

VFS «Tectos»

*Album of technical solutions for the
"Tectos "
ventilated facade system
faced with natural stone slabs*

Portugal 2022

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1. General information

1.1. Assignment and field of application

Construction of Ventilated facade system with air gap (then VFS) with facing with natural stone slabs "Tectos" is designed for facing facades and insulation on the outside of newly constructed and reconstructed buildings and structures for various assignment of all levels of responsibility, fire resistance levels and classes of functional and structural risk in areas belonging to different wind areas with different geological and geophysical conditions - in accordance with the confirmed by calculations and tests bearing capacity of structures, as well as areas with different temperature and climatic conditions - in accordance with the results of thermal engineering calculations and areas with non-aggressive, slightly aggressive and moderately aggressive external environment.

1.2. TECHNICAL DESCRIPTION

VFS «Tectos» is used in two versions of design depending on the guide profiles:

1. Vertical T-shaped profile:

It is a supporting frame made of T-shaped profiles mounted vertically on brackets.

2. Vertical P-shaped profile:

It is a supporting frame made of U-shaped profiles mounted vertically on brackets.

VFS «Tectos» consists of the following products:

- 1. Brackets mounted on the building base by means of anchors or other fasteners;*
- 2. Supporting vertical guide profiles fixed to the brackets with blind rivets;*
- 3. Thermal insulation boards (if there are requirements for thermal insulation), secured to the building base using dowel for thermal insulation with a metal nail;*
- 4. Wind- and moisture-proof membrane (if necessary), fixed from the outside to the surface of the heat-insulating boards using disc-shaped dowels with blind rivents;*
- 5. Clamer profiles secured to the guides with blind rivets;*
- 6. Cladding slabs made of natural (artificial stone) fixed to the guides in a hidden way using clamer profiles;*
- 7. Elements of junctions with window, balcony and other openings in the wall, junctions with protruding and other elements of the building (canopies, roofs, plinths, etc.);*
- 8. Fastening elements (anchor fasteners, blind rivets, self-tapping screws, etc.)*

Brackets

They are used for installing vertical guide profiles and transferring constant and variable loads of the VFS to the building foundation. The bracket is installed vertically, the plane of the bracket for fastening the guide profile is located vertically. The brackets are manufactured in various lengths, which allows you to adjust the reach of the brackets in the range from 60 to 230 mm. It is possible to use brackets with a reach of more than 230 mm. when confirmed by strength calculations. To unify the lengths of the brackets used, additional elements are used with the ability to adjust the deviations of the building foundations - 60 mm. Fastening the system brackets to the building foundation is provided with anchor fasteners.

Vertical guide profiles

They are used for fixing natural stone facing slabs. The profiles are fixed directly to the support shelf of the bracket using blind rivets. Vertical guide profiles are installed with the spacing of the cladding slabs regardless of the type of profile: T-type or P-type.

Thermal insulation layer

In VFS «Tectos» it is possible to use single and double layer insulation. For the inner layer of two-layer thermal insulation use mineral wool or fiberglass non-combustible boards on synthetic binder with a density of 30 to 80 kg/m³. For the outer layer of two-layer thermal insulation use mineral wool or fiberglass non-combustible boards on synthetic binder with a density of at least 80 kg/m³. The thickness of the heat-insulating layer and the grades of boards are determined by thermal calculation. The maximum thickness of thermal insulation is 200 mm. The thickness of the outer layer of insulation should be at least 30 mm.

Thermal insulation is installed in rows from bottom to top. The insulation boards of the first row of the inner layer are fixed to the base with three dowels, and the following ones - with two dowels. The boards of the outer layer of two-layer thermal insulation and single-layer insulation boards are fastened with five dowels. If a wind waterproof membrane is used, the boards of the outer layer or single-layer insulation are fastened with two dowels, and the windwaterproof membrane is further fastened with at least three dowels per board.

Clamer profiles

Used for hanging cladding plates. Clamer plates are available in four types:

- 1. Starters;*
- 2. Regulars;*
- 3. Terminal;*
- 4. Slope.*

Adjoining elements

For window and door openings slopes, basement units, drains and places of connection of NFS to balconies, eaves, parapets and other elements of general building structures of buildings steel elements of connections are used. The elements are made of galvanized steel sheet not less than 0.55 mm thick with or without additional protective polyester coating. The elements of fire protection jambs must be fixed to the building base (fixing only to window units is not allowed). It is allowed to clad window and door openings with natural stone on top of fire protection metal boxes.

Natural stone

Natural stone slabs are used to clad the Tectos system. Slabs of any brand and manufacturer with Technical Certificates issued by the Federal Certification Center in accordance with the procedure established by law can be used.

Auxiliary elements of the VFS

Auxiliary elements, which are made of galvanized steel sheet not less than 0.55 mm thick, are used to fasten the abutment elements to the building base and supporting structures.

Fixing elements

Fasteners (anchor fasteners, rivets, self-tapping screws, etc.) are used to fasten the system elements to the building base and to each other.

Fasteners of any brands and manufacturers with Technical Certificates issued by the Federal Certification Center in accordance with the procedure established by law may be used in the VFS.

Thermal insulation gasket

Between the wall and the fifth bracket, a gasket made of paronite or similar material is installed to thermally insulate the supporting base and prevent corrosion of the brackets.

Tectos VFS metal products are of two types:

- 1. "Lite" - products are made of steel thin-sheet, cold-rolled 08KP rolled steel according to GOST 9045-93 with protective zinc coating of I class thickness.*
 - 2. "High" - products are made of corrosion-resistant steels of domestic grades and in brackets foreign analogs: 08X17 according to TU RMO-001/05 (AISI 430); 08X17T according to GOST 5632-72* (AISI 439); 12X17 according to GOST 5632-72* (AISI 430); 04-12X18N10 according to GOST 5632-72* (AISI 304); 08-12X18N10T GOST 5632-72* (AISI 321); 10X17N13M2T GOST 5632-72*.*
- Application of anticorrosive measures in the form of protective coatings of metal products is regulated in accordance with SNiP 2.03.11-85 "Protection of building structures from corrosion" for given operating conditions.*

1.3. METHODS OF QUALITY CONTROL of Tectos VFS products

Geometric dimensions of VFS products are checked by universal measuring tools or specially made templates, fixtures and other means, tested and registered in the prescribed manner.

The main measuring instruments are:

- calipers according to GOST 166-89 "Calipers. Technical conditions";*
- metal measuring rulers according to GOST 427-75 "Measuring rulers metal.*

Technical conditions";

- measuring tape measures according to GOST 7502-89 "Measuring metal measuring tape. Technical conditions";*
- angles according to GOST 3749-77 "Verification angles 90o*

Technical conditions".

The conformity of the appearance of products is controlled visually, if necessary, with the use of selected as reference samples of products. Quality and thickness of protective coatings should be checked in specialized testing centers, laboratories.

Control of deviations of the system elements during installation is carried out with the help of geodetic instruments.

Allowable deviation values:

<i>Nº</i>	<i>Geometric parameters</i>	<i>Permissible deviations, mm</i>
<i>1</i>	<i>Deviations of joint verticality at full height</i>	<i>±10</i>
<i>2</i>	<i>Full length deviations of horizontal joints</i>	<i>±10</i>
<i>3</i>	<i>Deviation of cladding from the plane</i>	<i>±10</i>
<i>4</i>	<i>Deviation of cladding from straightness by 1</i>	<i>±3</i>
<i>5</i>	<i>Gap between adjacent slabs</i>	<i>±2</i>
<i>6</i>	<i>Deviation from the design clearance</i>	<i>±2</i>

1.4. APPLICATION AND OPERATING INSTRUCTIONS

Works on installation of Tectos VFS (all versions) should be performed by organizations that have permits for this type of construction activity. At the same time, the specialists who are entrusted with installation works must be trained by OOO Fasade «Technologies», or its authorized organizations, or they must get acquainted with the permit documentation for VFS «Tectos» hinged ventilated facade and the instruction "Procedure and peculiarities of installation of the hinged ventilated facade «Tectos».

When installing Tectos VFS, it is allowed to fit the products using cutting or abrasive tools, except for gas-flame torches, and then bring them to the specified state of corrosion protection.

Tectos NFS fastening elements are used in accordance with the fastener manufacturer's instructions. Drilling when installing the fastening elements must be carried out using a universal drilling tool. The drilling axes must be perpendicular to the plane of the drilling surface. Drilling holes in unstable building foundations (cellular concrete block masonry, slotted brick masonry, etc.) must be carried out without impact loads.

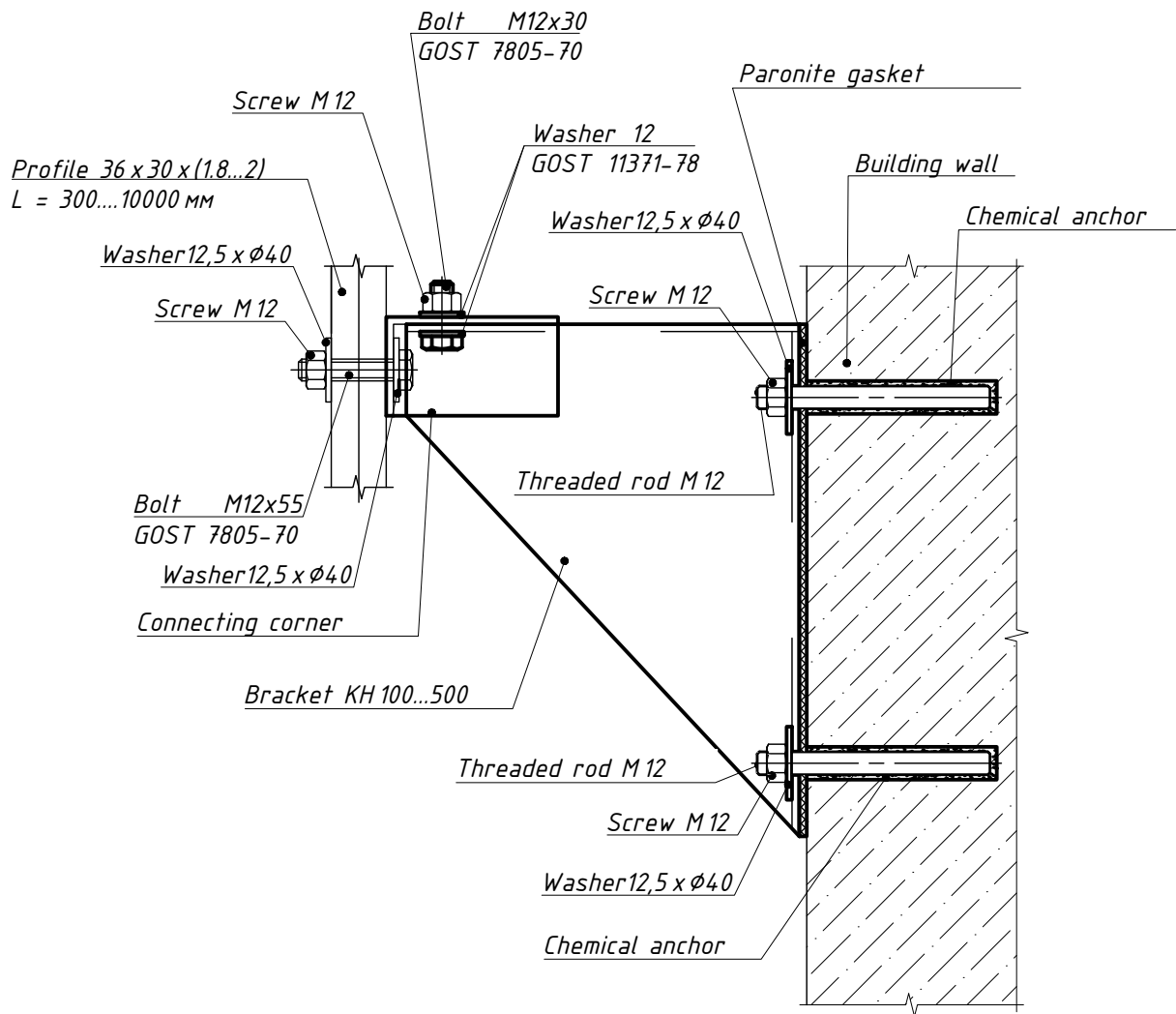
Natural stone (artificial stone) face plates and VFS products must not be struck during their assembly or installation of fasteners.

