Saimaa University of Applied Sciences
Lappeenranta
Double Degree Program in Civil and Construction Engineering

Uliana Rybina

Adapting technical specifications for the new product Connection loops PVL 140

Bachelor's Thesis 2013

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Saimaa University of Applied Sciences, Lappeenranta
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Bachelor's Thesis, 2013
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The objective of the study was to create new technical specifications for the new product manufactured in the company Peikko. The product is a rope connecting loops PVL 140. The task is also to find a similar method to calculate the shift in the Russian GOST and compare it with the calculation, which is presented in the Eurocode. The work was commissioned by the Peikko Group company.

The theoretical part presented an overview of the technical terms and what they are for. It is also the main question - what are the connecting loops and what they are their basic properties, characteristics, and stresses that they are experiencing. Here is the original version of the new technical conditions adapted to the new product.The information was gathered from literature, norms, regulations, hand books, producer's brochures, the Internet, textbooks and interviews.

Contents

1. Introduction

The thesis is to presents a new specification for connecting steel wire ropes. This specification is applicable to construction of metal products, consisting of high-strength steel wire and galvanized metal body of the Finnish company PEIKKO (hereinafter rope loop PVL), for connecting precast concrete wall elements together vertically.

Wire loop PVL is produced in a specialized factory with automation equipment and designed for installation in the wall construction elements for sensing the shear forces which arise in the junctions of wall panels.

Wire loop PVL may be used only for connections of wall anchors or precast concrete products in which the transverse forces are transmitted predominantly parallel to the static load and / or perpendicular to the seam. Systematic tensile stresses in the seam (at the level of structural elements) should be excluded or taken through the adoption of additional measures.

The list of documents to which these links, or that are used in the preparation of this specification are given in Appendix 1 of this specification.
Rope loop PVL is set to normal, reinforced concrete, which is the minimum strength class C25/30 and maximum - S50/60 in accordance with EN 206-1:2000-07 ÷ B55 or B25 for SP 52-101-2003, GOST 25192-82.

Loops from Peikko are applicable for both teams, and for monolithic structures. Attachment is simple, as well as the installation: simply remove the plastic cover and bend the connecting portion rope loop to the working position.

For monolithic structures connection fittings are used.

Constructively the rope loop PVL has a high-strength steel wire, galvanized sheet steel, steel clamp and a metal lock. The ends of the cable are summarized in parallel in one direction and compressed together using a metal collar - formed in such a way that the loop is threaded through a hole in the bottom of the metal casing and is fixed in position by means of metallic castle, which, in turn, is fixed in the same hole. During the production of reinforced concrete element, the connecting part of the loop inside the metal case is closed and the plastic top cover is attached to the body with tape. A general view of the junction stenosis of new panels using rope loops PVL is given in Appendix 2, the elements and dimensions of cable loops PVL are also given in Appendix 2.

2. Common information about technical specification

Technical Specifications (TS) is a document that establishes the technical requirements to be met by a particular product, material or substance, and so a group of them. In addition, they should be given the procedure by which to determine whether these requirements are met.

2.1. Document status

Specifications are technical documents , which are being developed to address the developer (manufacturer) or at the request of the customer (consumer) products. Specifications are an integral part of a set of design or other technical documentation for the products.

Specifications are developed on one specific product , material , substance or a few specific products, materials , substances, etc. (then the code of the GST on to each product , material , etc.) The requirements of established specifications must not conflict with the mandatory requirements of state or interstate standards that apply to these products.

Composition, construction and design specifications must comply with the requirements of customers coming in ESKD.

Technical regulations and standards in accordance with the law on technical regulation are not required to manufacture products with the exception of a number of products , such as technical devices used at hazardous production facilities .

Product engineering and instrument specifications are referred to as non-core engineering and other documents in accordance with GOST 2.201 (three groups of digits separated by periods, with the code at the end of the document) :
four- letter code development organization (or code highlighted in the centralized assignment of symbols);
1) six-digit code classification characteristics assigned to products and design documents for GST;
2) three-digit serial registration number;
3) document code according to GOST 2.102 - "TU ".

Example: ABCD.123456.789TU where ABCD - code development organization , 123456 - product code Classifier ESKD , 789 - serial registration number.

