
Table A.1: Anchor part materials

Part	Designation	Material
1	Anchor sleeve (GSD/GSE)	Stainless steel 1.4404 EN 10088 series
2a	Threaded bush (GSD)	Stainless steel 1.4578 EN 10088 series
2b	Threaded pin (GSE)	Stainless steel 1.4578 EN 10088 series

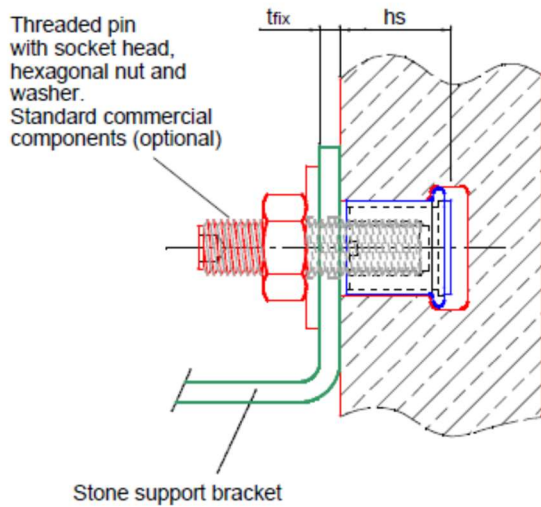
**GSD-GSE**

Product Description – Types of anchors, anchor parts, materials

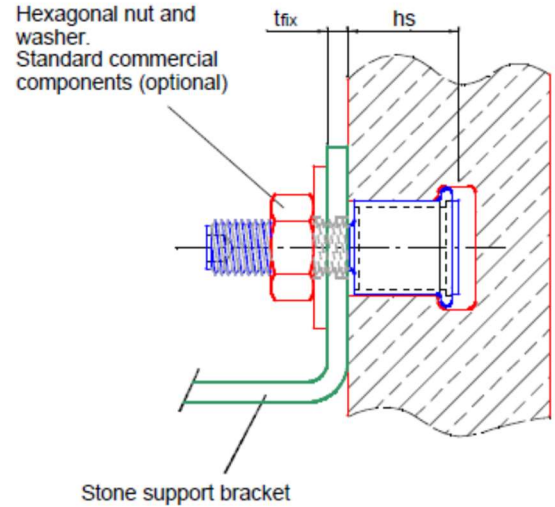
**Annex A1**  
 of ETA N° 23/0116



**Figure A.3 – Anchors installed in the stone panel.**  
**GSD (left): with internal thread; GSE (right): with external thread**



**Figure A.4 – GSD anchor intended use: the connection with a metallic substructure/bracket**



**Figure A.5 – GSE anchor intended use: the connection with a metallic substructure/bracket**

**Table A.2: Anchor embedment depth with working tolerances and maximum bracket thickness  $t_{fix}$**

Anchor	$h_s$ (mm) min.	$t_{fix}$ (mm)
GSD M6x10	10 (+0.5/-0.1)	7
GSD/GSE M8x15	15 (+0.5/-0.1)	10
GSD/GSE M8x21	21 (+0.5/-0.1)	10

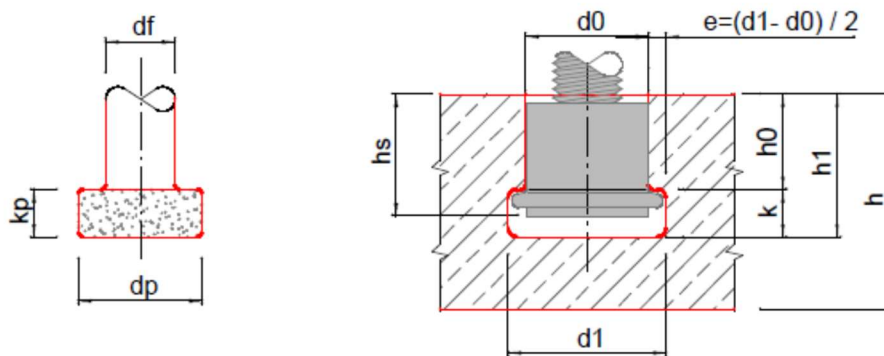
**GSD-GSE**

Product Description – The installed anchors. Intended use. Anchor embedment depth and support bracket thickness

**Annex A2**  
**of ETA N° 23/0116**

**Table A.3: Drilling bit dimensions with reference to Figure A.6**

Anchor	Drilling bit	d <sub>p</sub> mm	k <sub>p</sub> mm	d <sub>f</sub> mm
GSD M6x10	GSB 12	12 (+0.7/+0.4)	4.6 (-0.0/-0.1)	7
GSD/GSE M8x15 GSD/GSE M8x21	GSB 14	14 (+0.7/+0.5)	6 (-0.0/-0.1)	8