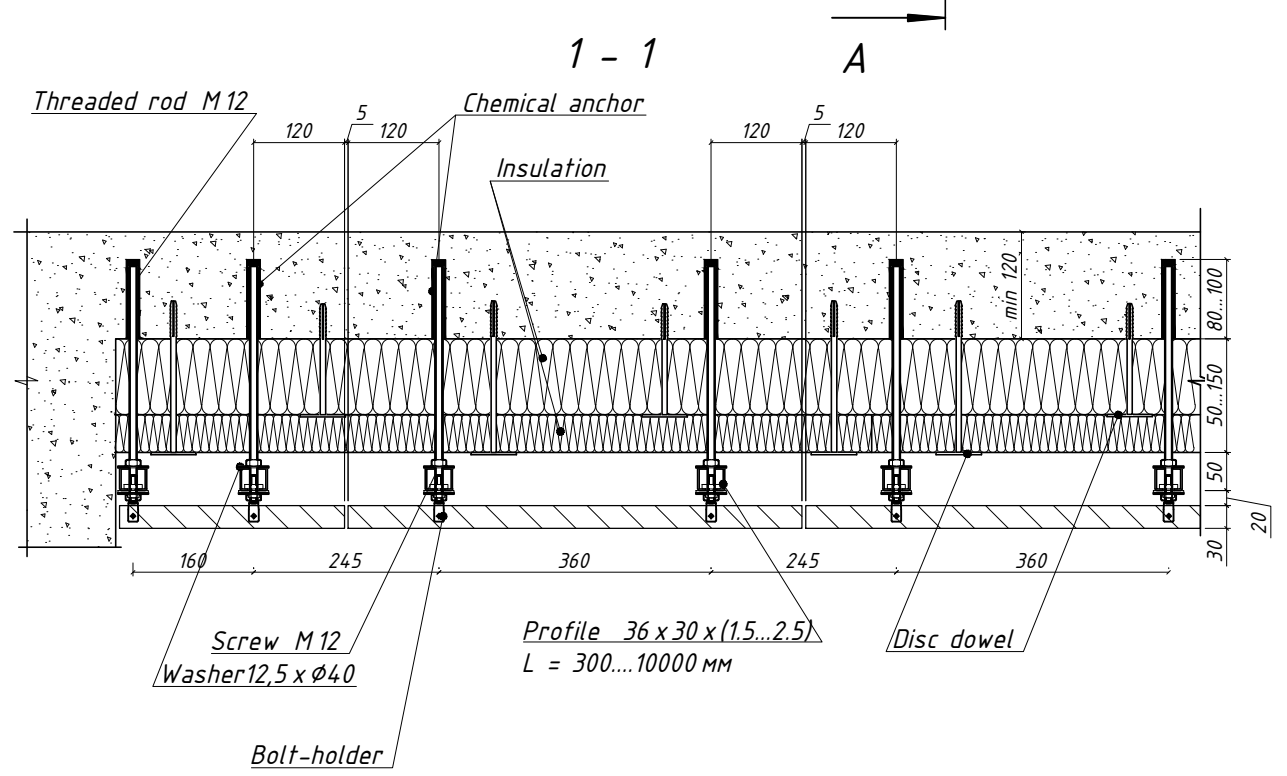
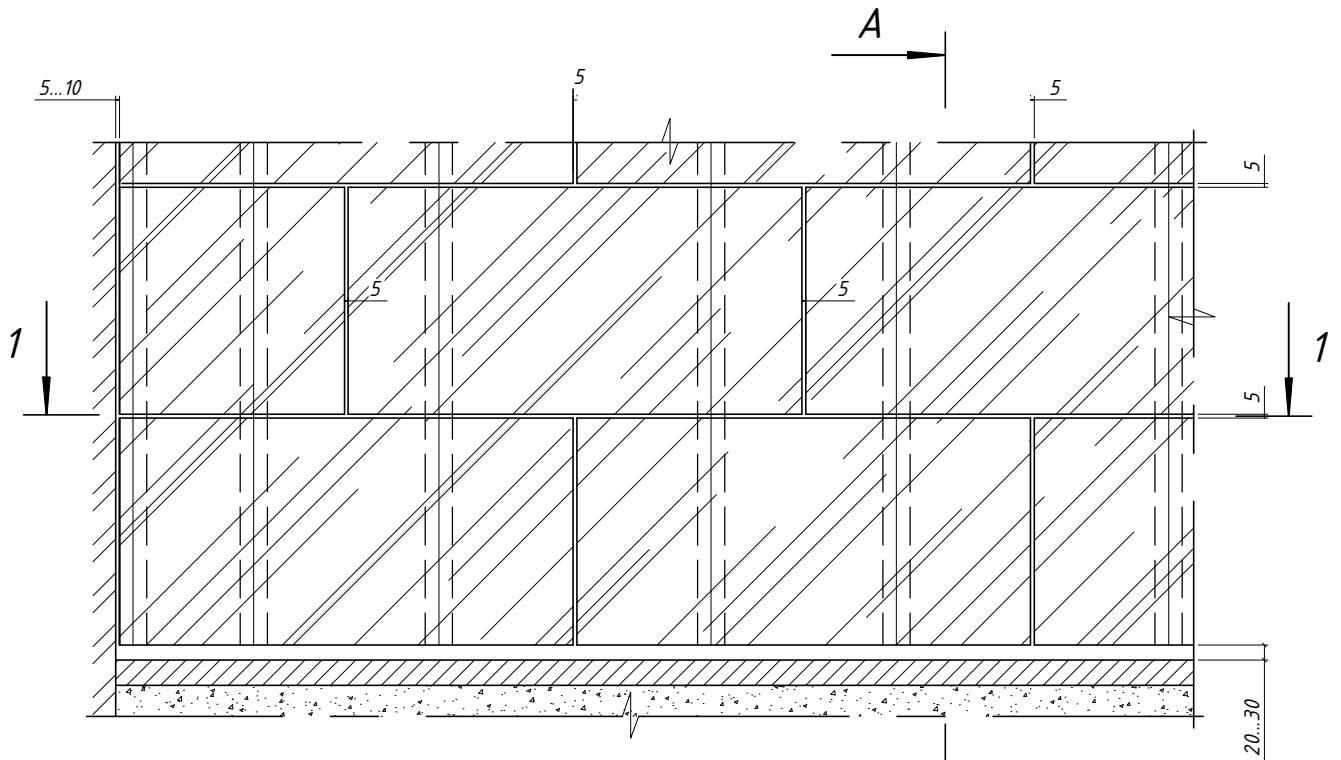
The VFS is not allowed to be present during installation:

- deviations from the shape exceeding those specified in the working drawings;*
- conditions for the formation of electrochemical pairs between dissimilar metals;*
- damage to the protective coating without subsequent restoration;*
- protruding burrs;*
- damage to the insulation (dents, tears) on the side and end faces with depth of more than 50 mm and an area of more than 10 cm², as well as - delamination of insulation.*

It is not allowed to attach stairs, technological equipment and fittings to the ceramic granite facing slabs and NFS products without additional coordination with the project developers. The surface of ceramic granite facing slabs should be cleaned from dirt and dust using detergents that do not cause damage to the protective coating of structures. It is not allowed to use sand, alkalis and other substances for cleaning and washing the surface, which may damage the facing tiles and the protective coating of the VFS products.

2.1 Vertical system with bolt-holder

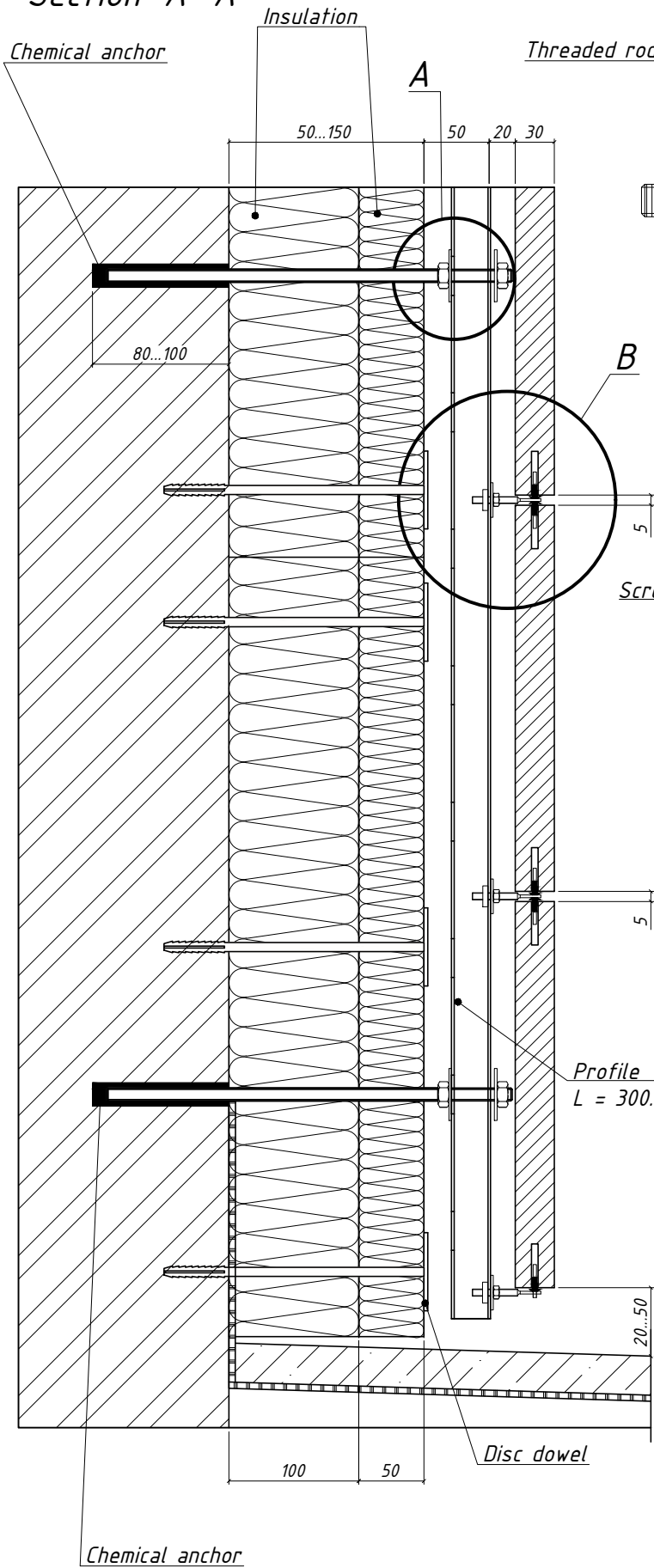




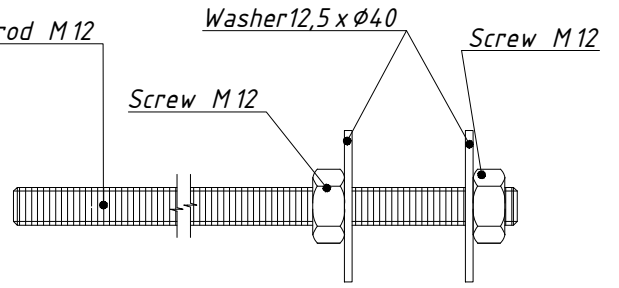
Ventilated facade system
«Tectos»

Typical fastening points.
Fragment of wall cladding

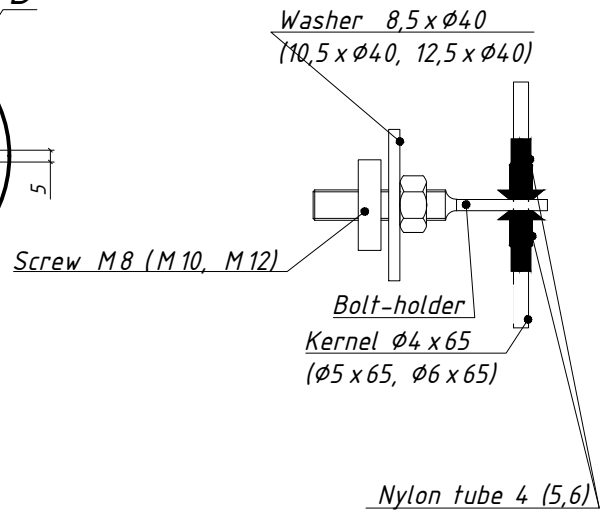
Section A - A



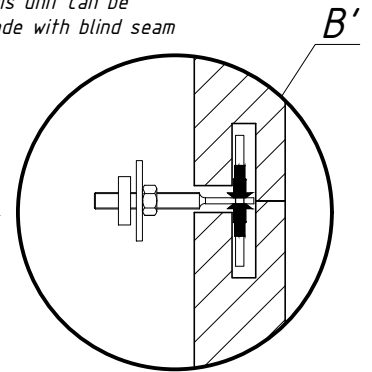
Node A



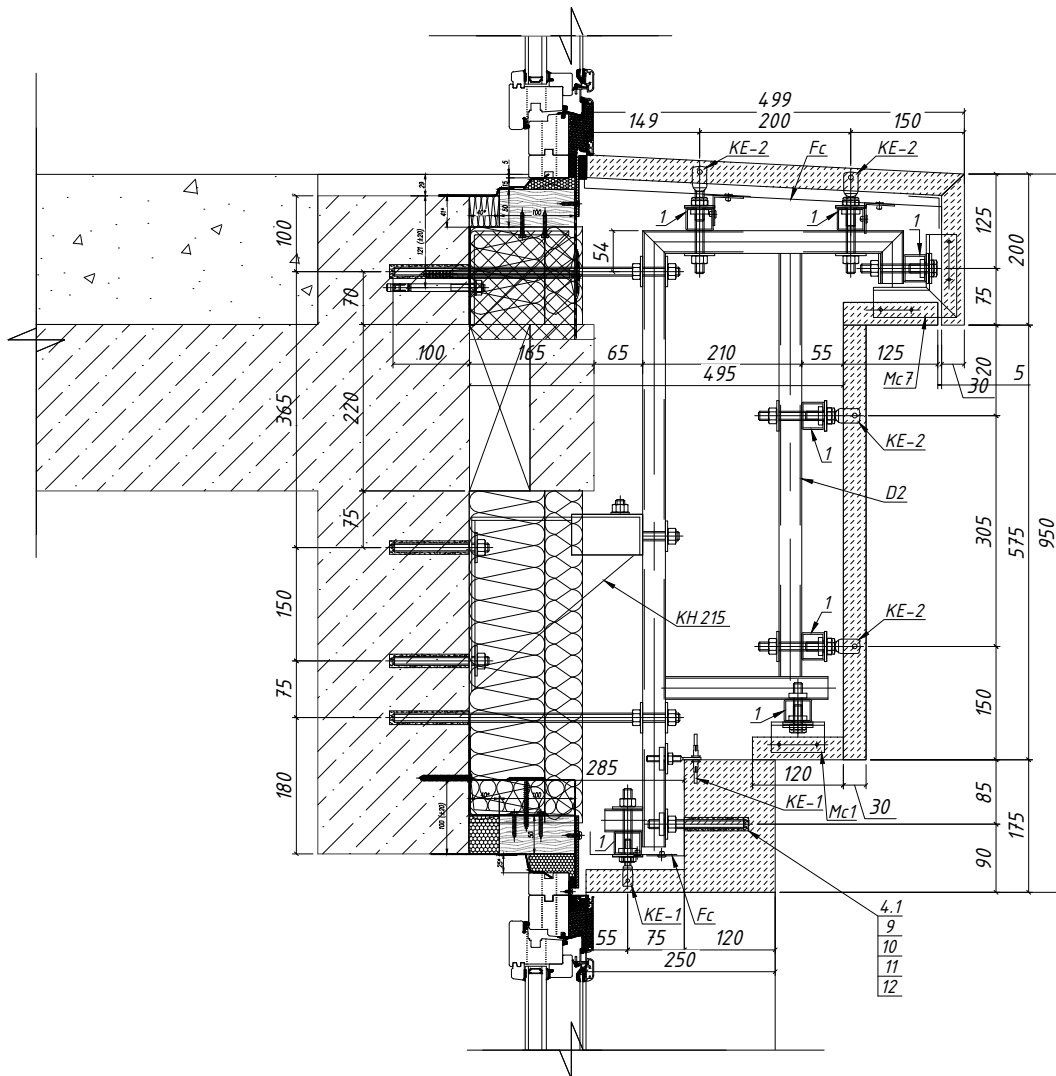
Node B



This unit can be made with blind seam



Profile 36 x 30 x (1,5...2,5)
L = 300...10000 mm



Legend:

1 - PF - Profile 36 x 30 x (1.5...2.5) AISI 430 L = 300...10000 mm

KE-1 - fastening element 1:

- Bolt M8 x 65 inox A 2
- Screw plate M8
- Nut M8
- Washer 8.5 x ϕ 40
- Rod ϕ 4 x 65
- Nylon tube

KE-2 - fastening element 2:

- Bolt M12 x 65 inox A 2
- Screw plate M12
- Nut M12
- Washer 12.5 x ϕ 40
- Rod ϕ 6 x 65
- Nylon tube

Mc1, Mc7 - Metal corner t=4 mm

D-2 detail of profile

4.1 - Screw plate M12

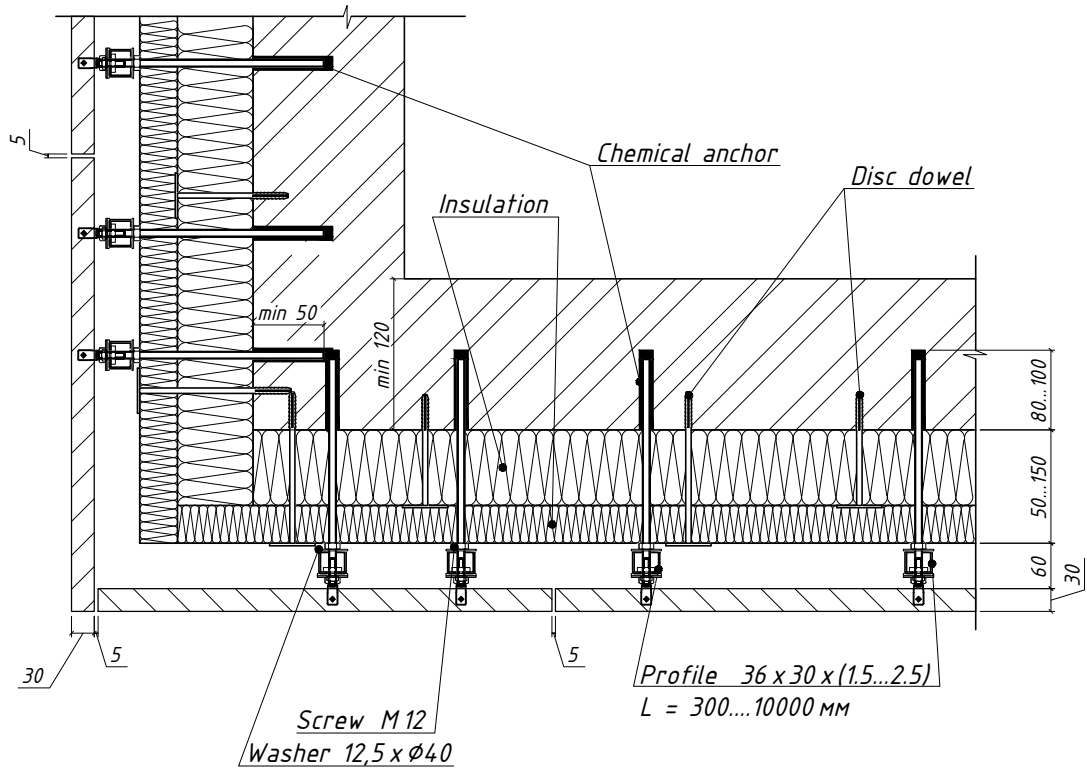
9 - Washer 12.5 x ϕ 40

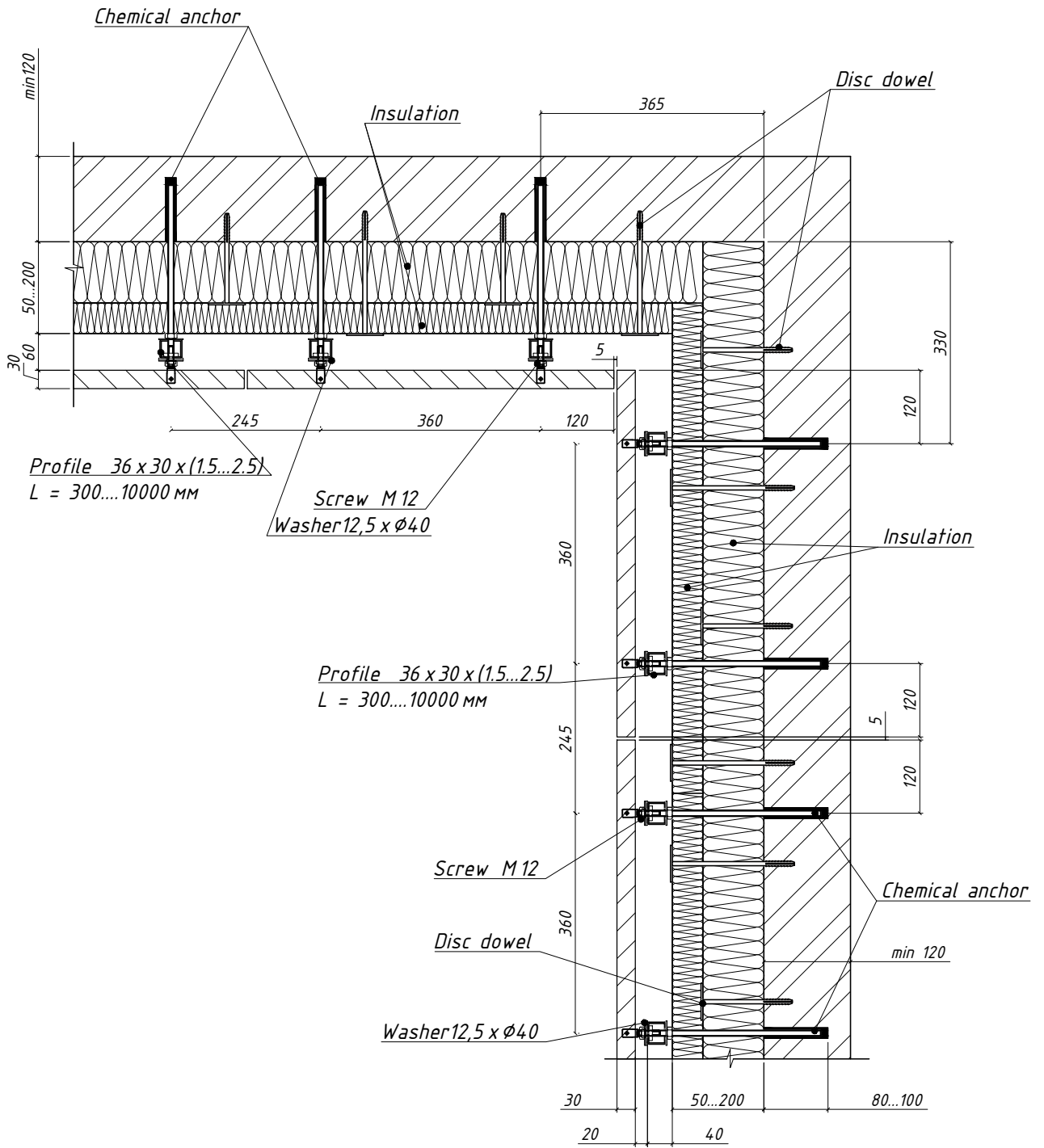
10 - Nut M12

11 - Threaded rod M12

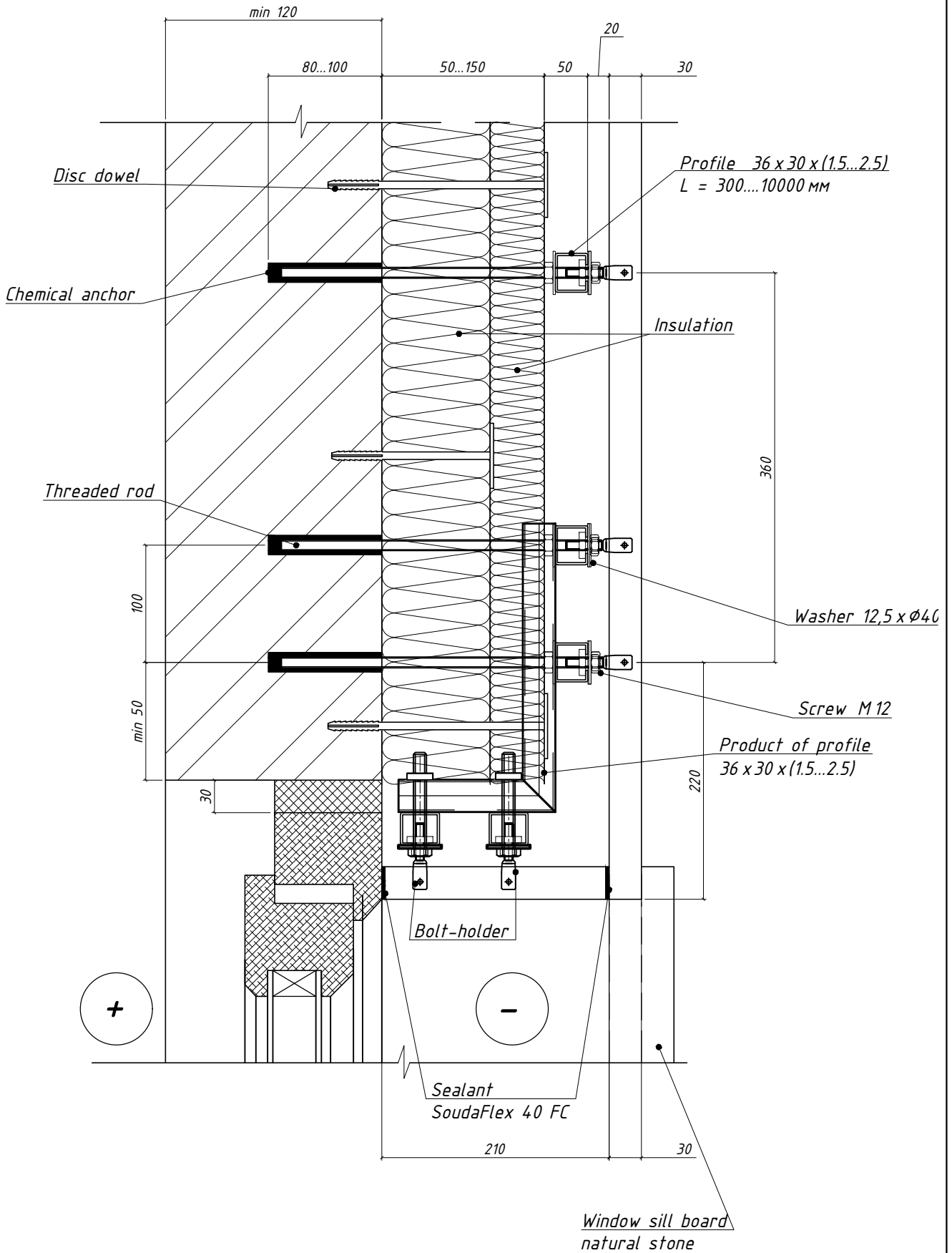
12 - SoudaFlex 40FC Sealant

External wall corner

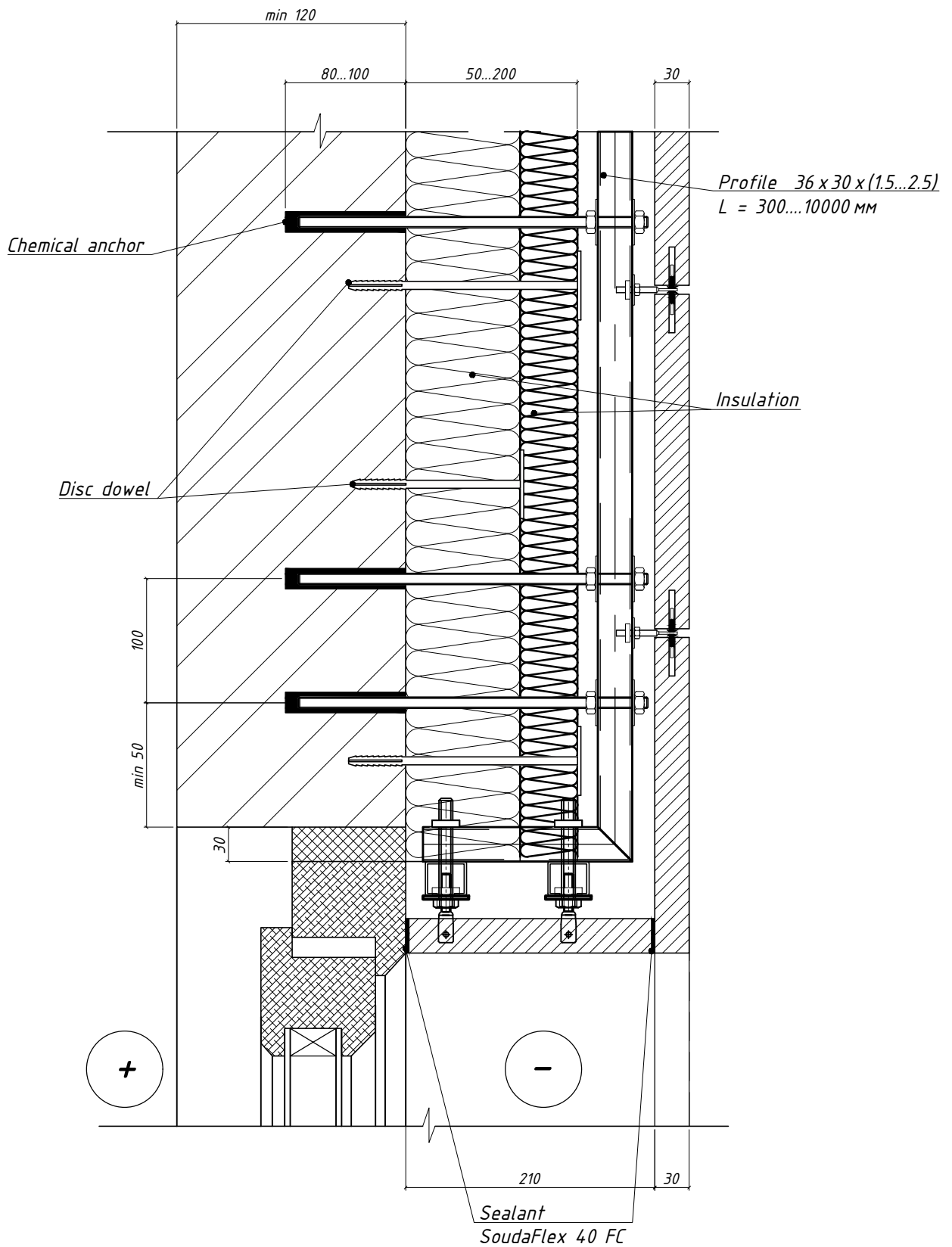




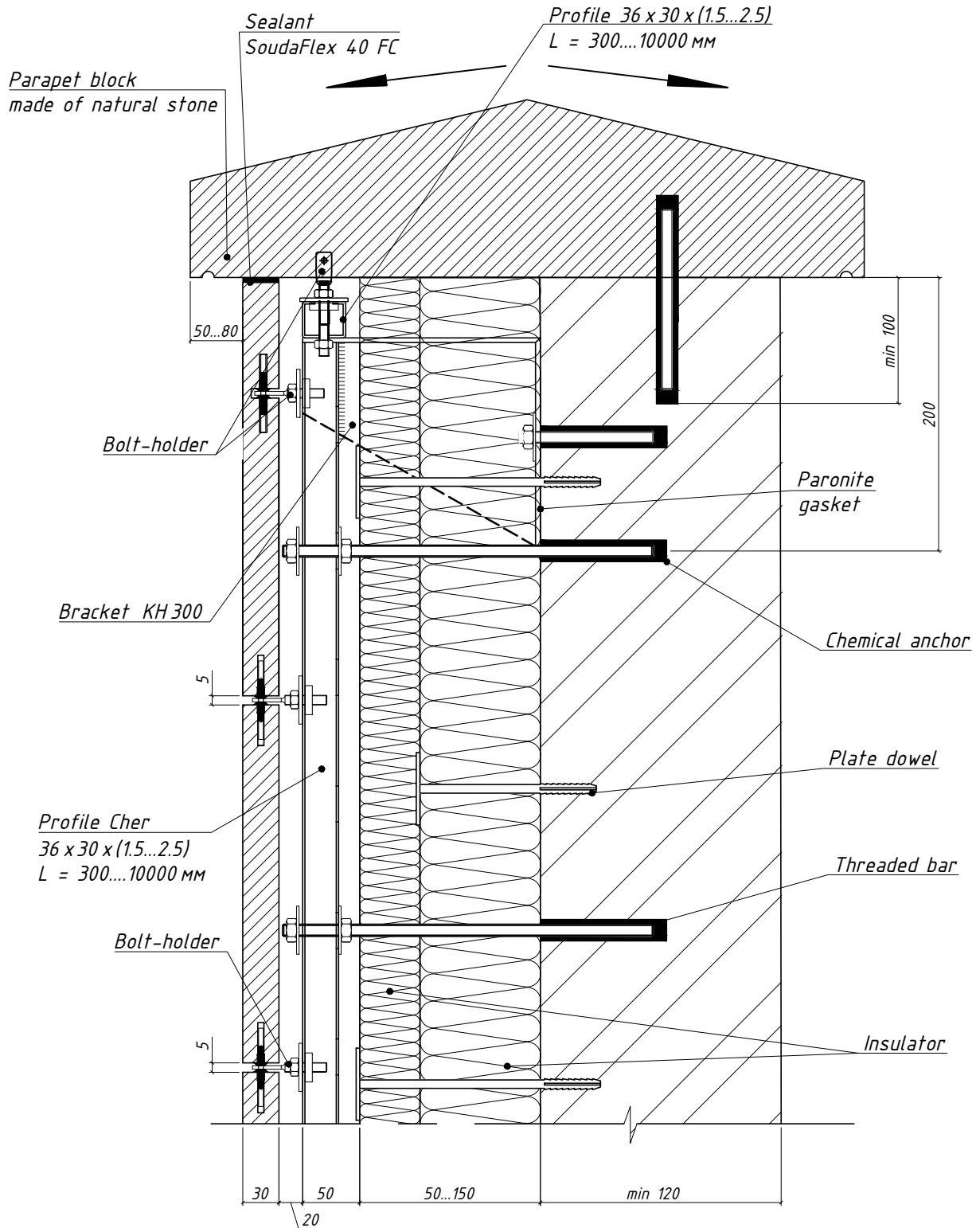