2.2.Structure of the document

According to the standards in force in Russia , the technical specifications should include an introduction and sections, arranged in the following order :
-technical requirements;
-safety requirements;

-environmental protection requirements;
-acceptance rules;
-methods of control;
-transportation and storage;
-instructions for use;
-the manufacturer's warranty.

Specifications may be a regulatory document. Also specifications are the main document required for a decision by the authorized services Epidemiology at the sanitary -epidemiological evaluation of domestic products.

Specifications may be subject to registration in Rosstandart agreement with the Federal Service and , in separate cases - the fire brigade , Gospromnadzorom etc. With the introduction of 184- FZ " On technical regulation" in accordance with Article 13 of the documents in the field of standardization , the object of Technical Terms is not included in the list of regulatory documents developed in the Russian Federation.

1. Common information about connecting of wall panels

The purpose of these compounds is not only to firmly fasten the individual elements, but also provide an air and watertight joint. The invention relates to construction, namely, the construction of wall panels with insulation and a butt connection to the frame of the building and may be used in the construction of low-rise buildings walls without further finishing panels after their installation.

2.1. Compound number 1

Connect number one is a classic. The panels are using beam. The commonly used dual beam size is of 50 * 150 * 2700. This compound can be applied to the wall panels and panels for floors.

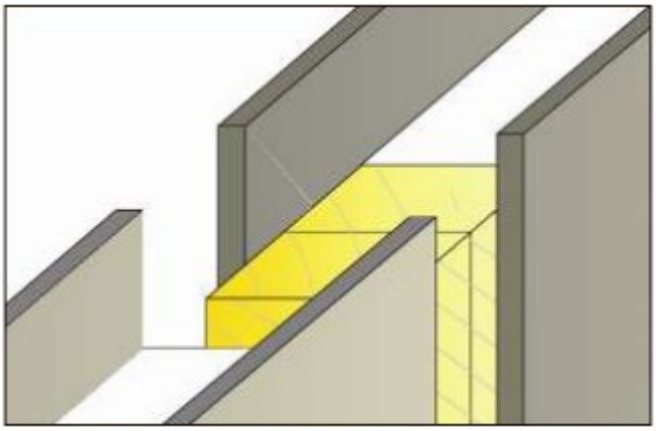


Figure 3.1. Compound 1

2.2. Compound number 2

Compound number 2 represents a keyed connection. Woodruff key is made of SIP application GB panel 3 and styrofoam. General options are 100 * 150 * 2700, made of SIP panel thickness 150 mm. GB3 thickness can be determined by the thickness of the polystyrene available, but can not be less than 12 mm.

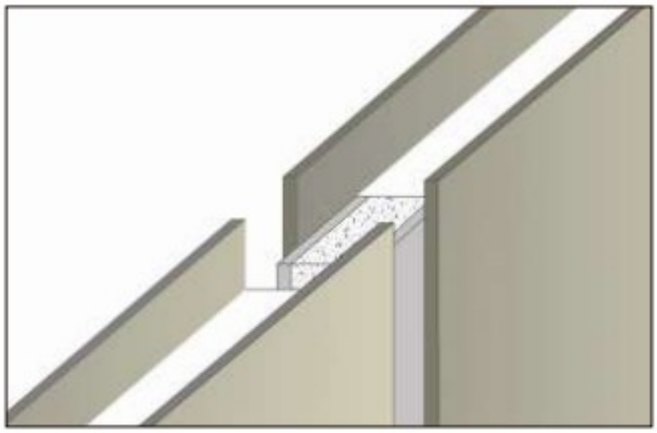


Figure 3.2. Compound 2

2.3. Compound number 3

Key consists of a plate GB-3100 * 2700 22 mm thick density of not less than 1000 kg/m3. The application is possible in case when producing polystyrene panels are used SIP format 1100 * 2700 mm (see process description). The feather should be installed directly on the operation site during installation. In the grooves with a layer of foam, the feather is inserted through a mallet, or a light hammer. Fastening tabs to the outside of the panel to produce wood screws 4 * 70 mm, pre countersink (ris.8.13).
When you use number 2 and number 3 step timber must be
1200 mm. Connection number 2 and number 3 only apply to wall panels.