**Figure A.6 – Drilling bit and drill hole geometries**

**Table A.4: Drill hole dimensions with reference to Figure A.6**

Anchor type	“d <sub>0</sub> ” drill hole diameter (mm)		“d <sub>1</sub> ” undercut diameter (mm)		“h <sub>s</sub> ” minimum anchor embedment depth (mm)	“h <sub>0</sub> ” drill hole thickness (mm)	“k” undercut height (mm)	“e” undercut depth (mm)	“h” facade panel thickness (mm)	
	L,M,S <sup>(1)</sup>	G <sup>(2)</sup>	L,M,S <sup>(1)</sup>	G <sup>(2)</sup>					nominal	min.
GSD M6x10	12 (+0.8/+0.3)	13 (+0.1/-0.6)	16 (+0.8/+0.3)	17 (+0.1/-0.6)	10 (+0.5/-0.1)	8.5 (+0.5/-0.1)	4.6 (-0.0/-0.6)	2.0	20	18
GSD/GSE M8x15	14 (+0.9/+0.4)	15 (+0.1/-0.6)	19 (+0.9/+0.4)	20 (+0.1/-0.6)	15 (+0.5/-0.1)	13.5 (+0.5/-0.1)	6.0 (-0.0/-1.0)	2.5	30	25
GSD/GSE M8x21	14 (+0.9/+0.4)	15 (+0.1/-0.6)	19 (+0.9/+0.4)	20 (+0.1/-0.6)	21 (+0.5/-0.1)	19.5 (+0.5/-0.1)	6.0 (-0.0/-1.0)	2.5	40	30

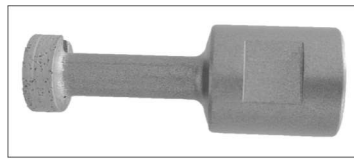
(1) L = Limestone, M = Marble, S = Sandstone

(2) G = Granite

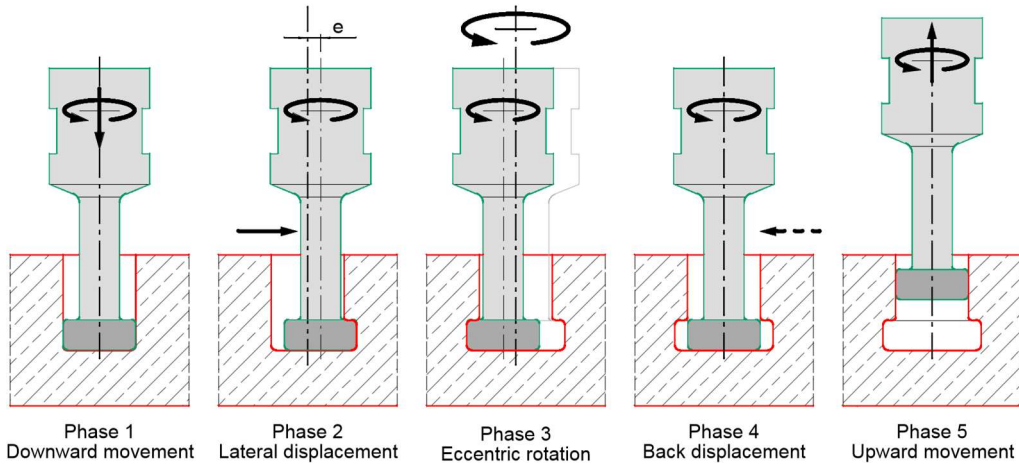
**GSD-GSE**

Product Description – Dimensions: drilling bit, drill hole geometry

**Annex A3**  
**of ETA N° 23/0116**



Drilling Bit GSB ..



Phase 1: downward movement of the drilling bit for the "d<sub>0</sub>" drill hole  
 Phase 2: lateral displacement "e" of the drilling bit for undercut beginning  
 Phase 3: eccentric rotation of the drilling bit for the full "d<sub>1</sub>" undercut execution  
 Phase 4: back displacement of the drilling bit till the hole axis  
 Phase 5: upward movement drawing the drilling bit out of the hole

