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Designated according to Article 29 of Regulation (EU) No 305/2011

Member of EOTA
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European Technical Assessment

ETA 14/0465 of 30/12/2014

(English language translation, the original version in Czech language)

I General Part

Technical Assessment Body issuing the ETA and designated according to Article 29 of the Regulation (EU) No. 305/2011	**Technical and Test Institute for Construction Prague**
Trade name of the construction product	**FAST W**
Product family to which the construction product belongs	Product area code: 4 External Thermal Insulation Composite Systems with rendering on mineral wool for the use as external insulation to walls of buildings.
Manufacturer	FAST Sp. z o.o. ul. Foluszova 112 65-751 Zielona Gora Republic of Poland www.fast.zgora.pl
Manufacturing plant(s)	FAST Sp. z o.o. ul. Foluszova 112 65-751 Zielona Gora Republic of Poland
This European Technical Assessment contains	32 pages including 6 Annexes which form an integral part of this Assessment. Annex No. 7 Control Plan contains confidential information and is not included in the European Technical Assessment when that Assessment is publicly available.
This European Technical Assessment is issued in accordance with regulation (EU) No. 305/2011 on the basis of	ETAG 004, edition 2013, used as European Assessment Document (EAD)

II Specific part

1 Technical description of the product

1.1 Definition and composition of the kit

This product is an ETICS (External Thermal Insulation Composite System) with rendering - a kit comprising components which are factory-produced by the manufacturer or component suppliers. The ETICS manufacturer is ultimately responsible for all components of the ETICS specified in this ETA.

The ETICS kit comprises a prefabricated insulation product of mineral wool (MW) to be bonded or mechanically fixed onto a wall. The methods of fixing and the relevant components are specified in the table below. The insulation product is faced with a rendering system consisting of one or more layers (site applied), one of which contains reinforcement. The rendering system is applied directly to the insulating panels, without any air gap or disconnecting layer.

The ETICS may include special fittings (e.g. base profiles, corner profiles ...) to treat details of ETICS (connections, corners, parapets, sills ...). Assessment and performance of these components is not addressed in this ETA, however the ETICS manufacturer is responsible for adequate compatibility and performance within the ETICS when the components are delivered as a part of the kit.

Composition of the ETICS

Table No. 1

	Components	**Coverage (kg/m^2)**	**Thickness (mm)**
Insulation products with associated methods of fixing	**Bonded ETICS (fully or partially bonded) with supplementary anchors. National application documents shall be taken into account).**		
	• Insulation product: MW according to EN 13162: 2012 see Annex No. 1 for product characteristics	/	50 to 250
	• Adhesives: - **FAST Normal W** (cement based powder requiring addition of water 0.22 l/kg) - **FAST Specjal W** (cement based powder requiring addition of water 0.22 l/kg) - **FAST Specjal DS** (ready to use paste)	4.0 to 6.0 (dry) 2.0 – 3.0	/

	Components	Coverage (kg/m^2)	Thickness (mm)
Insulation products with associated methods of fixing	**Mechanically fixed ETICS with anchors and supplementary adhesive (see Cl. 3.4.4 and Annex No. 5 for possible associations MW/anchors)**		
	• Insulation product: EPS according to EN 13162: 2012 see Annexes No. 2, 3, 4 for product characteristics	/	50 to 280
	• Supplementary adhesives: - **FAST Normal W** (cement based powder requiring addition of water 0.22 l/kg) - **FAST Specjal W** (cement based powder requiring addition of water 0.22 l/kg) - **FAST Specjal DS** (ready to use paste)	4.0 to 6.0 (dry) 2.0 – 3.0	/
	• Anchors see Annex No. 5 for individual product characteristics. In addition to the following list. other anchors can be used provided that they comply with the requirements introduced in the Annex 5. - **ejotherm STR U. STR U 2G** plastic screw-in anchors - **ejotherm NT U** plastic nailed-in anchors - **ejotherm NTK U** plastic nailed-in anchors - **EJOT SDM-T plus** plastic screw-in anchors - **Ejot H1 eco** plastic nailed-in anchors - **EJOT H3** plastic nailed-in anchors - **KOELNER TFIX-8M** plastic nailed-in anchors - **KOELNER TFIX-8S. TFIX-8ST** plastic screw-in anchors - **KOELNER KI-10N** plastic nailed-in anchors - **KOELNER KI-10NS** plastic screw-in anchors - **BRAVOLL PTH-KZ 60/8-La** - **BRAVOLL PTH 60/8-La** plastic nailed-in anchors	ETA-04/0023 ETA-05/0009 ETA-07/0026 ETA-04/0064 ETA-11/0192 ETA-14/0130 ETA-08/0336 ETA-11/0144 ETA-07/0221 ETA-05/0055	

	Components	Coverage (kg/m^2)	Thickness (mm)
	- **WKRET-MET LFN 8. LFM 8** plastic nailed-in anchors	ETA-06/0080	
	- **WKRET-MET LFN 10. LFM 10** plastic nailed-in anchors	ETA-06/0105	
	- **WKRET-MET LTX 10. LMX 10** plastic nailed-in anchors	ETA-08/0172	
	- **KEW TSD 8** plastic nailed-in anchors	ETA-04/0030	
	- **fischer TERMOZ 8N. 8 NZ** plastic nailed-in anchors	ETA-03/0019	
	- **fischer TERMOZ 8U. 8 UZ** plastic screw-in anchors	ETA-02/0019	
	- **Hilti XI-FV** plastic gun-nailed anchors	ETA-03/0004	
	- **Hilti SX-FV** plastic screw-in anchors	ETA-03/0005	
	- **Hilti SD-FV8** plastic nailed-in anchors	ETA-03/0028	
	- **Hilti SDK-FV 8** plastic nailed-in anchors	ETA-07/0302	
	- **Hilti D-FV. D-FV T** plastic screw-in anchors	ETA-05/0039	
Base coat	• **FAST Specjal W** (cement based powder requiring addition of water 0.22 l/kg)	4.0 to 6.0 (dry)	3.0 - 5.0
Reinforcement	• Standard mesh applied in one or two layers see Annex No. 6 for product characteristics: - **AKE 145A / R 117 A101** - **AKE 160 / R 131 A101** - **117S** - **SECCO E 145** - **SECCO E 160** - **REDNET E 145** - **REDNET E 160** - **Valmieras SSA-1363-160**	/	/