Fragment of a standard design solution for a façade using the MAS system
 Section G - G. Side slope of the window (door) opening, sheet 20



Fragment of a standard design solution for a façade using the Tectos system
Upper slope of window (door) opening



Connection to a parapet made of natural stone



Window sill board
(low tide)
from natural stone

50

Sealant
SoudaFlex 40 FC

50...80

Bolt-holder

Bracket KH 150

5

Profile Cher
36 x 30 x (1.5...2.5)
L = 300...10000 MM

Bolt-holder

5

30

20

50

50...150

min 120

Profile Cher
36 x 30 x (1.5...2.5)
L = 300...10000 MM

min 50

Paronite
gasket

Chemical anchor

Disc dowel

Threaded rod

Insulation

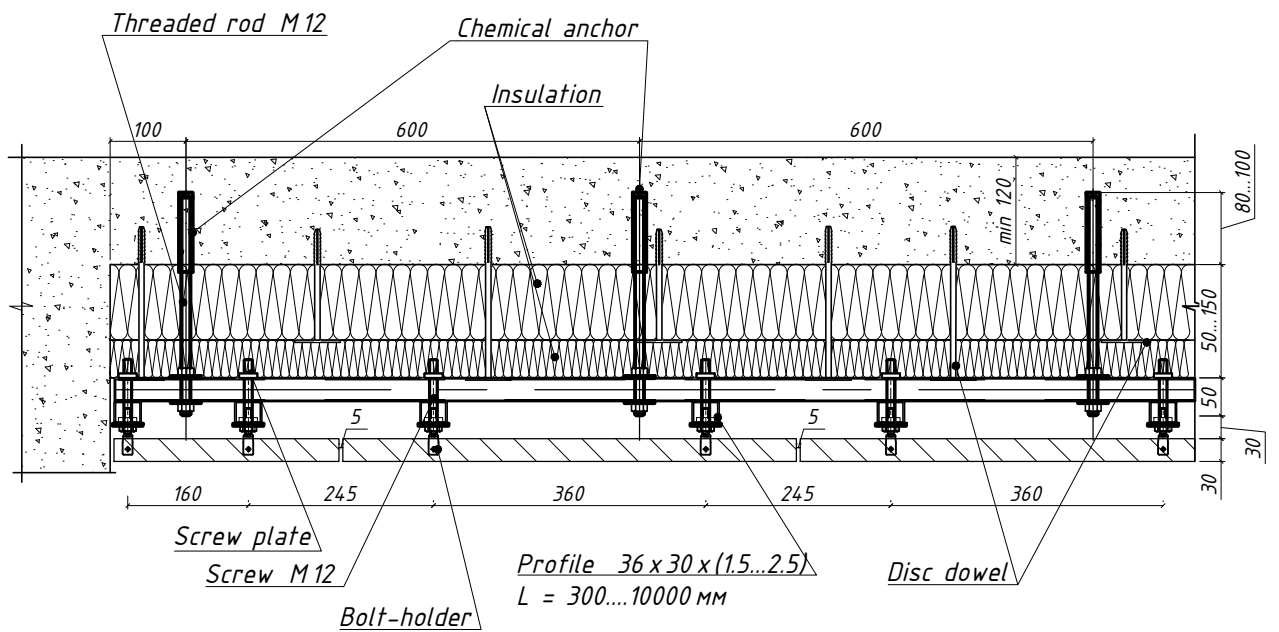
Ventilated facade system
«Tectos»