Figure A.7 - Drilling phases of the undercut drill hole

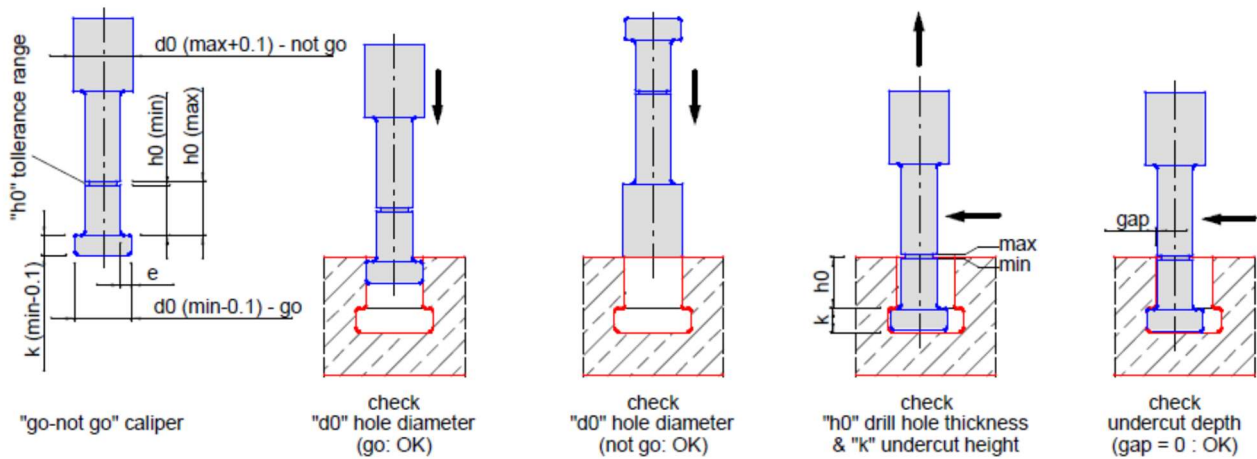


Figure A.8 – Dimension checking of the undercut drill hole by “go-not go” calliper

GSD-GSE

Product Description – Dimensions: drilling bit, drill hole geometry

Annex A4  
of ETA N° 23/0116



## SPECIFICATION OF INTENDED USE

### ➤ ACTIONS

The GSD-GSE anchors are subject to static and quasi-static loading.

### ➤ SPECIFICATIONS OF THE MATERIALS OF THE PANELS TO BE FIXED

The GSD-GSE are used as anchors for the rear fixing of façade panels, both in vertical and in horizontal position, made of the following materials: natural stone (except slate) in different varieties in accordance with EN 1469. The said natural stone varieties belong to the stone groups I (high quality intrusive rocks (plutonic rocks)) and IV (sedimentary rocks with “hard stone characteristics”) with reference to the classification contained in Table 1.1 of EAD 330030-00-0601 and further reported in Table B.1 hereafter, which is an extract from EOTA Technical Report TR 062 “Design of fasteners for façade panels made of natural stone (except slate)”.

- For minimum panel thickness, see Table A.4 and Figure A.6 in Annex A3.
- The used natural stone is free of open seams and mechanically active cracks and alterations.
- The material for the façade panels to be fixed is specified by the values shown in Tables B.2 and B.3 in the next page.

**Table B.1: Stone groups for façade panels made of natural stone (except slate)**

Stone group		Natural stone type	Boundary conditions
<b>I</b>	High quality intrusive rocks (plutonic rocks)	Granite, granitite, tonalite, diorite, monzonite, gabbro, other magmatic plutonic rocks	None
<b>II</b>	Metamorphic rocks with “hard stone characteristics“	Quartzite, granulite, gneiss, migmatite	None
<b>III</b>	High quality extrusive rocks (volcanic rocks)	Basalt and basaltic lava without harmful ingredients (like sun burner basalt)	Minimum density $\rho$ : basalt: 2.7 kg/dm <sup>3</sup> basaltic lava: 2.2 kg/dm <sup>3</sup>
<b>IV</b>	Sedimentary rocks with “hard stone characteristics“ <sup>1)</sup>	Sandstone, limestone and marble	Minimum density $\rho$ : sandstone: 2.1 kg/dm <sup>3</sup>

<sup>1)</sup> For façade panels made of natural stones with planes of anisotropies, the difference between the flexural strength determined parallel to the planes of anisotropy and perpendicular to the edges of the planes of anisotropy shall not be more than 50%.

**GSD-GSE**

Intended Use – Specifications

**Annex B1/1**  
**of ETA N° 23/0116**

## SPECIFICATION OF INTENDED USE

### ➤ SPECIFICATIONS OF THE MATERIALS OF THE PANELS TO BE FIXED

The material for the façade panels to be fixed is specified by the values shown hereafter in Tables B.2 and B.3.