	Components	Coverage (kg/m^2)	Thickness (mm)
Key coat	- **FAST Grunt M** ready to use liquid	0.35	/
	- **FAST Grunt S-T** ready to use liquid		
Finishing coats	• Powder – mineral binder: - **FAST Baranek** grain structure (particle size 2.0; 2.5; 3.0 mm). powder requiring addition of water 0.20 - 0.22 l/kg	2.2 to 3.5	Regulated by particle size
	- **FAST Kornik** ribbed structure (particle size 2.0; 3.0 mm). powder requiring addition of water 0.20 - 0.22 l/kg	2.2 to 3.5	
	- **FAST MS** powder requiring addition of water 0.22 – 0.28 l/kg	3.0 - 4.5	2.0 - 3.0
	• Ready to use paste – binder based on silicate: - **FAST Baranek S** grain structure (particle size 1.0; 1.5; 2.0 mm)	1.7 to 3.5	Regulated by particle size
	- **FAST Kornik S** ribbed structure (particle size 2.0; 3.0 mm)	1.7 to 3.5	
	• Ready to use paste – binder based on silicone: - **FAST Baranek SIL** grain structure (particle size 1.0; 1.5; 2.0 mm)	1.7 to 3.5	Regulated by particle size
	- **FAST Kornik SIL** ribbed structure (particle size 2.0; 3.0 mm)	1.7 to 3.5	
	• Ready to use paste – binder based on acrylic: - **FAST Granit** mosaic structure (particle size 1.5 mm)	3.5	Regulated by particle size
Key coats to be used under protective coats	**Only to be used with finishing coats FAST Baranek. FAST Kornik and FAST MS**		
	- **FAST Grunt S** to be used under silicate protective coat ready to use liquid	0.08 - 0.10	-
	- **FAST Grunt SIL** to be used under silicone protective coat ready to use liquid	0.05 - 0.17	-

	Components	Coverage (kg/m^2)	Thickness (mm)
Protective coats	**Only to be used with finishing coats FAST Baranek. FAST Kornik and FAST MS**		
	- **FAST F - S** silicate protective coat ready to use liquid, two layers, dilute up to 5 % of volume with FAST Grunt S	0.10 - 0.20 (l/m^2) per layer	-
	- **FAST Silikon** silicone protective coat ready to use liquid. one or two layers, first layer to be diluted up to 10 % of volume with water	0.12 (l/m^2) per layer	-
Ancillary materials	Remain under the manufacturer's responsibility		

2 Specification of the intended use(s) in accordance with the applicable European Assessment Document (hereinafter "EAD")

2.1 Intended use

This ETICS is intended for use as external insulation of buildings' walls. The walls are made of masonry (bricks, blocks, stones …) or concrete (cast on site or as prefabricated panels). The characteristics of the walls shall be verified prior to use of the ETICS, especially regarding conditions for reaction to fire classification and for fixing of the ETICS either by bonding or mechanically. The ETICS is designed to give the wall to which it is applied satisfactory thermal insulation.

The ETICS is made of non load-bearing construction elements. It does not contribute directly to the stability of the wall on which it is installed, but it can contribute to durability by providing enhanced protection from the effect of weathering.

The ETICS can be used on new or existing (retrofit) vertical walls. It can also be used on horizontal or inclined surfaces which are not exposed to precipitation.

The ETICS is not intended to ensure the airtightness of the building structure.

The choice of the method of fixing depends on the characteristics of the substrate, which may need preparation (see cl. 7.2.1 of the ETAG 004) and shall be done in accordance with the national instructions.

The ETICS belong to Category S/W2, according to EOTA Technical Report No 034.

2.2 Manufacturing

The European Technical Assessment is issued for the ETICS on the basis of agreed data/information, deposited with the Technical and Test Institute Prague, which identifies the ETICS that has been assessed and judged. Changes to the ETICS or production process, which could result in this deposited data/information being incorrect, shall be notified to the Technical and Test Institute Prague before the changes are introduced. The Technical and Test Institute Prague 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.

2.3 Design and installation

The installation instructions including special installation techniques and provisions for the qualification of the personnel are given in the manufacturer's technical documentation.

Design, installation and execution of ETICS are to be in conformity with national documents. Such documents and the level of their implementation in Member States' legislation are different. Therefore, the assessment and declaration if performance are done taking into account general assumptions introduced in the chapters 7.1 and 7.2 of ETAG 004 used as EAD, which summarize how information introduced in the ETA and related documents is intended to be used in the construction process and gives advice to all parties interested when normative documents are missing.

2.4 Packaging, transport and storage

The information on packaging, transport and storage is given in the manufacturer's technical documentation. It is the responsibility of the manufacturer(s) to ensure that this information is made know to the concerned people.

2.5 Use, maintenance and repair

The finishing coat shall normally be maintained in order to fully preserve the ETICS performance. Maintenance includes at least:

- visual inspection of the ETICS,
- repairing of localized damaged areas due to accidents,
- the aspect maintenance with products adapted and compatible with the ETICS (possibly after washing or ad hoc preparation).

Necessary repairs should be performed as soon as the need has been identified.

It is important to be able to carry out maintenance as far as possible using readily available products and equipment, without spoiling appearance. Only products which are compatible with the ETICS shall be used.

The information on use, maintenance and repair is given in the manufacturer's technical documentation. It is the responsibility of the manufacturer(s) to ensure that this information is made know to the concerned people.

3 Performance of the product and references to the methods used for its assessment

The performances of the kit as described in this chapter are valid provided that the components of the kit comply with Annexes 1 - 7.

3.1 Mechanical resistance and stability (BWR 1)

Not relevant.

3.2 Safety in case of fire (BWR 2)

3.2.1 Reaction to fire (ETAG 004 - clause 5.1.2.1, EN 13501-1)

Table No. 2

Configuration	Heat of combustion (MJ/kg)	Flame retardant content	Euroclass according to EN 13501-1
Adhesive	max. 0.31	No flame retardant	**A2 - s1, d0**
Panels of MW Maximal density of 217 kg/m^3	-	In quantity ensuring Euroclass A1 according to EN 13501-1	
Base coat render	max. 0.31	No flame retardant	
Glass fiber mesh	max. 8.17	No flame retardant	
Key coat for mineral, silicone and silicate finishing coats	max. 2.81	No flame retardant	
Finishing coats with mineral binder Finishing coats with silicate binder Finishing coats with silicone binder	max. 2.30	No flame retardant	
Key coats for protective coats	max. 32.71	No flame retardant	
Protective coats	max. 4.21	No flame retardant	
For use of finishing coat with acrylic binder FAST GRANIT	-	-	**F**
For use of adhesive FAST SPECJAL DS	-	-	

Note: A European reference fire scenario has not been laid down for facades. In some Member States, the classification of ETICS according to EN 13501-1 might not be sufficient for the use in facades. An additional assessment of ETICS according to national provisions (e.g. on the basis of a large scale test) might be necessary to comply with Member State regulations, until the existing European classification system has been completed.