Typical fastening points.
Window opening ebb

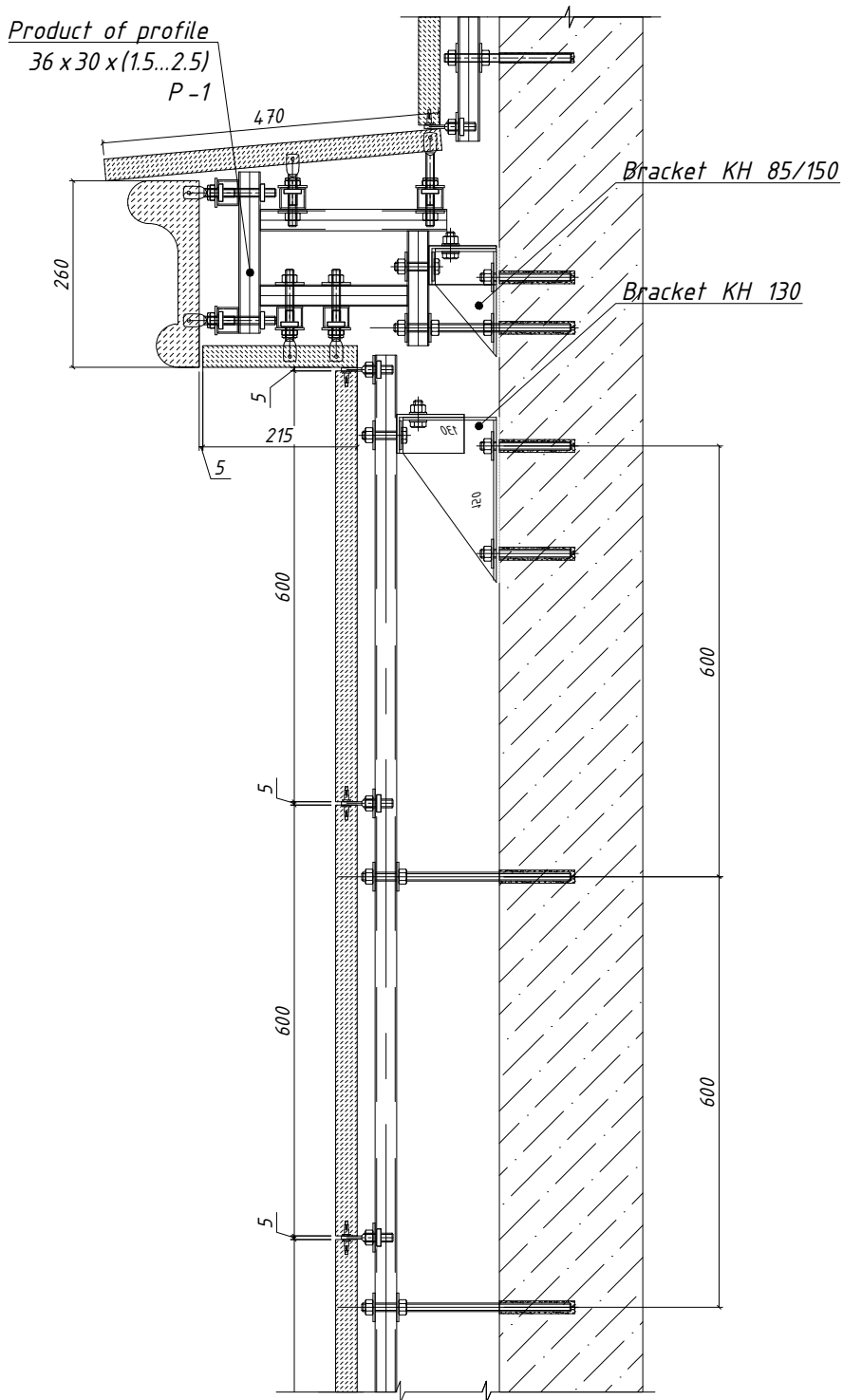
Sheet

20

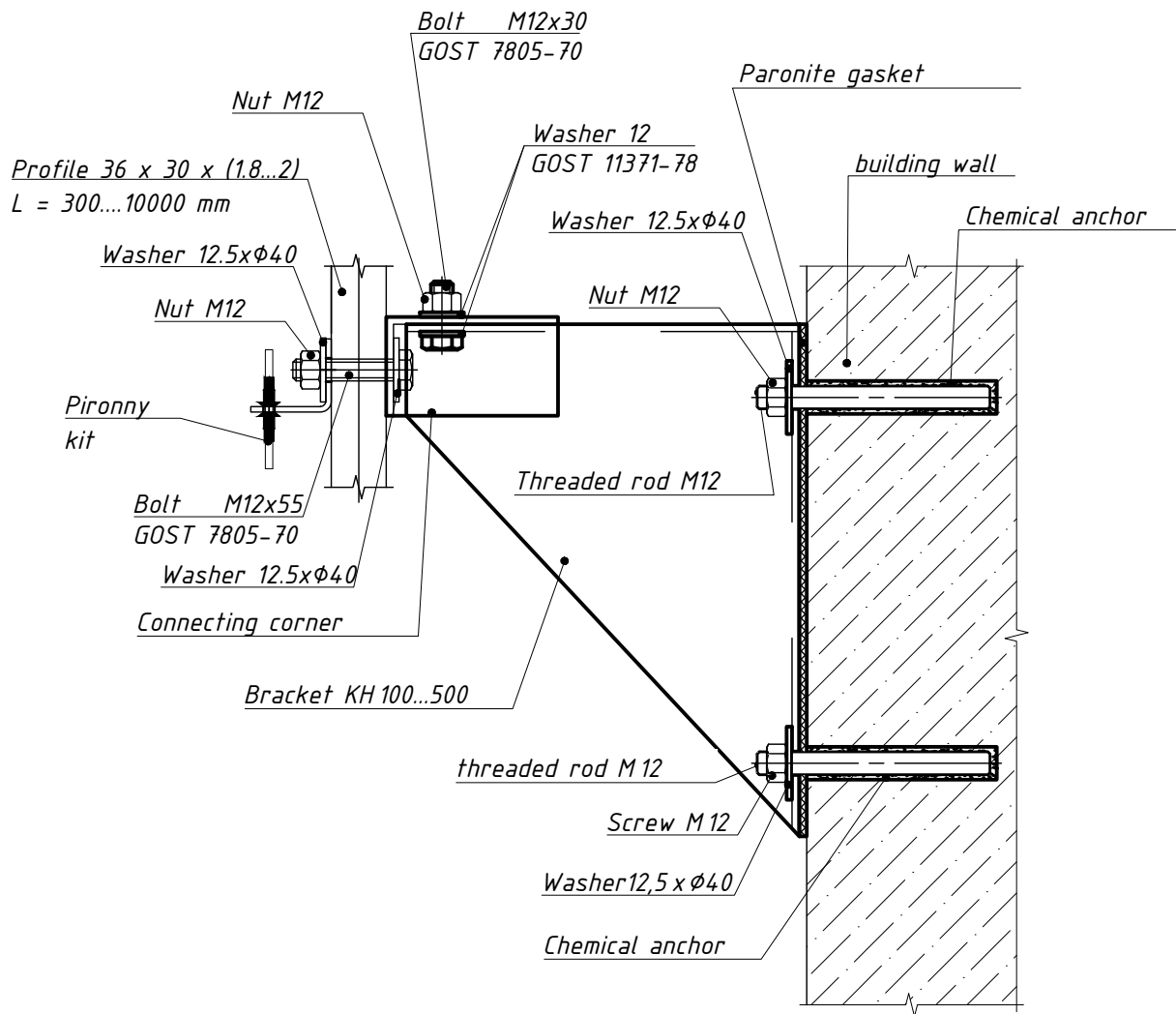
The basic installation solution of the ceiling

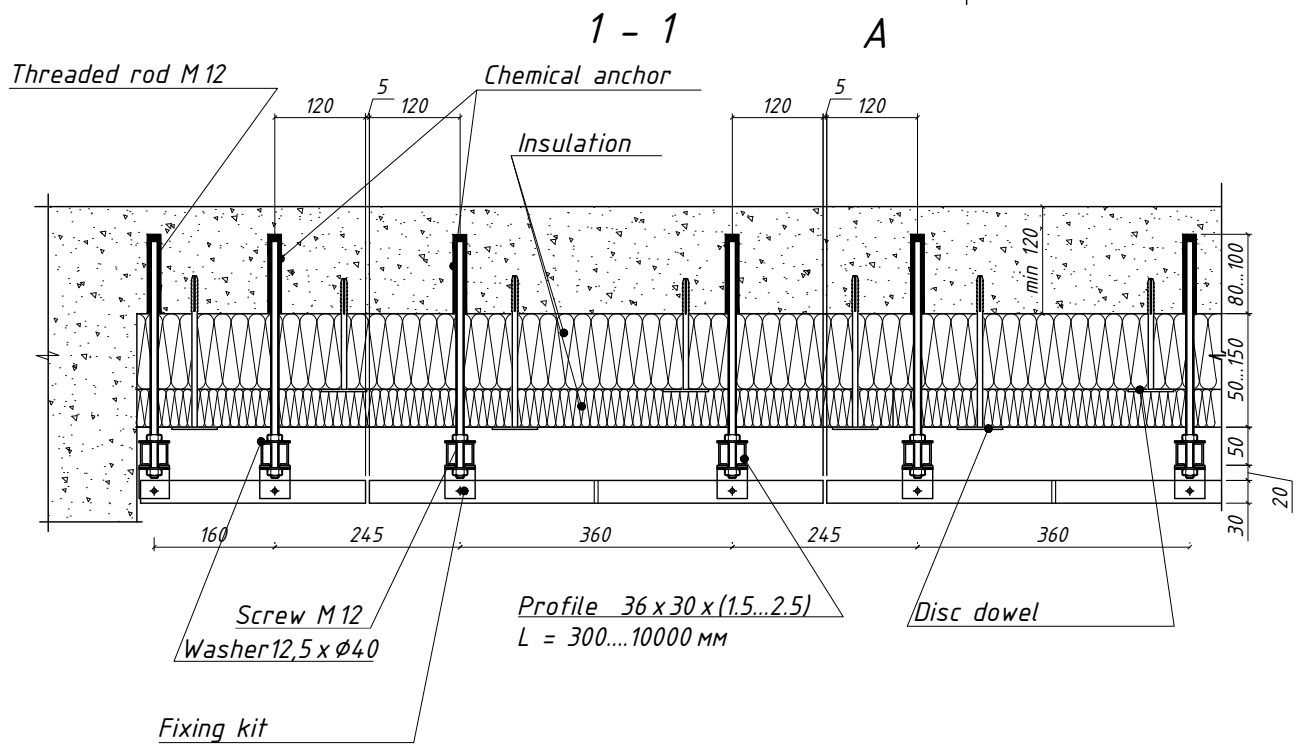
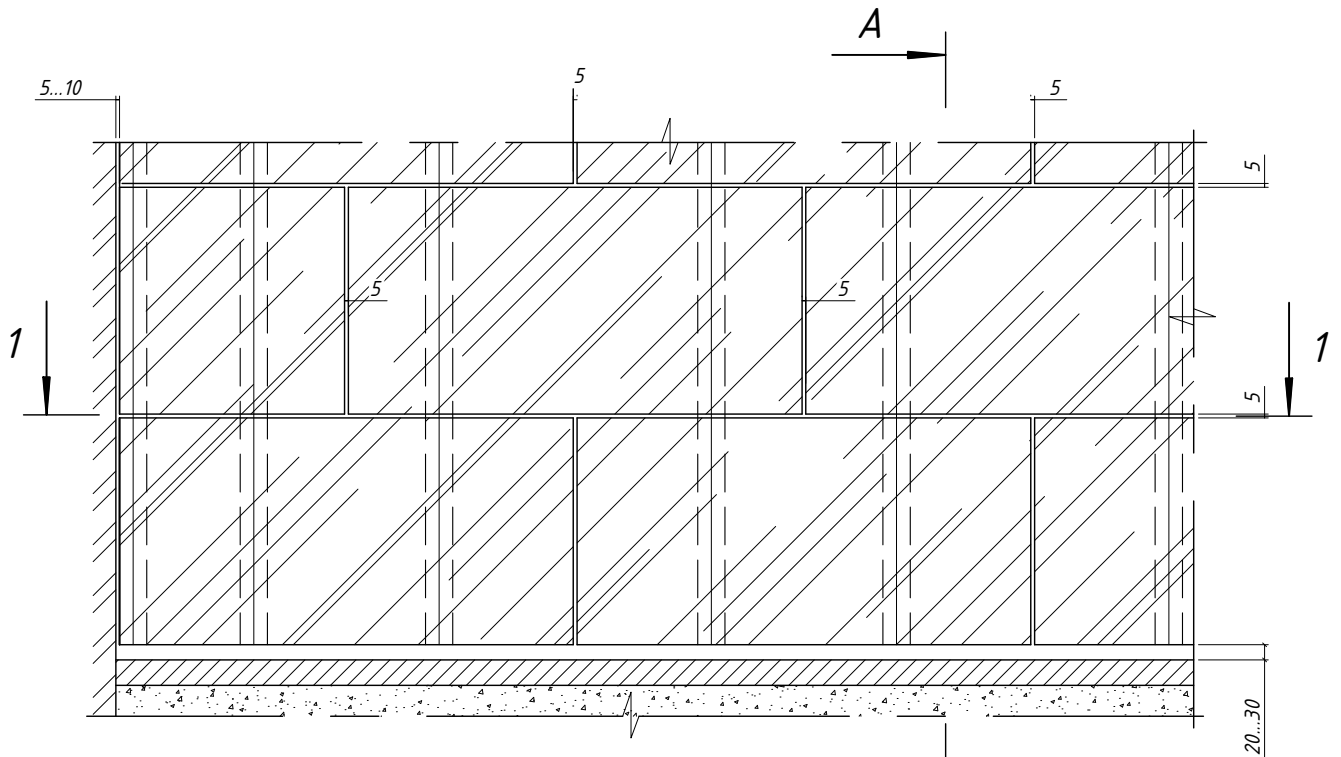