**Table B.2: Characterization of the panel material: specification of the stone of group I**

Blanco Cristal, granite (country of origin: Spain)	Mean value from tests	Minimum expected value
Flexural strength $\sigma_{5\%}$ <sup>1)</sup> according to EN 12372:2006 [MPa]	16.13	15.29
Flexural dynamic modulus of elasticity $Ed_F$ <sup>2)</sup> according to EN 14146:2004 [MPa]	46110	-

**Table B.3: Characterization of the panel material: specification of the stone of group IV**

Jura Marmor beige, limestone (country of origin: Germany)	Mean value from tests	Minimum expected value
Flexural strength $\sigma_{5\%}$ <sup>1)</sup> according to EN 12372:2006 [MPa]	12.79	8.91
Flexural dynamic modulus of elasticity $Ed_F$ <sup>2)</sup> according to EN 14146:2004 [MPa]	63010	-

<sup>1)</sup> 5%-fractile value of  $\geq 5$  tests on panels by a confidence level of 75% and unknown standard deviation.

<sup>2)</sup> Mean value of  $\geq 5$  tests.

### ➤ DESIGN

The GSD-GSE anchors for the rear fixing of natural stone façade panels (except slate), in accordance with EN 1469, are intended to be used for fastenings which are designed in accordance with EOTA Technical Report TR 062 "Design of fasteners for façade panels made of natural stone (except slate)". Anchorages are designed under the responsibility of an engineer experienced in anchorages and façade design. The position of the anchors is shown in the design drawings.

### ➤ INSTALLATION CONDITIONS

Each façade panel is fixed by means of at least four anchors positioned in a rectangular pattern.

The anchors are intended to be used with a minimum edge distance of 50 mm.

According to the installation instructions by the manufacturer, 1% of all drillings shall be checked and the geometry of the drill hole shall be verified and recorded.

Since the hole dimensions depend on the anchor type, every type of hole corresponding to one anchor type is to be checked through a specific calliper.

The intended use of GSD-GSE anchors, with respect to environmental conditions, results from their Corrosion Resistance Class (CRC) in accordance with EN 1993-1-4: see Table 3.1 of this ETA.

**GSD-GSE**

Intended Use – Specifications

**Annex B1/2  
of ETA N° 23/0116**

# INSTALLATION INSTRUCTIONS

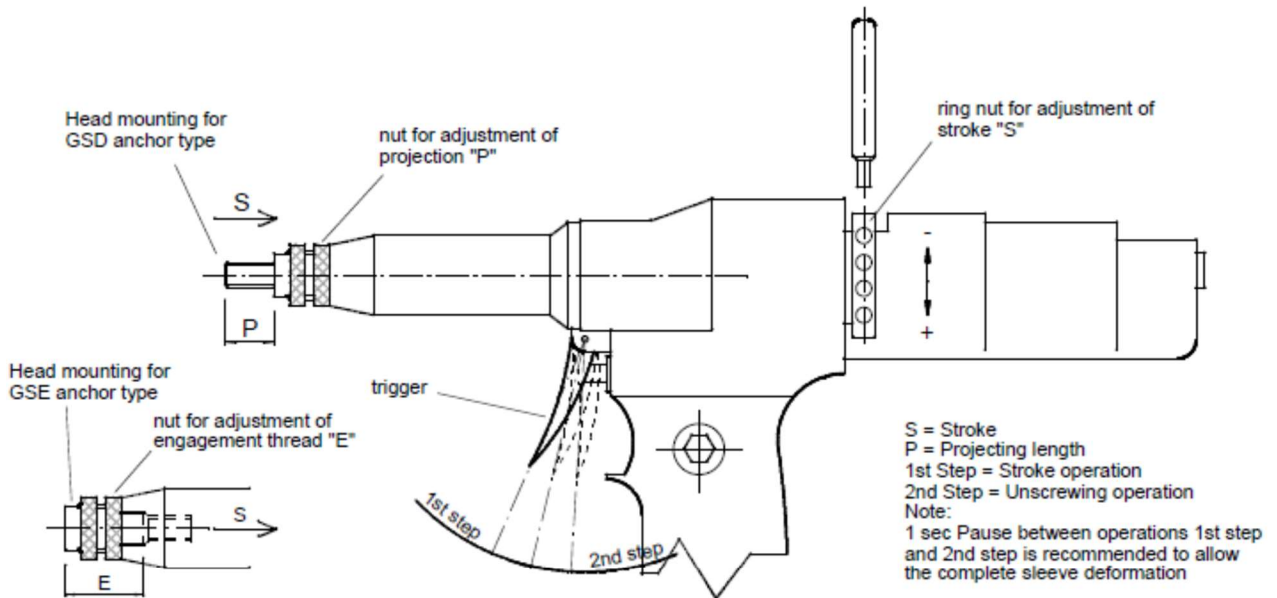


Figure B.2 - Pneumatic Setting Tool Instructions for Use

Table B.4 - Riveting Tool Settings

Anchor type	P (mm)	E (mm)	S (mm)	p (bar)
GSD M6x10	11	>16	4	4.5/5
GSD/GSE M8x15 GSD/GSE M8x21	16	>18	6	5.5/6