3.3 Hygiene, health and environment (BWR 3)

3.3.1 Water absorption (ETAG 004 - clause 5.1.3.1)

- Base coat **FAST Specjal W:**

Water absorption after 1 hour < 1 kg/m^2

Water absorption after 24 hours < 0.5 kg/m^2

- Rendering system:

Table No. 3

		Water absorption after 24 hours	
		< 0.5 kg/m^2	**≥ 0.5 kg/m^2**
Rendering system: Base coat **FAST Specjal W** + finishing coats as indicated here:	**FAST Baranek** **FAST Kornik**	X	
	FAST MS	X	
	FAST Baranek S **FAST Kornik S**		X
	FAST Baranek SIL **FAST Kornik SIL**	X	
	FAST Granit	X	

3.3.2 Watertightness (ETAG 004 - clause 5.1.3.2)

3.3.2.1 Hygrothermal behavior

Pass (without defects).

3.3.2.2 Freeze-thaw behaviour

Pass (without defects).

3.3.3 Impact resistance (ETAG 004 - clause 5.1.3.3)

Table No. 4

Rendering system: Base coat **FAST Specjal W** + reinforcement and finishing coats indicated hereafter:	**Single standard mesh**	**Double standard mesh**
FAST Baranek **FAST Kornik**	Category II	Category II
FAST MS	Category II	Category I
FAST Baranek S **FAST Kornik S**	Category II	Category I
FAST Baranek SIL **FAST Kornik SIL**	Category II	Category I
FAST Granit	Category II	Category I

3.3.4 Water vapour permeability (ETAG 004 - clause 5.1.3.4)

Table No. 5

Rendering system: Base coat **FAST Specjal W** + reinforcement and finishing coats ,indicated hereafter	**Equivalent air layer thickness s_d**	
	Single standard mesh	**Double standard mesh**
FAST Baranek **FAST Kornik**	≤ 0.16 m	≤ 0.25 m
FAST MS	≤ 0.42 m	≤ 0.51 m
FAST Baranek S **FAST Kornik S**	≤ 0.13 m	≤ 0.34 m
FAST Baranek SIL **FAST Kornik SIL**	≤ 0.19 m	≤ 0.37 m
FAST Granit	≤ 0.37 m	≤ 0.42 m

3.3.5 Release of dangerous substances (ETAG 004 - clause 5.1.3.5, EOTA TR034)

NPD (no performance determined).

3.4 Safety and accessibility in use (BWR 4)

3.4.1 Bond strength between base coat and insulation product (ETAG 004 - clause 5.1.4.1.1)

Table No. 6

		Initial state	After hygrothermal cycles (on wall)
FAST Specjal W	MW lamella	> 0,08 MPa	< 0,08 MPa Failure in insulation product
	MW panel	< 0,08 MPa Failure in insulation product	< 0,08 MPa Failure in insulation product

3.4.2 Bond strength between adhesive and substrate / insulation product (ETAG 004 - clauses 5.1.4.1.2, 5.1.4.1.3)

Table No. 7

		Initial state	48 hrs. immersion in water + 2 hrs. 23°C/50% RH	48 hrs. immersion in water + 7 days 23°C/50% RH
FAST Normal W **FAST Specjal W** **FAST Specjal DS**	Concrete	≥ 0,25 MPa	≥ 0,08 MPa	≥ 0,25 MPa
	MW lamella	≥ 0,08 MPa	≥ 0,03 MPa	≥ 0,08 MPa
	MW panel	< 0,08 MPa Failure in insulation product	< 0,03 MPa Failure in insulation product	< 0,08 MPa Failure in insulation product

3.4.3 Fixing strength (ETAG 004 - clause 5.1.4.2)

Test not required (no limitation of ETICS length).

3.4.4 Wind load resistance (ETAG 004 - clause 5.1.4.3)

- Insulation product MW panel (TR15)

Table No. 8

Anchor description	Trade name		**See Annex No. 5**	
	Assembly		Surface assembly	Countersunk assembly
	Plate diameter (mm)		60 or more	
Characteristics MW panel	Thickness (mm)		≥ 50	≥ 100
	Tensile strength (kPa)		≥ 15	
Maximal load	Anchors placed at the body of the insulation product	R_{panel} in dry condition	min. value: 0.41 kN average value: 0.43 kN	
		R_{panel} in wet condition	min. value: 0.35 kN average value: 0.37 kN	
	Anchors placed at joints of the insulation product	R_{joint} in dry condition	min. value: 0.38 kN average value: 0.41 kN	
		R_{joint} in wet condition	min. value: 0.29 kN average value: 0.30 kN	

- Insulation product MW double density panel Frontrock MAX E (TR10) and FASROCK MAX (TR7,5)

Table No. 9

Anchor description	Trade name		**See Annex No. 5**
	Assembly		Surface assembly
	Plate diameter (mm)		60 or more
Characteristics MW double density panel FRONTROCK MAX E, FASROCK MAX	Thickness (mm)		≥ 80
	Tensile strength (kPa)		≥ 7,5
Maximal load	Anchors placed at the body of the insulation product	R_{panel} in dry condition	min. value: 0.39 kN average value: 0.43 kN
		R_{panel} in wet condition	min. value: 0.32 kN average value: 0.34 kN
	Anchors placed at joints of the insulation product	R_{joint} in dry condition	min. value: 0.35 kN average value: 0.38 kN
		R_{joint} in wet condition	min. value: 0.26 kN average value: 0.28 kN

- Insulation product MW double density panel Frontrock MAX E (TR10)