The basic installation solution of the cornice

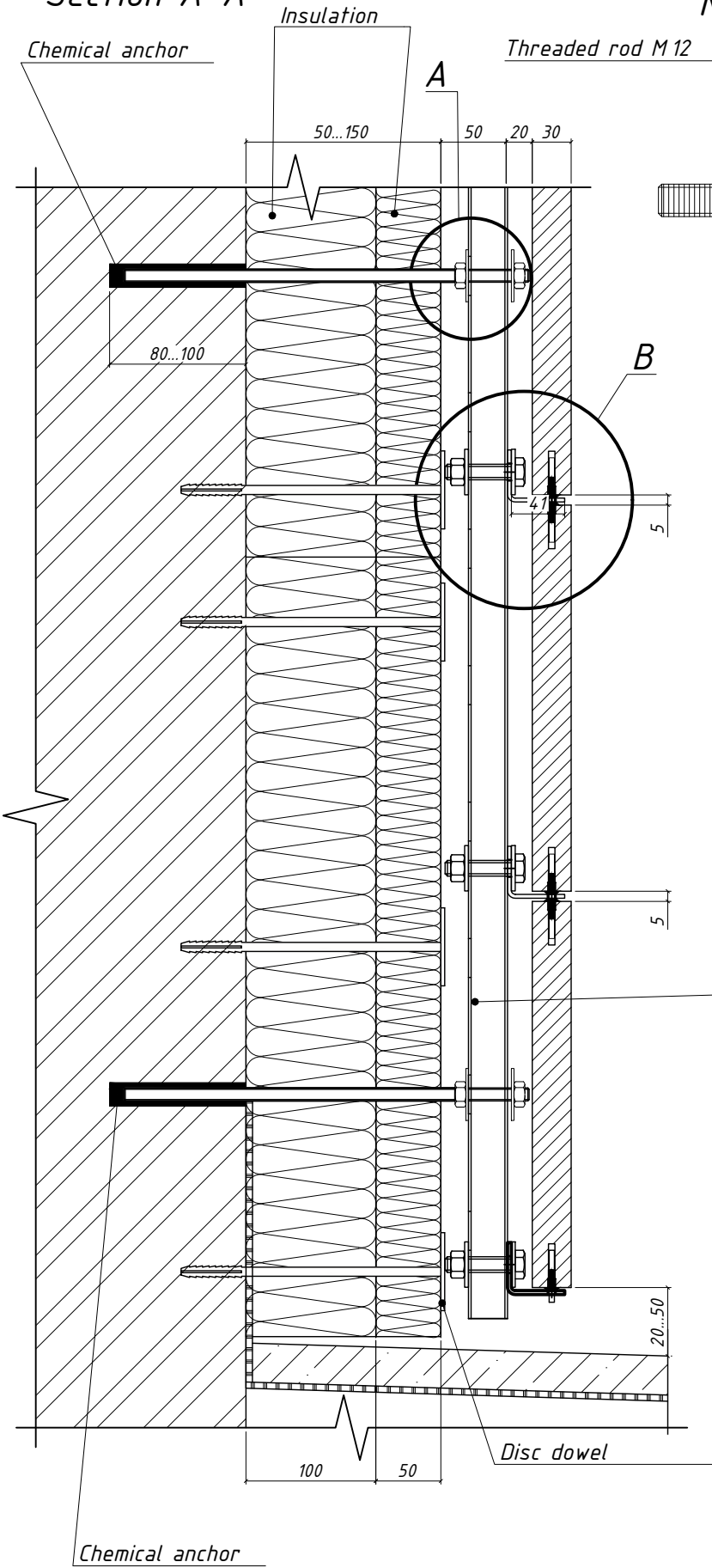


2.2 Vertical system with fixing kit

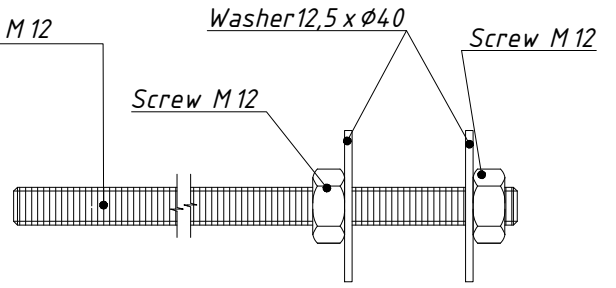




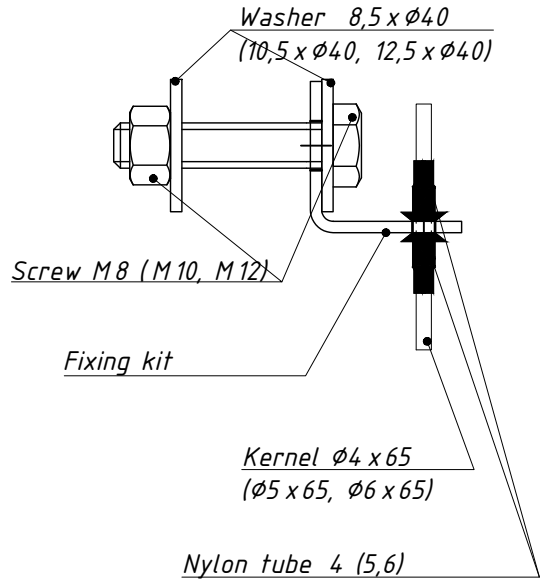
Section A-A



Node A

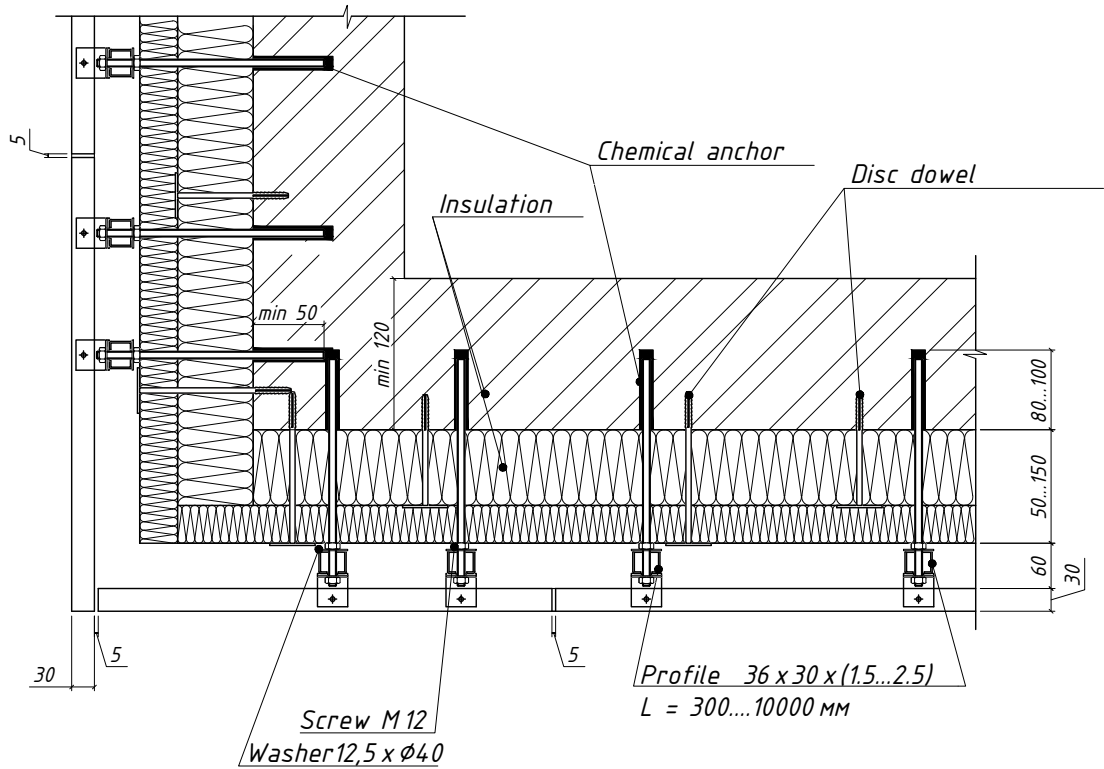


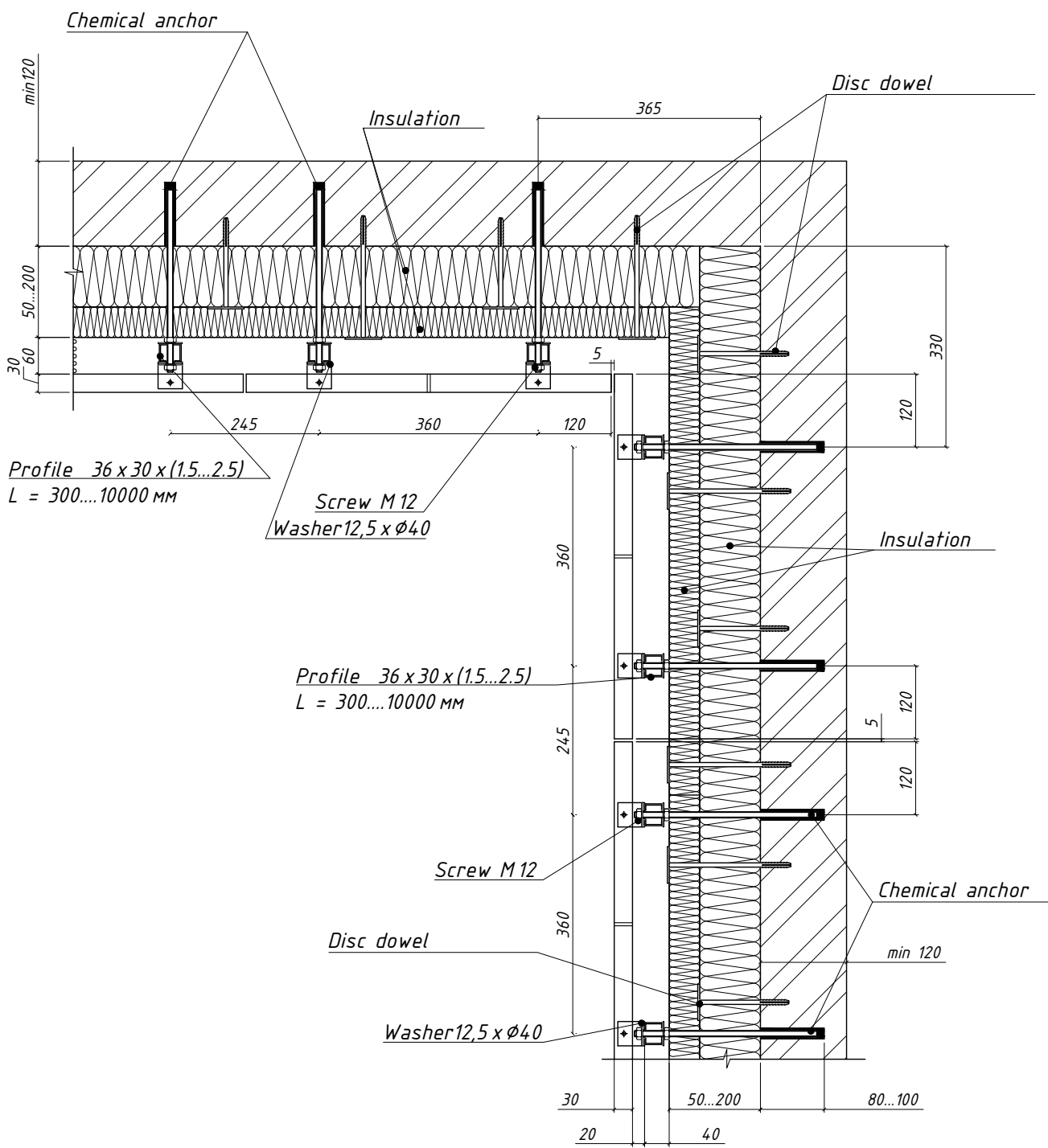
Node B

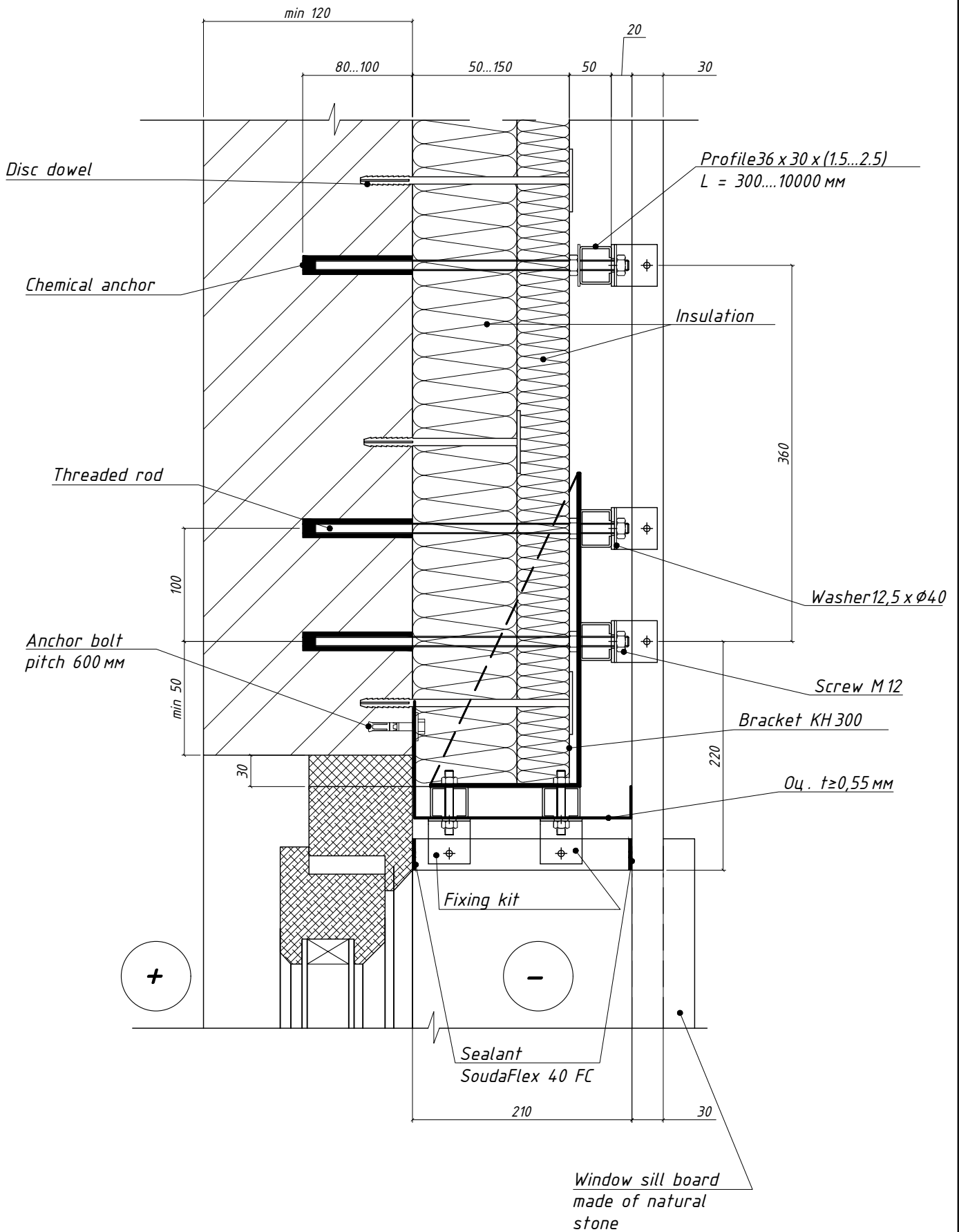


Profile 36 x 30 x (1.5...2.5)
L = 300...10000 mm

External wall corner

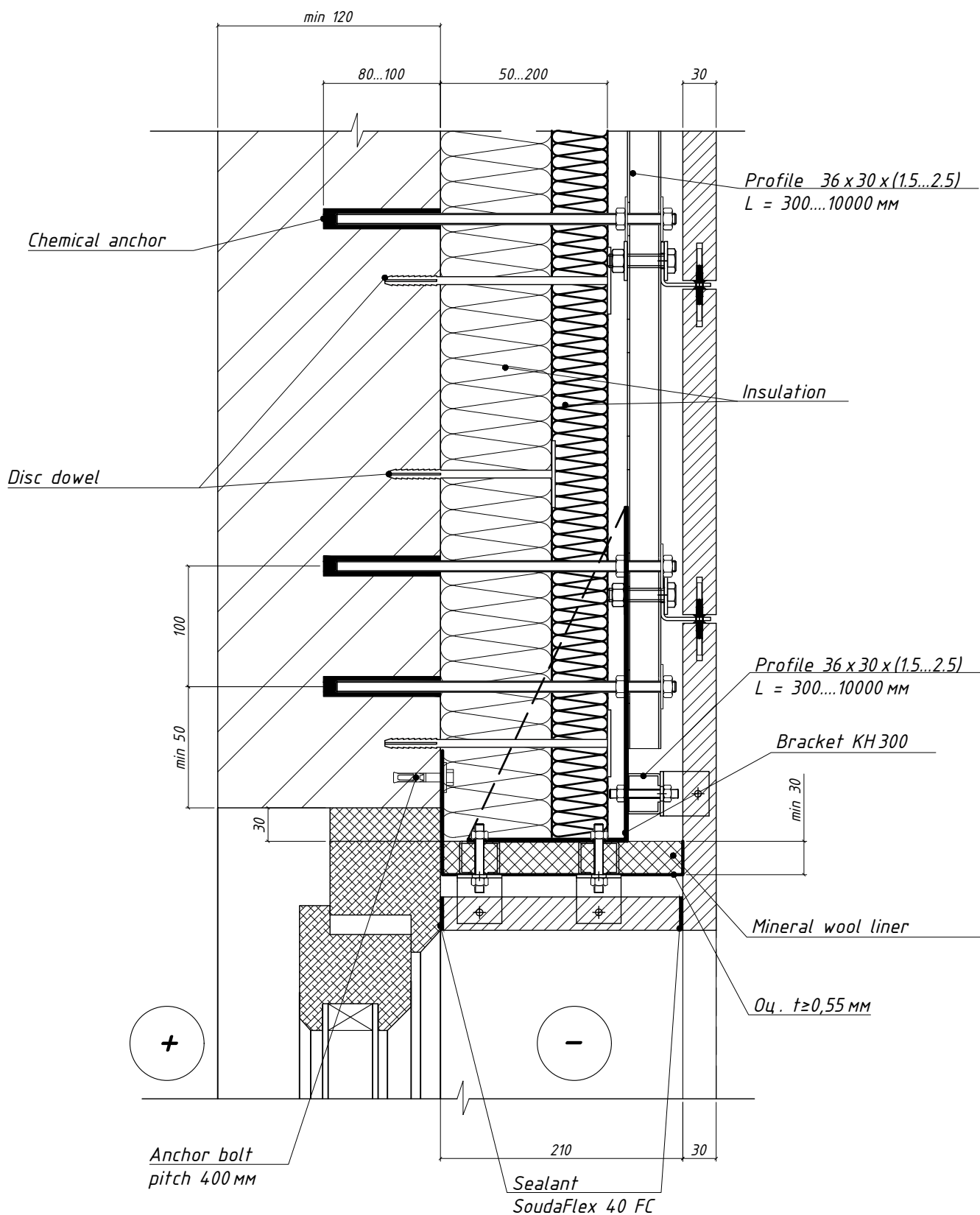




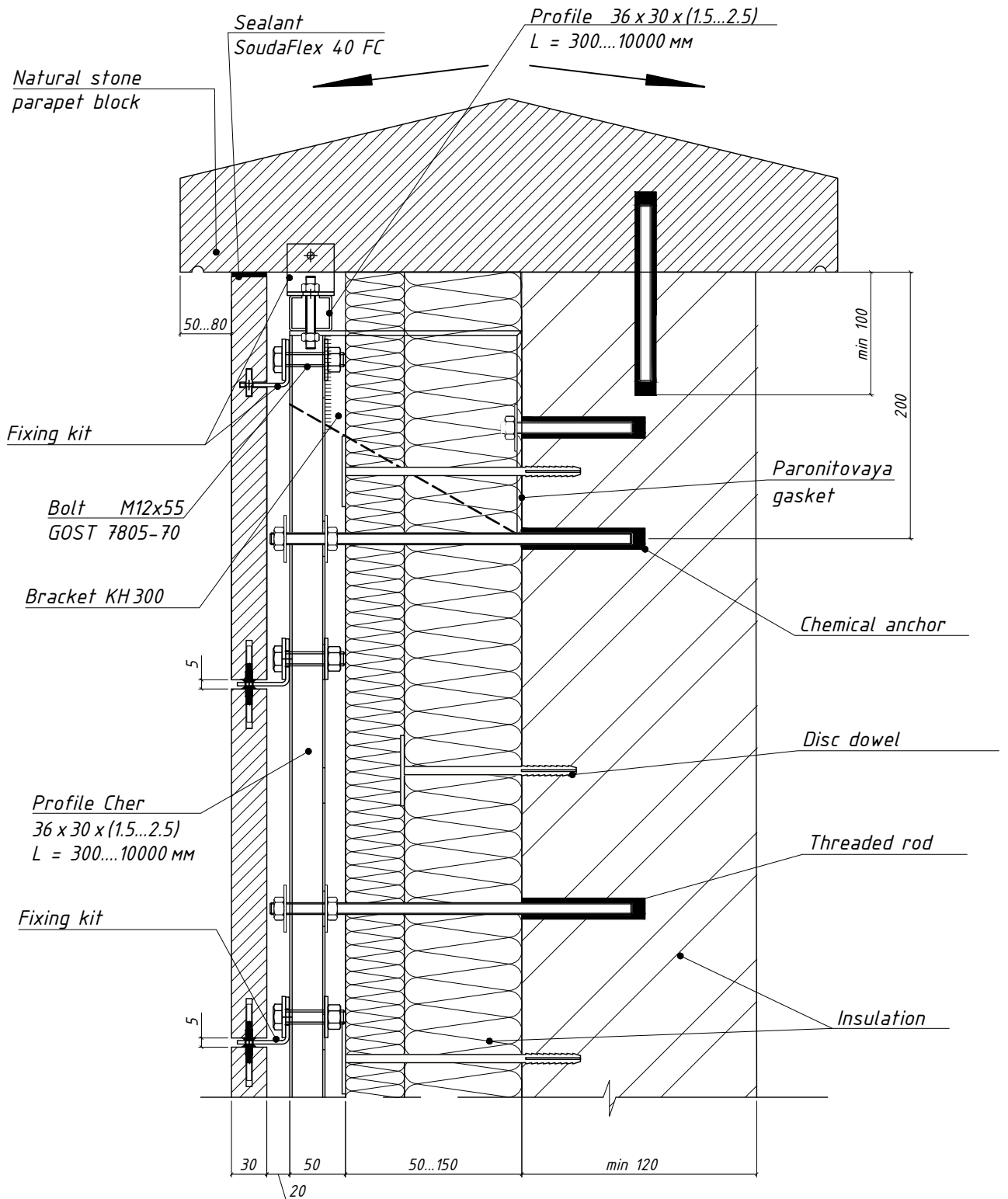


Fragment of a standard design solution for a façade using the MAS system.

Upper slope of a window (door) opening.