Figure B.1 – Pneumatic setting tool for the anchor installation

<b>GSD-GSE</b>		<b>Annex B2</b> of <b>ETA N° 23/0116</b>
Intended Use – Installation instructions: pneumatic setting tool, tool settings		

# INSTALLATION INSTRUCTIONS

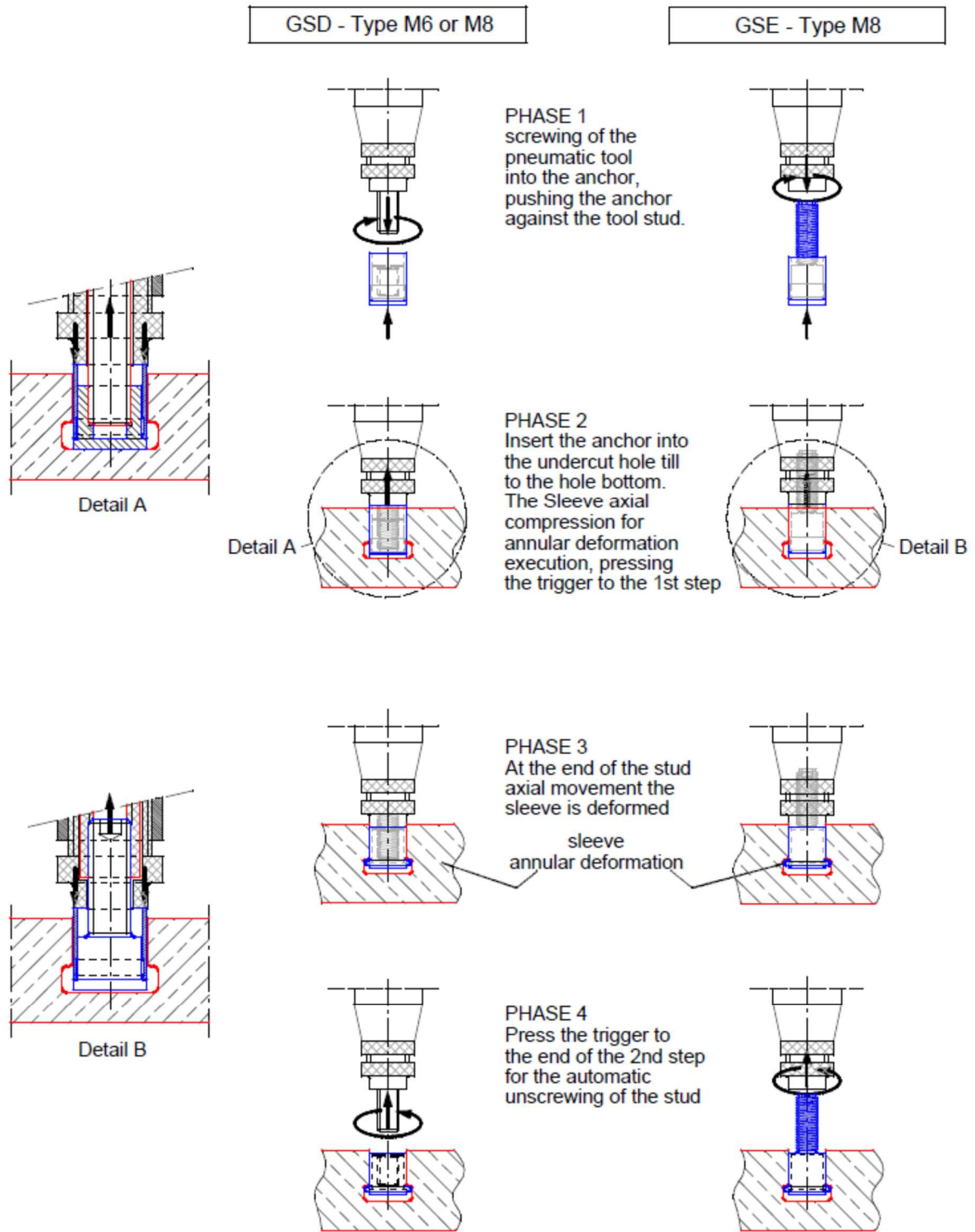


Figure B.2 – Anchor installation phases

**GSD-GSE**

Intended Use – Installation of the undercut anchors in the stone panel

**Annex B3**  
of ETA N° 23/0116

## INSTALLATION INSTRUCTIONS



Anchor components:

1: Sleeve,

2: Threaded bush

Behind the components, the undercut hole



Anchor component joining:

join the sleeve to the bush from the groove side



Anchor component joining:

push the sleeve to the end of the bush



Anchor screwing on to the pneumatic tool:

push it against the stud to activate the automatic screwing



End of screwing on the pneumatic tool

The sleeve edge is in contact with the tool



Anchor inserting into the undercut hole

Figure B.3 – Images and description of all installation phases of GSD type anchors

### GSD-GSE

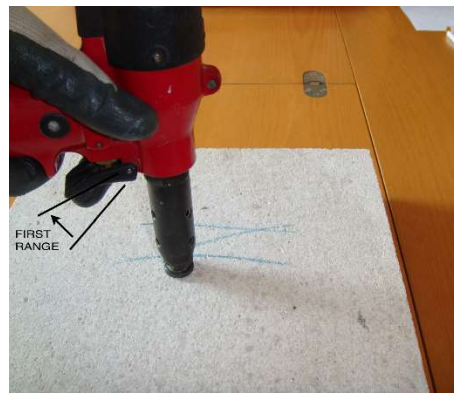
Intended use – Installation instructions of the “GSD” anchors in the stone panel

Annex B4/1  
of ETA N° 23/0116

## INSTALLATION INSTRUCTIONS



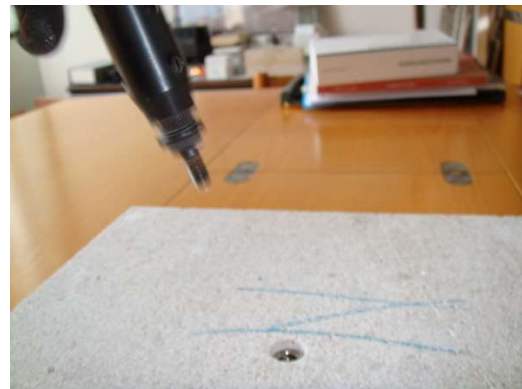
Insert the anchor till the hole bottom before pressing the trigger



Press the trigger for the first range of the trigger path. In this phase the stud is put in tension and it deforms the anchor inside the hole



At the end of the stud axial movement, press the trigger to the end of the path to activate the automatic un-screwing of the stud



Remove the pneumatic tool from the installed anchor



Check if the distance between the sleeve edge and the bush edge is  $< 1$  mm. If it is  $> 1$  mm, repeat the operations from “Press the trigger for the first range”, after having screwed the tool stud on the same anchor into the stone by simply pushing against it.

**Figure B.4 – Images and description of all installation phases of GSD type anchors**

### GSD-GSE

Intended use – Installation instructions of the “GSD” anchors in the stone panel

**Annex B4/2  
of ETA N° 23/0116**

## INSTALLATION INSTRUCTIONS



Anchor components:  
1: Sleeve,  
2: Threaded pin  
Behind the components, the undercut hole



Anchor component joining:  
join the sleeve to the pin from the groove side



Anchor component joining:  
push the sleeve to the end of the pin



Anchor screwing on to the pneumatic tool:  
push it against the tool hub to activate the automatic screwing



End of screwing on the pneumatic tool.  
The sleeve edge is in contact with the tool



Anchor inserting into the undercut hole

**Figure B.5 – Images and description of all installation phases of GSE type anchors**

### GSD-GSE

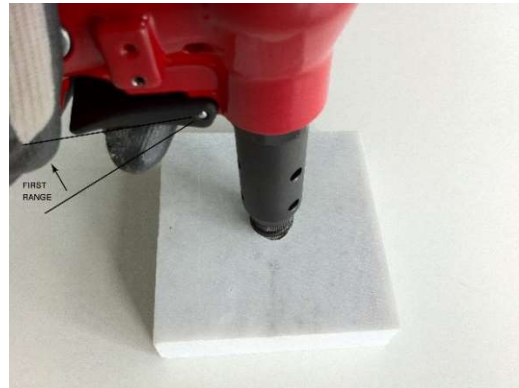
Intended use – Installation instructions of the “GSE” anchors in the stone panel

**Annex B5/1  
of ETA N° 23/0116**

## INSTALLATION INSTRUCTIONS



Insert the anchor till the hole bottom before pressing the trigger



Press the trigger for the first range of the trigger path. In this phase the hub is put in tension and it deforms the anchor inside the hole



At the end of the hub axial movement, press the trigger to the end of the path to activate the automatic un-screwing of the hub