Table No. 10

Anchor description	Trade name		**Anchors EJOT with plate EJOT VT 90**	**Anchors BRAVOLL with plate IT PTH 100**	
	Assembly		Surface assembly with additional plate		
	Plate diameter (mm)		90	100	
Characteristics MW panel Frontrock MAX E	Thickness (mm)		≥ 80	≥ 80	≥ 100
	Tensile strength (kPa)		≥ 10		
Maximal load	Anchors placed at the body of the insulation product	R_{panel} in dry condition	min. value: 0.59 kN average value: 0.66 kN	min. value: 0.60 kN average value: 0.63 kN	min. value: 0.76 kN average value: 0.79 kN
		R_{panel} in wet condition	min. value: 0.29 kN average value: 0.31 kN	min. value: 0.30 kN averagevalue: 0.33 kN	NPD
	Anchors placed at joints of the insulation product	R_{joint} in dry condition	min. value: 0.48 kN average value: 0.51 kN	min. value: 0.51 kN average value: 0.52 kN	min. value: 0.52 kN average value: 0.62 kN
		R_{joint} in wet condition	min. value: 0.28 kN average value: 0.29 kN	min. value: 0.23 kN average value: 0.27 kN	NPD

Table No. 11

Anchor description	Trade name		**Anchors ejotherm STR U 2G**	**Anchors ejotherm STR U 2G with additional plate VT 2G**
	Assembly		Countersunk assembly	
	Plate diameter (mm)		60	112.5
Characteristics MW panel Frontrock MAX E	Thickness (mm)		≥ 100	
	Tensile strength (kPa)		≥ 10	
Maximal load	Anchors placed at the body of the insulation product	R_{panel} in dry condition	min. value: 0.31 kN average value: 0.36 kN	min. value: 0.87 kN average value: 0.92 kN
	Anchors placed at joints of the insulation product	R_{joint} in dry condition	min. value: 0.33 kN average value: 0.37 kN	min. value: 0.89 kN average value: 0.93 kN

3.4.5 Render strip tensile test

Table No. 12

		Glass fiber mesh **AKE 145 A / R 117 A101** (manufacturer: SAINT-GOBAIN ADFORS CZ s.r.o.)					
		Crack width W_{typ} [mm]/ number of cracks at relative elongation ε					
Load direction		**ε = 0.3 %**	**ε = 0.5 %**	**ε = 0.8 %**	**ε = 1.0 %**	**ε = 1.5 %**	**ε = 2.0 %**
Warp	Sample No. 1	-	-	≤ 0.05/1	≤ 0.05/4	≤ 0.05/5	≤ 0.05/8
	Sample No. 2	-	-	≤ 0.05/1	≤ 0.05/5	≤ 0.05/8	≤ 0.10/10
	Sample No. 3	-	-	≤ 0.05/1	≤ 0.05/5	≤ 0.05/7	≤ 0.10/9
Weft	Sample No. 1	-	≤ 0.05/1	≤ 0.05/1	≤ 0.05/5	≤ 0.05/8	≤ 0.10/10
	Sample No. 2	-	≤ 0.05/1	≤ 0.05/2	≤ 0.05/4	≤ 0.05/6	≤ 0.10/11
	Sample No. 3	-	≤ 0.05/2	≤ 0.05/3	≤ 0.05/6	≤ 0.105/6	≤ 0.10/11

Table No. 13

		Glass fiber mesh **AKE 160 A / R 131 A101** (manufacturer: SAINT-GOBAIN ADFORS CZ s.r.o.)					
		Crack width W_{typ} [mm]/ number of cracks at relative elongation ε					
Load direction		**ε = 0.3 %**	**ε = 0.5 %**	**ε = 0.8 %**	**ε = 1.0 %**	**ε = 1.5 %**	**ε = 2.0 %**
Warp	Sample No. 1	-	-	≤ 0.05/2	≤ 0.05/3	≤ 0.05/5	≤ 0.05/7
	Sample No. 2	-	-	≤ 0.05/3	≤ 0.05/5	≤ 0.05/7	≤ 0.05/10
	Sample No. 3	-	-	≤ 0.05/2	≤ 0.05/4	≤ 0.05/6	≤ 0.05/8
Weft	Sample No. 1	-	≤ 0.05/4	≤ 0.05/7	≤ 0.05/7	≤ 0.05/7	≤ 0.05/11
	Sample No. 2	-	≤ 0.05/2	≤ 0.05/5	≤ 0.05/5	≤ 0.05/7	≤ 0.05/12
	Sample No. 3	-	≤ 0.05/3	≤ 0.05/7	≤ 0.05/7	≤ 0.05/8	≤ 0.05/12

Table No. 14

		Glass fiber mesh **117 S** (manufacturer: Technical Textiles, s.r.o.)					
		Crack width W_{typ} [mm]/ number of cracks at relative elongation ε					
Load direction		**ε = 0.3 %**	**ε = 0.5 %**	**ε = 0.8 %**	**ε = 1.0 %**	**ε = 1.5 %**	**ε = 2.0 %**
Warp	Sample No. 1	-	-	≤ 0.05/4	≤ 0.05/5	≤ 0.05/7	≤ 0.10/8
	Sample No. 2	-	≤ 0.05/3	≤ 0.05/3	≤ 0.05/4	≤ 0.05/6	≤ 0.10/6
	Sample No. 3	-	≤ 0.05/2	≤ 0.05/4	≤ 0.05/4	≤ 0.05/6	≤ 0.10/7
Weft	Sample No. 1	-	≤ 0.05/3	≤ 0.10/3	≤ 0.10/5	≤ 0.10/5	≤ 0.15/7
	Sample No. 2	-	≤ 0.05/3	≤ 0.05/3	≤ 0.10/4	≤ 0.10/5	≤ 0.10/7
	Sample No. 3	-	≤ 0.05/3	≤ 0.05/3	≤ 0.10/4	≤ 0.10/5	≤ 0.10/6