Connection to a parapet made of natural stone



Window sill board
(low tide)
made of natural
stone

50

50...80

Sealant
SoudaFlex 40 FC

fixing kit

Bolt M12x55
GOST 7805-70

Bracket KH 300

5

Profile Cher
36 x 30 x (1.5...2.5)
L = 300...10000 MM

Fixing kit

5

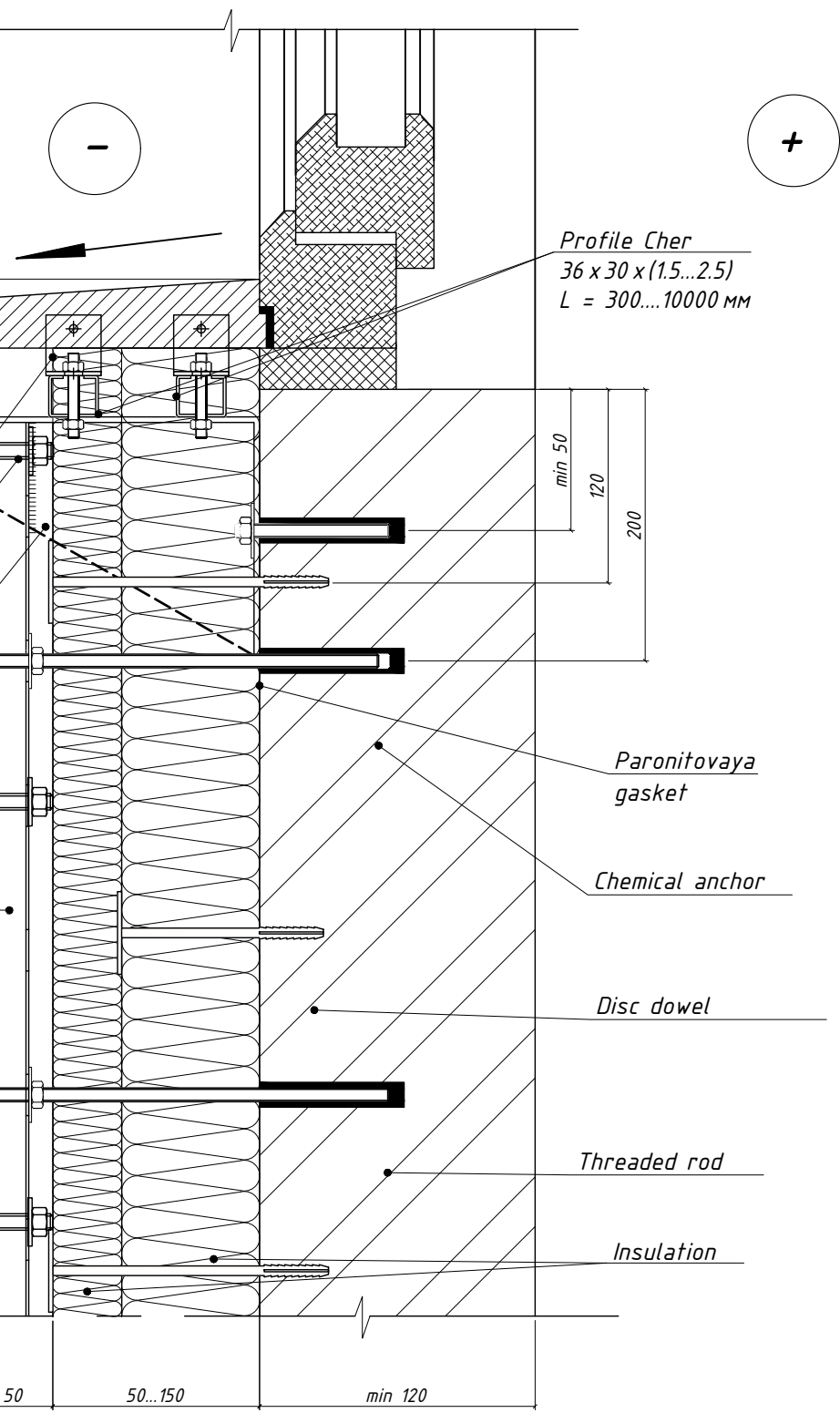
30

50

50...150

min 120

20



Profile Cher
36 x 30 x (1.5...2.5)
L = 300...10000 MM

min 50

120

200

Paronitovaya
gasket

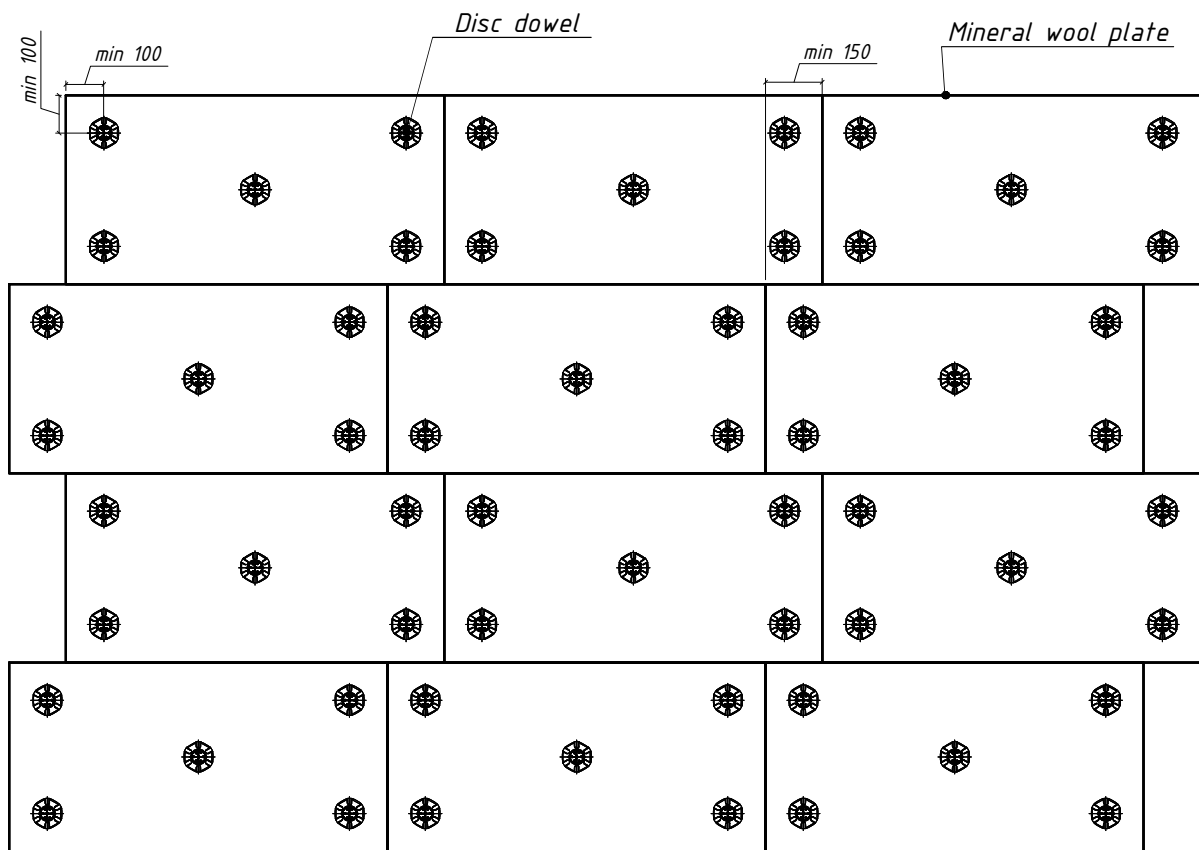
Chemical anchor

Disc dowel

Threaded rod

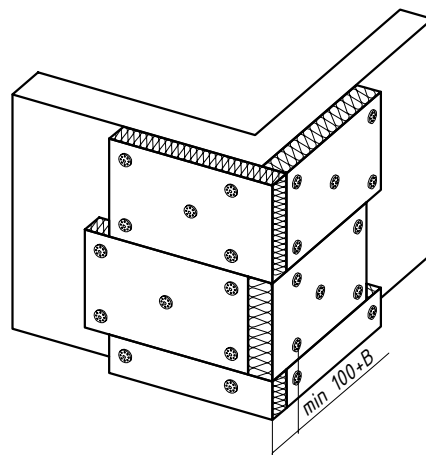
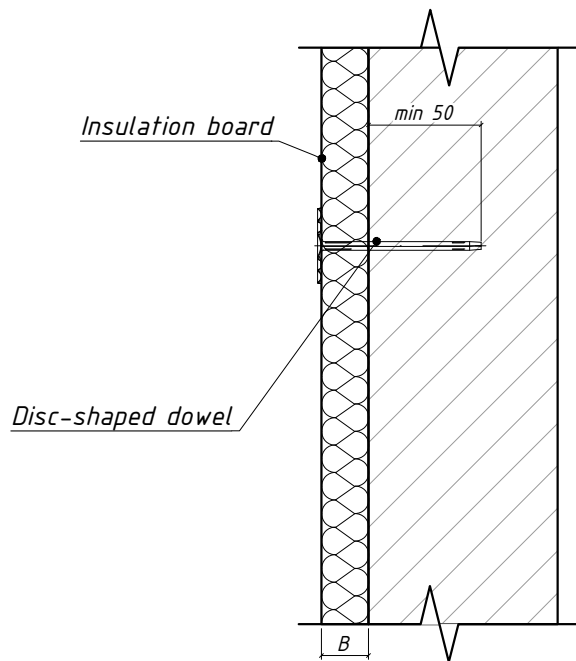
Insulation