Remove the pneumatic tool from the installed anchor



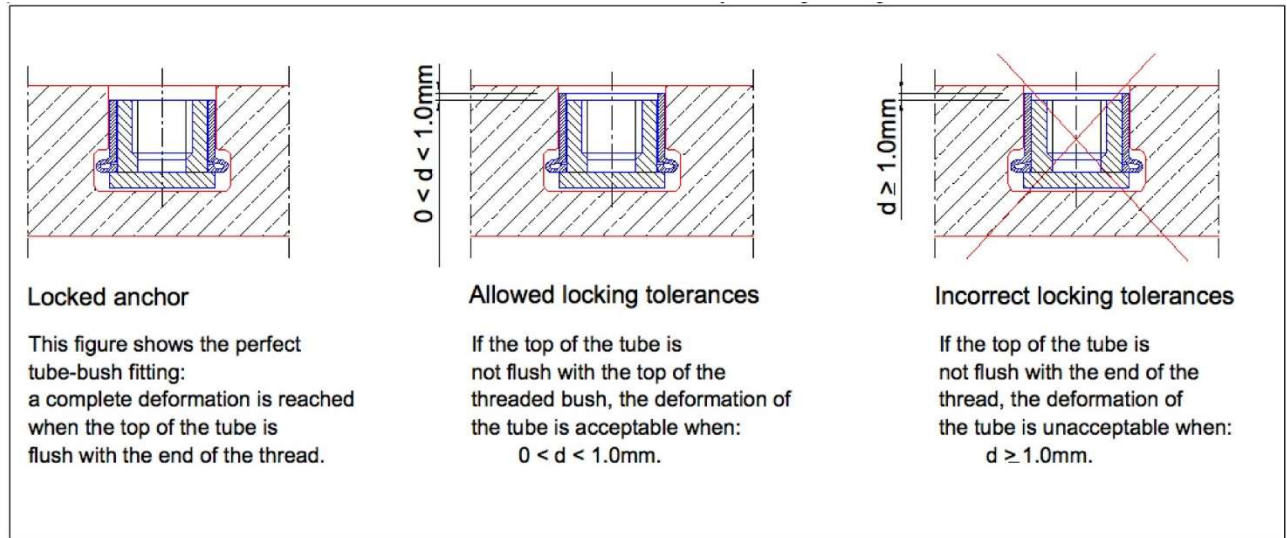
Check if the distance between the sleeve edge and the threaded pin edge is  $< 1$  mm. If it is  $> 1$  mm, repeat the operations from “Press the trigger for the first range”, after having screwed the tool hub on the same anchor into the stone by simply pushing against it.

**Figure B.6 – Images and description of all installation phases of GSE type anchors**

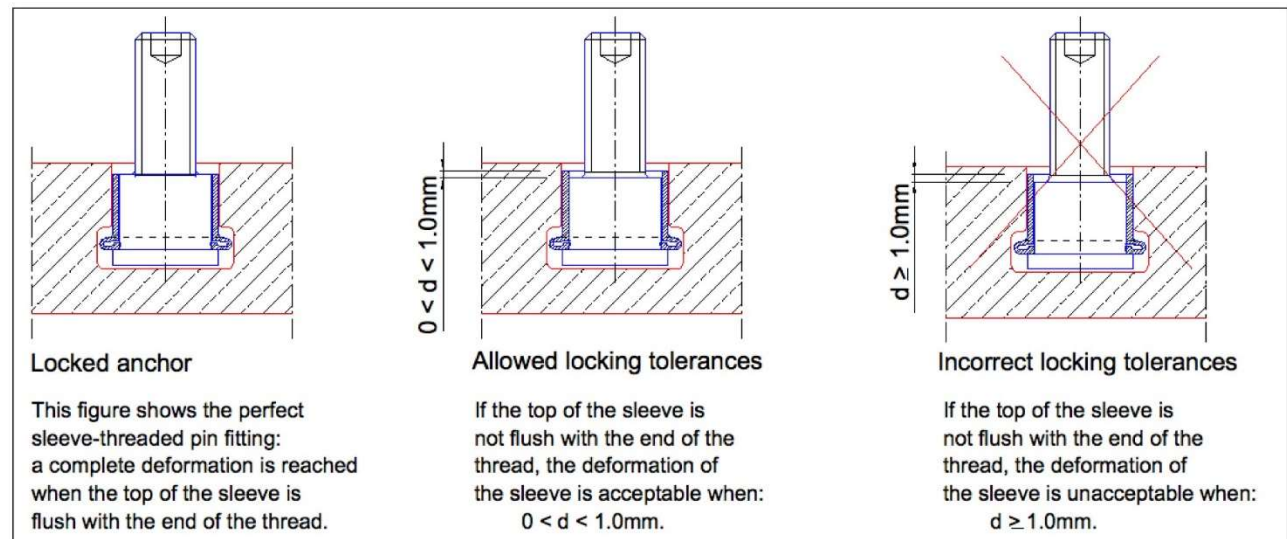
<b>GSD-GSE</b>	<b>Annex B5/2</b> of ETA N° 23/0116
Intended use – Installation instructions of the “GSE” anchors in the stone panel	