Table No. 15

		SECCO E 145 (manufacturer: ASGLATEX Ohorn GmbH)					
		Crack width W_{typ} [mm]/ number of cracks at relative elongation ε					
Load direction		**ε = 0.3 %**	**ε = 0.5 %**	**ε = 0.8 %**	**ε = 1.0 %**	**ε = 1.5 %**	**ε = 2.0 %**
Warp	Sample No. 1	≤ 0.05/1	≤ 0.05/2	≤ 0.05/5	≤ 0.05/10	≤ 0.05/11 ≤ 0.10/3	≤ 0.05/12 ≤ 0.10/3
	Sample No. 2	≤ 0.05/1	≤ 0.05/3	≤ 0.05/7	≤ 0.05/11 ≤ 0.10/1	≤ 0.05/13 ≤ 0.10/2	≤ 0.05/14 ≤ 0.10/4
	Sample No. 3	≤ 0.05/2	≤ 0.05/3	≤ 0.05/6	≤ 0.05/9	≤ 0.05/12 ≤ 0.10/2	≤ 0.05/13 ≤ 0.10/3
Weft	Sample No. 1	≤ 0.05/1	≤ 0.05/3	≤ 0.05/7	≤ 0.05/11 ≤ 0.10/2	≤ 0.05/13 ≤ 0.10/3	≤ 0.05/15 ≤ 0.10/3
	Sample No. 2	≤ 0.05/2	≤ 0.05/6	≤ 0.05/9 ≤ 0.10/1	≤ 0.05/12 ≤ 0.10/2	≤ 0.05/13 ≤ 0.10/2	≤ 0.05/16 ≤ 0.10/3
	Sample No. 3	-	≤ 0.05/4	≤ 0.05/7	≤ 0.05/11 ≤ 0.10/2	≤ 0.05/14 ≤ 0.10/3	≤ 0.05/17 ≤ 0.10/2 ≤ 0.15/1

Table No. 16

		SECCO E 160 (manufacturer: ASGLATEX Ohorn GmbH)					
		Crack width W_{typ} [mm]/ number of cracks at relative elongation ε					
Load direction		**ε = 0.3 %**	**ε = 0.5 %**	**ε = 0.8 %**	**ε = 1.0 %**	**ε = 1.5 %**	**ε = 2.0 %**
Warp	Sample No. 1	≤ 0.05/1	≤ 0.05/2	≤ 0.05/4	≤ 0.05/7 ≤ 0.10/2	≤ 0.05/11 ≤ 0.10/3	≤ 0.05/13 ≤ 0.10/3
	Sample No. 2	≤ 0.05/1	≤ 0.05/3	≤ 0.05/5	≤ 0.05/6	≤ 0.05/13 ≤ 0.10/2	≤ 0.05/15 ≤ 0.10/3
	Sample No. 3	-	≤ 0.05/1	≤ 0.05/5	≤ 0.05/8 ≤ 0.10/1	≤ 0.05/13 ≤ 0.10/2	≤ 0.05/13 ≤ 0.10/4
Weft	Sample No. 1	-	≤ 0.05/1	≤ 0.05/4	≤ 0.05/6 ≤ 0.10/1	≤ 0.05/8 ≤ 0.10/2	≤ 0.05/11 ≤ 0.10/3
	Sample No. 2	-	≤ 0.05/2	≤ 0.05/6	≤ 0.05/8	≤ 0.05/9 ≤ 0.10/1	≤ 0.05/12 ≤ 0.10/2
	Sample No. 3	≤ 0.05/1	≤ 0.05/3	≤ 0.05/6	≤ 0.05/8	≤ 0.05/10 ≤ 0.10/1	≤ 0.05/13 ≤ 0.10/2

Table No. 17

		REDNET E 145 (manufacturer: ASGLATEX Ohorn GmbH)					
		Crack width W_{typ} [mm]/ number of cracks at relative elongation ε					
Load direction		**ε = 0.3 %**	**ε = 0.5 %**	**ε = 0.8 %**	**ε = 1.0 %**	**ε = 1.5 %**	**ε = 2.0 %**
Warp	Sample No. 1	≤ 0.05/1	≤ 0.05/2	≤ 0.05/5	≤ 0.05/10	≤ 0.05/11 ≤ 0.10/3	≤ 0.05/12 ≤ 0.10/3
	Sample No. 2	≤ 0.05/1	≤ 0.05/3	≤ 0.05/7	≤ 0.05/11 ≤ 0.10/1	≤ 0.05/13 ≤ 0.10/2	≤ 0.05/14 ≤ 0.10/4
	Sample No. 3	≤ 0.05/2	≤ 0.05/3	≤ 0.05/6	≤ 0.05/9	≤ 0.05/12 ≤ 0.10/2	≤ 0.05/13 ≤ 0.10/3
Weft	Sample No. 1	≤ 0.05/1	≤ 0.05/3	≤ 0.05/7	≤ 0.05/11 ≤ 0.10/2	≤ 0.05/13 ≤ 0.10/3	≤ 0.05/15 ≤ 0.10/3
	Sample No. 2	≤ 0.05/2	≤ 0.05/6	≤ 0.05/9 ≤ 0.10/1	≤ 0.05/12 ≤ 0.10/2	≤ 0.05/13 ≤ 0.10/2	≤ 0.05/16 ≤ 0.10/3
	Sample No. 3	-	≤ 0.05/4	≤ 0.05/7	≤ 0.05/11 ≤ 0.10/2	≤ 0.05/14 ≤ 0.10/3	≤ 0.05/17 ≤ 0.10/2 ≤ 0.15/1

Table No. 18

		REDNET E 160 (manufacturer: ASGLATEX Ohorn GmbH)					
		Crack width W_{typ} [mm]/ number of cracks at relative elongation ε					
Load direction		**ε = 0.3 %**	**ε = 0.5 %**	**ε = 0.8 %**	**ε = 1.0 %**	**ε = 1.5 %**	**ε = 2.0 %**
Warp	Sample No. 1	≤ 0.05/1	≤ 0.05/2	≤ 0.05/4	≤ 0.05/7 ≤ 0.10/2	≤ 0.05/11 ≤ 0.10/3	≤ 0.05/13 ≤ 0.10/3
	Sample No. 2	≤ 0.05/1	≤ 0.05/3	≤ 0.05/5	≤ 0.05/6	≤ 0.05/13 ≤ 0.10/2	≤ 0.05/15 ≤ 0.10/3
	Sample No. 3	-	≤ 0.05/1	≤ 0.05/5	≤ 0.05/8 ≤ 0.10/1	≤ 0.05/13 ≤ 0.10/2	≤ 0.05/13 ≤ 0.10/4
Weft	Sample No. 1	-	≤ 0.05/1	≤ 0.05/4	≤ 0.05/6 ≤ 0.10/1	≤ 0.05/8 ≤ 0.10/2	≤ 0.05/11 ≤ 0.10/3
	Sample No. 2	-	≤ 0.05/2	≤ 0.05/6	≤ 0.05/8	≤ 0.05/9 ≤ 0.10/1	≤ 0.05/12 ≤ 0.10/2
	Sample No. 3	≤ 0.05/1	≤ 0.05/3	≤ 0.05/6	≤ 0.05/8	≤ 0.05/10 ≤ 0.10/1	≤ 0.05/13 ≤ 0.10/2