3. INSULATION ATTACHMENT DIAGRAMS



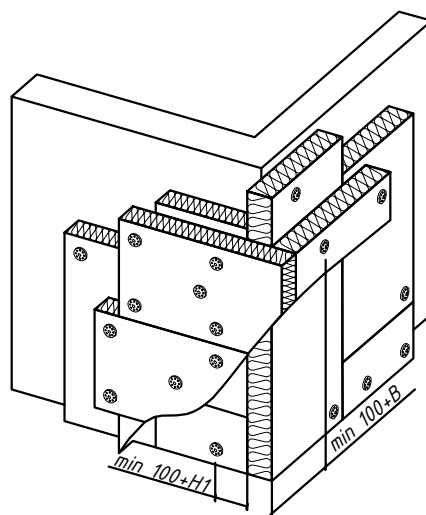
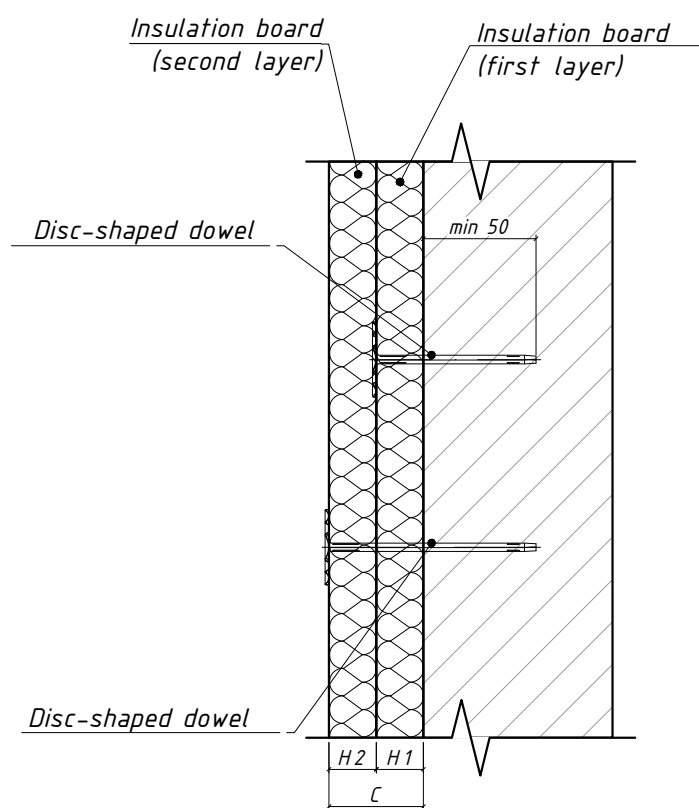
Note:

1. Each slab is secured to the building base with at least five disc dowels.



Note:

1. B - thickness of the thermal insulation layer;
2. Each slab is secured to the building base with at least five disc dowels.



Note:

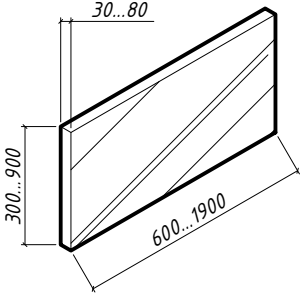
1. H1 - thickness of the inner layer of thermal insulation;
2. H2 - thickness of the outer layer of thermal insulation;
3. The inner layer slabs are attached to the building base with two disc-shaped dowels;
4. The outer layer slabs are attached to the building base with five disc-shaped dowels.

4. Nomenclature

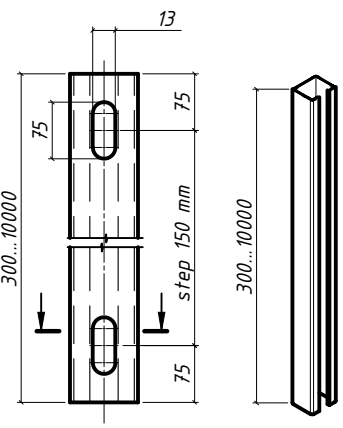
2. General specification of elements, products and construction details of the Ventilated facade system «Tectos» (Start)

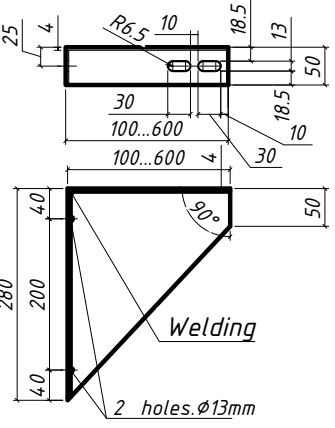
Sketch element	Name, material	Mark	Weight, Kg	Assignment
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Cladding

	<p>Plates facing natural stone marble (granite)</p>	P	<p>Variable depends on the type and size of the plate</p>	Facade cladding
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Elements of the subsystem

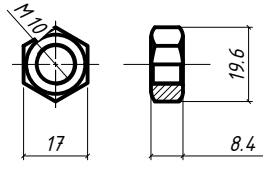
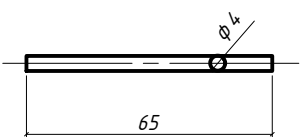
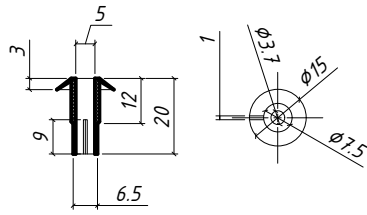
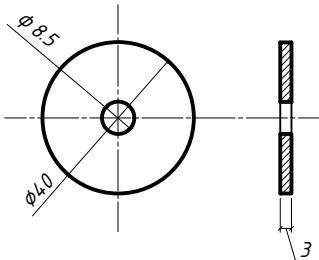
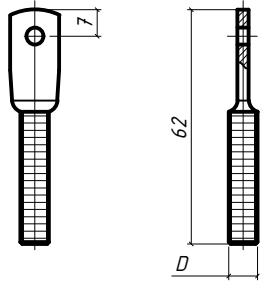
	<p>Profile guide profile made of stainless steel Cher 36x30x1,5...2,5 mm</p>	PF	<p>1,6 Kg on 1 running meter</p>	Guide structural subsystem
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	<p>Bracket Note: The dimensions of the bracket can be changed according to the order. Thickness 3, 4, 5 mm</p>	KH	<p>KH100 ... KH 500 Aisi 430, Aisi 304, 08 Pc 08 Yu</p>	<p>fastening horizontal rails (if stipulated by the project for reinforcement of load-bearing structures)</p>
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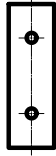

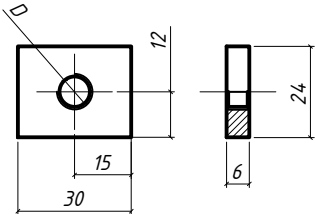
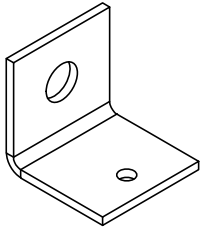

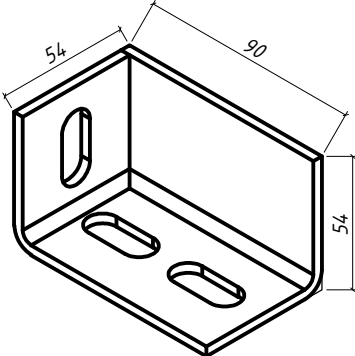
General specification of elements, products and construction details of the Ventilated facade system «Tectos»(continuation)

Sketch element	Name, material	Mark	Weight, kg	Assignment
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Elements of the subsystem

	Nut M8, M10, M12	Gp A 2, A 4	0,015 0,01	Fixing the guide П.Ф. to the rod of the supporting П.Н.
	Rod diameter 4...6mm	Sl A 2, A 4	0,0066, 0,009, 0,014	Element fastening system
	Nylon tube	Nt		Element fastening system
	Washer D - 8,5 mm; 10,5 mm; 12,5 mm	W A 2, A 4	0,028 0,027 0,0265	Element fastening system
	Bolt-holder D - M8; M 10; M 12. Galvanized steel or stainless steel AISI304, AISI430 no ГОСТ 2590-2006	M 8 M 10 M 12	M 8 = 0,019; M 10 = 0,032; M 12 = 0,048	Element fastening system

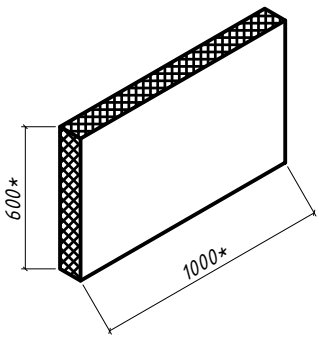
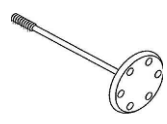
General specification of elements, products and construction details of the Ventilated facade system «Tectos»(continuation)

Sketch element	Name, material	Mark	Weight, kg	Assignment
<i>Elements of the subsystem</i>				
	<p align="center"><i>gasket paronite Thickness 2, 3, 4 mm</i></p>	<p align="center"><i>Gp</i></p>		<p align="center"><i>Installation of wall bracket KH</i></p>
	<p align="center"><i>Chemical anchor</i></p>	<p align="center"><i>CA</i></p>		<p align="center"><i>Mounting the main structures on the wall directly from a threaded rod of minor ПH</i></p>
	<p align="center"><i>Screw plate. D - M8; M10; M12. Galvanized steel or stainless steel AISI304, AISI430 no ГОСТ 19903-2015</i></p>	<p align="center"><i>M 8 M 10 M 12</i></p>	<p align="center"><i>M 8 = 0,031; M 10 = 0,03; M 12 = 0,028</i></p>	<p align="center"><i>Fastening element slabs on subsystem</i></p>
	<p align="center"><i>bolted connection 3, 4, 5 mm</i></p>	<p align="center"><i>Bc Aisi 430, Aisi 304</i></p>		<p align="center"><i>Fastening element slabs on subsystem</i></p>
	<p align="center"><i>Fire cut-off thick not less than 0.55 mm</i></p>	<p align="center"><i>Fc t≥0,55 Zn</i></p>		<p align="center"><i>Fireproof partition</i></p>
	<p align="center"><i>Connective corner Thickness 3, 4, 5 mm</i></p>	<p align="center"><i>CC Aisi 430, Aisi 304, 08 ПС 08 Ю</i></p>	<p align="center"><i>0,31</i></p>	<p align="center"><i>Mounting the KN bracket and horizontal guides (if provided by the project to strengthen load-bearing structures)</i></p>

General specification of elements, products and construction details of the Ventilated facade system «Tectos»(continuation)

Sketch element	Name, material	Mark	Weight, Kg	Assignment
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Элементы утепления

	<p>Mineral wool slab insulation internal, external "roof30", "roof60", "roof60", "roof70", "roof80", "floor125", "floor190", "sandwich k", "lite", "vent50", "vent25", "facade12", "facade15", "linerock standard i", "linerock ventioptimal", "linerock sandwich s", "linerock sandwich k", "technoface", "technofas two-layer", "technolight extra", "technolight optima", "technoblock standard", "technovent standard", "technovent Optima", "technovent prof", "technovent" two-layer", "technoruf nzo", "technoruf n35", "technoruf 45", "technoruf v60", "isolatig-l" (isoroc-l), "isolate" (isoroc-ls), "isofas" (is of as) (is of as), "изоветн" (isovent), "изофлор" (isofloor), "изофуд" (isoroof), "isoroof-h" (isoroof-b), "isoroof-v" (isoroof-m), "teplit-v", "teplit-s", "teplit-z k", "teplit-sandwich-s", "teplit-sandwich-k", "basalit pt-150", "basalit pt-175", "basalit pt-200", "basalit l-30", "basalit l-50", "basalit l-75", "basalit sandwich-s", "basalit sandwich-k", "basalit venti-n", "basalit venti-v", "mpn", "mpn35", "fre", "fre75", "spk", "fkd", "fkl", "frk50", "frk75", "pdk", "fs", "fss", "fsk", "nobasil lsp", "nobasil cylinders", "nobasil cylinders el", "nobasil r-ppd", "sps 175", "sps 200", "spe", "sae", "spk 110", "paroc cepuü "fire "marine fire slab", "marine slab", "oven slab", "pro slab", "slab, pro roof slab", "invent", "cos", "grs", "ssb", "fps", "fpb", "cgl", мамы "paroc unm", "ama", "paroc cepuu "bli", "paroc cepuu "fas", "fab", "fal", "was", "wab", "wps", "uns", "extra", "paroc" cepuu "ros" u "rob", "floor batts", "floor batts i", "roof batts", "roof batts h", "roof batts b", "roof batts c", "Beton element batts", "cavity batts", "light"</p>	Mws	Variable depends depending on the type and size of thickness slabs	Insulation fencing designs (walls)
	Dowel disc-shaped	DdS	Fastening insulation to Wall building	

Note: Possibility of replacing purchased materials and products specified in this specification with similar ones according to their characteristics, purpose and scope of application, materials and products whose suitability confirmed by relevant technical certificates, established in the construction project according to in agreement with the customer.