# INSTALLATION INSTRUCTIONS



**Figure B.7 – Criteria for the acceptance control of installation (once installation is completed), GSD type**



**Figure B.8 – Criteria for the acceptance control of installation (once installation is completed), GSE type**

## GSD-GSE

Intended use – Criteria for the acceptance control of installation

**Annex B6**  
of ETA N° 23/0116

**Table C1: Characteristic resistance to breakout or pull-out failure under tension load**

	GSD M6X10		GSD M8x15 GSD M8X21		GSE M8x15 GSE M8x21	
Designation of natural stone	Blanco Cristal	Jura Marmor beige	Blanco Cristal	Jura Marmor beige	Blanco Cristal	Jura Marmor beige
Country of origin	Spain	Germany	Spain	Germany	Spain	Germany
Petrographic description	Granite	Limestone	Granite	Limestone	Granite	Limestone
Panel thickness h [mm]	20	20	M8x15: 30 M8x21: 40	M8x15: 30 M8x21: 40	M8x15: 30 M8x21: 40	M8x15: 30 M8x21: 40
Characteristic resistance to breakout or pull-out failure under tension load $N_{RK}^{1)}$ [kN]	2.92	2.97	6.53	6.31	6.80	6.48
Reduction factor for natural stone $\alpha_{TR}$ for GSD-GSE = 1						

**Table C2: Characteristic resistance to breakout or pull-out failure under shear load**

	GSD M6X10		GSD M8x15 GSD M8X21		GSE M8x15 GSE M8x21	
Designation of natural stone	Blanco Cristal	Jura Marmor beige	Blanco Cristal	Jura Marmor beige	Blanco Cristal	Jura Marmor beige
Country of origin	Spain	Germany	Spain	Germany	Spain	Germany
Petrographic description	Granite	Limestone	Granite	Limestone	Granite	Limestone
Panel thickness h [mm]	20	20	M8x15: 30 M8x21: 40	M8x15: 30 M8x21: 40	M8x15: 30 M8x21: 40	M8x15: 30 M8x21: 40
Characteristic resistance to breakout or pull-out failure under shear load $V_{RK}^{1)}$ [kN]	5.48	3.62	8.38	5.28	7.65	4.94

<sup>1)</sup> For other natural stones according to Table 1.1 of EAD 330030-00-0601, the characteristic resistances may be determined according to EOTA Technical Report TR 062 "Design of fasteners for façade panels made of natural stone (except slate)".

**GSD-GSE**

Performances – Characteristic resistances to breakout or pull-out failure under tension load  $N_{RK}$  and under shear load  $V_{RK}$

**Annex C1  
of ETA N° 23/0116**

**Table C3: Edge distance and spacing**

	GSD M6X10		GSD M8x15 GSD M8X21		GSE M8x15 GSE M8x21	
Designation of natural stone	Blanco Cristal	Jura Marmor beige	Blanco Cristal	Jura Marmor beige	Blanco Cristal	Jura Marmor beige
Country of origin	Spain	Germany	Spain	Germany	Spain	Germany
Petrographic description	Granite	Limestone	Granite	Limestone	Granite	Limestone
Edge distance $a_r$ [mm]	$\geq 50$	$\geq 50$	$\geq 50$	$\geq 50$	$\geq 50$	$\geq 50$
Minimum spacing $a$ [mm]	$8 \cdot h_s^{1)}$	$8 \cdot h_s^{1)}$	$8 \cdot h_s^{1)}$	$8 \cdot h_s^{1)}$	$8 \cdot h_s^{1)}$	$8 \cdot h_s^{1)}$

<sup>1)</sup>  $h_s$  = embedment depth of the anchor.

**Table C4: Characteristic resistance to steel failure under tension and shear load**

	GSD M6 <sup>2)</sup>	GSD M8 <sup>2)</sup>	GSE M8
Characteristic resistance to steel failure under tension load $N_{Rk,s}$ [kN]	14.1	25.6	25.6
Characteristic resistance to steel failure under shear load $V_{Rk,s}$ [kN]	7.0	12.8	12.8

<sup>2)</sup> The values of fastener characteristic resistance to steel failure  $N_{Rk,s}$  and  $V_{Rk,s}$  apply with fixing threaded bars of sizes M6/M8 made of stainless steel with minimum strength class 70 in accordance with EN ISO 3506-1.

**GSD-GSE**

Performances – Edge distance and spacing and characteristic resistances to steel failure under tension load  $N_{Rk,s}$  and under shear load  $V_{Rk,s}$

**Annex C2**  
of ETA N° 23/0116