Table No. 19

		Glass fiber mesh **Valmieras SSA-1363-160** (manufacturer: JSC Valmieras Stikla Šķiedra)					
		Crack width W_{typ} [mm]/ number of cracks at relative elongation ε					
Load direction		**ε = 0.3 %**	**ε = 0.5 %**	**ε = 0.8 %**	**ε = 1.0 %**	**ε = 1.5 %**	**ε = 2.0 %**
Warp	Sample No. 1	≤ 0.05/3	≤ 0.05/4	≤ 0.05/7	≤ 0.05/8 ≤ 0.10/1	≤ 0.05/9 ≤ 0.10/3	≤ 0.05/10 ≤ 0.10/4
	Sample No. 2	≤ 0.05/1	≤ 0.05/3	≤ 0.05/5 ≤ 0.10/1	≤ 0.05/7 ≤ 0.10/3	≤ 0.05/9 ≤ 0.10/3 ≤ 0.15/1	≤ 0.05/10 ≤ 0.10/4 ≤ 0.15/1
	Sample No. 3	-	≤ 0.05/1	≤ 0.05/6	≤ 0.05/7 ≤ 0.10/1	≤ 0.05/11 ≤ 0.10/3	≤ 0.05/14 ≤ 0.10/5 ≤ 0.15/1
Weft	Sample No. 1	≤ 0.05/1	≤ 0.05/3	≤ 0.05/5	≤ 0.05/6 ≤ 0.10/3	≤ 0.05/9 ≤ 0.10/4	≤ 0.05/13 ≤ 0.10/3
	Sample No. 2	-	≤ 0.05/2	≤ 0.05/5	≤ 0.05/7	≤ 0.05/11 ≤ 0.10/2	≤ 0.05/15 ≤ 0.10/3
	Sample No. 3	≤ 0.05/2	≤ 0.05/4	≤ 0.05/7	≤ 0.05/9	≤ 0.05/11	≤ 0.05/15 ≤ 0.10/2

The characteristic crack width W_{rk} [mm] at a render strain value of 0.8%, determined with simple Method II pursuant to ETAG 004, cl. 5.5.4.1.

Table No. 20

	Characteristic width of cracks W_{rk} [mm] at render strain value of 0.8%	
	Warp direction	**Weft direction**
AKE 145 A / R117 A101	0.050	0.050
AKE 160 A / R131 A101	0.050	0.050
117S	0.050	0.145
SECCO E 145	0.050	0.085
SECCO E 160	0.050	0.050
REDNET E 145	0.050	0.085
REDNET E 160	0.050	0.050
Valmieras SSA-1363-160	0.089	0.050

3.5 Protection against noise (BWR 5)

3.5.1 Airborne sound insulation

Table No. 21

Insulation product	Rendering system	ETICS fixing	Substrate description	ETICS performance
Insulation product: Panels of mineral wool **Dimensions:** Length: 1000 mm Width: 500 mm Thickness: 50 mm **Density**: 217 kg/m^3	**Minimum mass of the rendering system**: 19.6 kg/m^2	**Mechanical fixing:** anchor EJOT STR U 2G 8 ks/m^2 **Bonding by adhesives:** Fully bonded Coverage 2.0 kg/ m^2	**Substrate**: Heavy masonry wall with rendering on both faces **Density:** 305 kg/m^2	**ΔR_w = - 2 dB** **$\Delta R_w + C$ = - 3 dB** **$\Delta R_w + C_{tr}$ = - 4 dB**

3.6 Energy economy and heat retention (BWR 6)

3.6.1 Thermal resistance

The thermal transmittance of the substrate wall covered by the ETICS is calculated in accordance with the standard EN ISO 6946:

$$U_C = U + \chi_p \times n$$

Where:

$\chi_p \times n$ has only to be taken into account if it is greater than 0.04 W/(m^2.K)

U_c global (corrected) thermal transmittance of the covered wall (W/ (m^2.K)

n number of anchors (through insulation product) per 1 m^2

χ_p local influence of thermal bridge caused by an anchor. The values listed below can be taken into account if not specified in the anchor's ETA:

= 0.002 W/K for anchors with a stainless steel screw covered by plastic anchors and for anchors with an air gap at the head of the screw
($\chi_p \times n$ negligible for n < 20)

= 0.004 W/K for anchors with a galvanized steel screw with the head covered by a plastic material
($\chi_p \times n$ negligible for n < 10)

= negligible for anchors with plastic nails (reinforced or not with glass fibres …)

U thermal transmittance of the current part of the covered wall (excluding thermal bridges) (W/ (m^2.K)) determined as follows:

$$U_c = \frac{1}{R_i + R_{render} + R_{substrate} + R_{se} + R_{si}}$$

Where:

R_i thermal resistance of the insulation product (according to declaration in reference to EN 13162) in (m^2.K)/W

R_{render} thermal resistance of the rendering system (about 0.02 in (m^2.K)/W) or determined by test according to EN 12667 or EN 12664

$R_{substrate}$ thermal resistance of the substrate of the building (concrete, brick …) in (m².K)/W

R_{se} external superficial thermal resistance in (m².K)/W

R_{si} internal superficial thermal resistance in (m².K)/W

The value of thermal resistance of each insulation product shall be given in the manufacturer's documentation along with the possible range of thicknesses. In addition, the point thermal conductivity of anchors shall be given when anchors are used in the ETICS.

3.7 Sustainable use of natural resources (BWR 7)

NPD (no performance determined).

4 Assessment and verification of constancy of performance (hereinafter AVCP) system applied, with reference to its legal base

According to the European Commission decision 97/556/EC amended by the European Commission decision 2001/596/EC, the AVCP systems 1 and 2+ are valid (further described in Annex V to Regulation (EU) No. 305/2011).

Table No. 22

Product(s)	Intended use(s)	Level(s) or class(es) (Reaction to fire)	System(s)
External thermal insulation composite systems/kits (ETICS) with rendering	In external wall subject to fire regulations	A1 (1), A2 (1), B (1), C (1)	1
		A1 (2), A2 (2), B (2), C (2), D, E, (A1 to E) (3), F	2+
	In external wall not subject to fire regulations	Any	2+

(1) Products/materials for which a clearly identifiable stage in the production process results in an improvement of he reaction to fire classification (e.g. an addition of fire retardants or a limiting of organic material)
(2) Products/materials not covered by footnote (1)
(3) Products/materials that do not require to be tested for reaction to fire (e.g. Products/materials of Classes A1 according to Commission Decision 96/603/EC)

5 Technical details necessary for the implementation of the AVCP system, as provided for in the applicable EAD:

In order to help the Notified Body to make an evaluation of conformity, the Technical Assessment Body issuing the ETA shall supply the information detailed below. This information together with the requirements given in EC Guidance Paper B will generally form the basis on which the factory production control (FPC) is assessed by the Notified Body.

This information shall initially be prepared or collected by the Technical Assessment Body and shall be agreed with the manufacturer. The following gives guidance on the type of information required:

1) ETA

   Where confidentiality of information is required, this ETA makes reference to the manufacturer's technical documentation which contains such information.

2) Basic manufacturing proces

   The basic manufacturing process is described in sufficient detail to support the proposed FPC methods.
   The different components of the ETICS are generally manufactured using conventional techniques. Any critical process or treatment of the components which affects performance are highlighted in the manufacturer's documentation.

3) Product and materials specifications

   The manufacturer's documentation includes:
   - detailed drawings (possibly including manufacturing tolerances),
   - incoming (raw) materials specifications and declarations,
   - references to European and/or international standards,
   - technical data sheets.

4) Control Plan (as a part of FPC)

   The manufacturer and the Technical and Test Institute for Construction Prague have agreed a Control Plan which is deposited with the Technical and Test Institute for Construction Prague in documentation which accompanies the ETA. The Control Plan specifies the type and frequency of checks/tests conducted during production and on the final product. This includes the checks conducted during manufacture on properties that cannot be inspected at a later stage and for checks on the final product.

Products not manufactured by the ETICS manufacturer shall also be tested according to the Control Plan. It must be demonstrated to the Notified Body that the FPC system contains elements securing that the ETICS manufacturer takes products conforming to the Control Plan from his supplier(s).

Where materials/components are not manufactured and tested by the supplier in accordance with agreed methods, then where appropriate they shall be subject to suitable checks/tests by the ETICS manufacturer referring to the Control Plan once again.

In cases where the provisions of the European Technical Assessment and its Control Plan are no longer fulfilled, the Notified Body shall withdraw the certificate and inform the Technical and Test Construction Institute Prague without delay.

Issued in Prague on 30/12/2014

Signed by

Ing. Božena Musilová

Head of the Technical Assessment Body

Annexes:

Annex No. 1 :	Insulation product characteristics for fully bonded ETICS with supplementary anchors MW lamella (TR80)
Annex No. 2 :	Insulation Product Characteristics for mechanically fixed ETICS with anchors and supplementary bonding – MW panel (TR15)
Annex No. 3 :	Insulation Product Characteristics for mechanically fixed ETICS with anchors and supplementary bonding – MW double density insulation panel Frontrock MAX E (TR10)
Annex No. 4 :	Insulation Product Characteristics for mechanically fixed ETICS with anchors and supplementary bonding - MW double density panel FASROCK MAX (TR7,5)
Annex No. 5 :	Anchors, description of individual product characteristics contained in the ETA
Annex No. 6 :	Description of glass fiber mesh

Annex No. 1 : Insulation product characteristics for fully bonded ETICS with supplementary anchors MW lamella (TR80)

		MW lamella
Reaction to fire / EN 13501-1		Euroclass – A1 density ≤ 150 kg/m^3
Thermal resistance		acc. to the declaration in accordance with EN 13162 ((m^2.K)/W)
Thickness / EN 823		EN 13162 – T5
Length / EN 822		EN 13162 - ± 2%
Width / EN 822		EN 13162 - ± 1,5%
Squareness/ EN 824		EN 13162 – ≤ 5 mm/m
Flatness / EN 825		EN 13162 – ≤ 6 mm
Dimensional stability under:	specified temperature and humidity EN 1604	EN 13162 – DS(70,-)
	laboratory conditions/ EN 1603	EN 13162 - DS(70,90)
Water absorption (partial immersion) / EN 1609		EN 13162 – WS, WL(P)
Water vapour permeability, diffusion factor (μ) / EN 12086 – EN 13162		max. 5
Tensile strength perpendicular to the front of the slab in dry conditions (kPa) /EN 1607		≥ 80 kPa
Tensile strength perpendicular to the front of the slab in wet conditions (kPa) ETAG 004		≥ 50 kPa
Shear strength (MPa) / EN 12090		≥ 0.02 MPa
Shear modulus of elasticity (MPa) /EN 12090		≥ 1.0 MPa

Note: classes and levels for individual characteristics comply with EN 13162:2012.

Annex No. 2 : Insulation Product Characteristics for mechanically fixed ETICS with anchors and supplementary bonding – MW panel (TR15)

		MW panel (TR15)
Reaction to fire / EN 13501-1		Euroclass – A1 density ≤ 217 kg/m^3
Thermal resistance		acc. to the declaration in accordance with EN 13162 ((m^2.K)/W)
Thickness / EN 823		EN 13162 – T5
Length / EN 822		EN 13162 - ± 2%
Width / EN 822		EN 13162 - ± 1,5%
Squareness/ EN 824		EN 13162 – ≤ 5 mm/m
Flatness / EN 825		EN 13162 – ≤ 6 mm
Dimensional stability under:	specified temperature and humidity EN 1604	EN 13162 – DS(70,-)
	laboratory conditions/ EN 1603	EN 13162 - DS(70,90)
Water absorption (partial immersion) / EN 1609		EN 13162 – WS, WL(P)
Water vapour permeability, diffusion factor (μ) / EN 12086 – EN 13162		max. 6
Tensile strength perpendicular to the front of the slab in dry conditions (kPa) /EN 1607		≥ 15 kPa
Tensile strength perpendicular to the front of the slab in wet conditions (kPa) ETAG 004		≥ 6 kPa
Shear strength (MPa) / EN 12090		-
Shear modulus of elasticity (MPa) /EN 12090		-

Note: classes and levels for individual characteristics comply with EN 13162:2012.

Annex No. 3 : Insulation Product Characteristics for mechanically fixed ETICS with anchors and supplementary bonding – MW double density insulation panel Frontrock MAX E (TR10)

		MW double density panel Frontrock MAX E (TR10)
Reaction to fire / EN 13501-1		Euroclass – A1 density ≤ 155 kg/m^3
Thermal resistance		acc. to the declaration in accordance with EN 13162 ((m^2.K)/W)
Thickness / EN 823		EN 13162 – T5
Length / EN 822		EN 13162 - ± 2%
Width / EN 822		EN 13162 - ± 1,5%
Squareness/ EN 824		EN 13162 – ≤ 5 mm/m
Flatness / EN 825		EN 13162 – ≤ 6 mm
Dimensional stability under:	specified temperature and humidity EN 1604	EN 13162 – DS(70,-)
	laboratory conditions/ EN 1603	EN 13162 - DS(70,90)
Water absorption (partial immersion) / EN 1609		EN 13162 – WS, WL(P)
Water vapour permeability, diffusion factor (μ) / EN 12086 – EN 13162		max. 1
Tensile strength perpendicular to the front of the slab in dry conditions (kPa) /EN 1607		≥ 10 kPa
Tensile strength perpendicular to the front of the slab in wet conditions (kPa) ETAG 004		≥ 4 kPa
Shear strength (MPa) / EN 12090		-
Shear modulus of elasticity (MPa) /EN 12090		-

Note: classes and levels for individual characteristics comply with EN 13162:2012.

Annex No. 4 : Insulation Product Characteristics for mechanically fixed ETICS with anchors and supplementary bonding - MW double density panel FASROCK MAX (TR7,5)

		MW double density panel FASROCK MAX (TR7,5)
Reaction to fire / EN 13501-1		Euroclass – A1 density ≤ 200 kg/m^3
Thermal resistance		podle deklarace v souladu s EN 13162 ((m2.K)/W)
Thickness / EN 823		EN 13162 - T4
Length / EN 822		EN 13162 - ± 2%
Width / EN 822		EN 13162 - ± 1,5%
Squareness/ EN 824		EN 13162 - ≤ 5 mm/m
Flatness / EN 825		EN 13162 - ≤ 6 mm
Dimensional stability under:	specified temperature and humidity EN 1604	EN 13162 - DS(70,-)
	laboratory conditions/ EN 1603	EN 13162 - DS(70,90)
Water absorption (partial immersion) / EN 1609		EN 13162 - WS, WL(P)
Water vapour permeability, diffusion factor (μ) / EN 12086 – EN 13162		max. 1
Tensile strength perpendicular to the front of the slab in dry conditions (kPa) /EN 1607		≥ 7,5 kPa
Tensile strength perpendicular to the front of the slab in wet conditions (kPa) ETAG 004		≥ 3 kPa
Shear strength (MPa) / EN 12090		-
Shear modulus of elasticity (MPa) /EN 12090		-

Note: classes and levels for individual characteristics comply with EN 13162:2012.

Annex No. 5 : Anchors, description of individual product characteristics contained in the ETA

Trade name	Plate diameter (mm)	Characteristic pull-out resistance	Plate stiffness (kN/mm)	Load at plate rupture (kN)
Surface assembly				
Ejotherm STR U, STR U 2G	60	see ETA - 04/0023	0.60	2.08
Ejotherm NT U	60	see ETA - 05/0009	0.60	2.43
Ejotherm NTK U	60	see ETA - 07/0026	0.50	1.44
EJOT SDM-T plus U	60	see ETA - 04/0064	0.70	2.24
EJOT H1 eco	60	see ETA - 11/0192	0.60	1.40
EJOT H3	60	see ETA - 14/0130	0.60	1.25
KOELNER TFIX-8M	60	see ETA - 07/0336	1.00	1.75
KOELNER TFIX-8S	60	see ETA - 11/0144	0.60	2.04
KOELNER KI-10N, KI-10NS	60	see ETA - 07/0221	0.30	1.39
BRAVOLL PTH-KZ 60/8-L_a	60	see ETA – 05/0055	0.70	2.10
BRAVOLL PTH-60/8-L_a			0.60	1.63
WKRĘT-MET-ŁFN ø8; ŁFM ø 8	60	see ETA -06/0080	0.50	1.04
WKRĘT-MET-ŁFN ø10; ŁFM ø10	60	see ETA -06/0105	0.40	1.00
WKRĘT-MET LTX 10, LMX 10	60	see ETA -08/0172	0.40	1.64
KEW TSD 8	60	see ETA - 04/0030	0.50	1.42
fischer TERMOZ 8N, 8 NZ	60	see ETA - 03/0019	0.50/0.50	1.34/1.43
fischer TERMOZ 8U, 8 UZ	60	see ETA - 02/0019	0.50/0.50	2.45/1.43
Hilti XI-FV	60	see ETA - 03/0004	0.40	1.60
Hilti SX-FV	60	see ETA - 03/0005	0.70	1.73
Hilti SD-FV 8	60	see ETA - 03/0028	0.30	1.55
Hilti SDK- FV 8	60	see ETA - 07/0302	0.50	1.48
Hilti D-FV, D-FV T	60	see ETA - 05/0039	0.80	1.93
Countersunk assembly				
Ejotherm STR U, STR U 2G	60	see ETA - 04/0023	0.60	2.08

In addition to this list the following anchors can be used provided that they comply with the following requirements:

Surface assembly	Plate diameter (mm)	Characteristic pull-out resistance	Plate stiffness (kN/mm)
	60	See relevant ETA	≥ 0.30

Countersunk assembly	Plate diameter (mm)	Characteristic pull-out resistance	Plate stiffness (kN/mm)
	60	See relevant ETA	≥ 0.60

Minimal value of the load at plate rupture for other anchors is 0.8 kN.

Annex No. 6 : Description of glass fiber mesh

	Description	Strength after ageing	
	Standard fiber mesh applied in one or two layers with aperture size	Absolute strength after ageing (N/mm)	Relative residual strength after ageing, of the strength in the as-delivered state (%)
AKE 145 A / R117 A101	4.0 x 4.5 mm	≥ 20	≥ 50
AKE 160 A / R131 A101	3.5 x 3.8 mm	≥ 20	≥ 50
117S	4.6 x 3.2 mm	≥ 20	≥ 50
SECCO E 145	3.3 x 4.5 mm	≥ 20	≥ 50
SECCO E 160	3.5 x 3.8 mm	≥ 20	≥ 50
REDNET E 145	3.3 x 4.5 mm	≥ 20	≥ 50
REDNET E 160	3.5 x 3.8 mm	≥ 20	≥ 50
Valmieras SSA-1363-160	3.5 x 3.7 mm	≥ 20	≥ 50