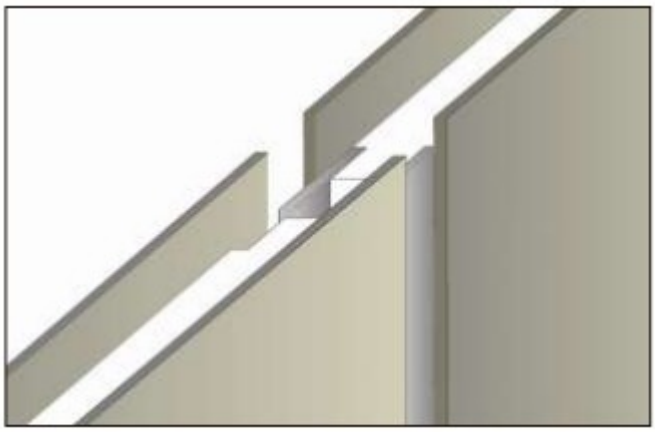


Figure 3.3. Compound 3

2.4. Compound number 4

The compound number 4 is designed to completely replace bar. This connection means to exclude timber connections and use a beam of 4 GB, which in turn consists of trehsloev GB 3 -25 mm, GB2 - 100 mm, GB 3-25 mm. The total weight is of 28.35 kg beams. The binder is cement milk. Fastening tabs are to the outside of the panel to produce wood screws 4 * 70 mm, without prior countersinking

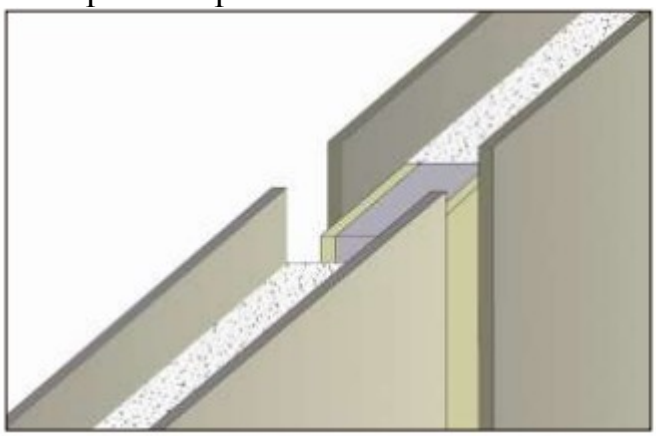


Figure 3.4. Compound 4

2.5. Compound number 5

The use of such a connection is possible if the production of SIP panels uses styrofoam format 1100 * 2700 (see description technical process). In grooves with a layer of foam, the panel is connected to the beam by means of a mallet or a hammer lung. Connect to produce wood screws 4 * 50, without first countersink.

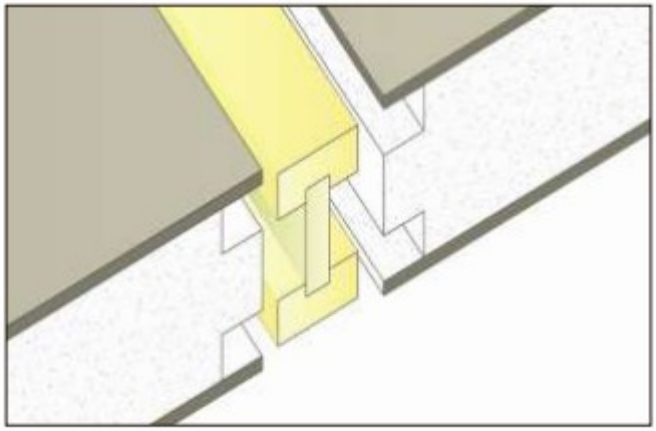


Figure 3.5. Compound 5

2. General information about PVL-loops

2.6. Common definition and properties

PVL Connecting Loop consists of a recess box which anchors itself to concrete well thanks to its stepped side form, and a wire, which together with the box forms are a load bearing structure.

Spacing of PVL Connecting Loops in the joint depends on the shear loads to be transferred. Boxes are installed to the formwork of wall panels before concreting.

Wire Loop boxes are installed to the formwork according to spacing needed to bear the shear loads, before the panel is cast. After removing the formwork, protective tape is removed and the loop is opened with for example a hammer or a pin. Pair of boxes and the vertical rebar installed into loops form a joint which resists vertical shear forces, together with the concrete grout in the joint.

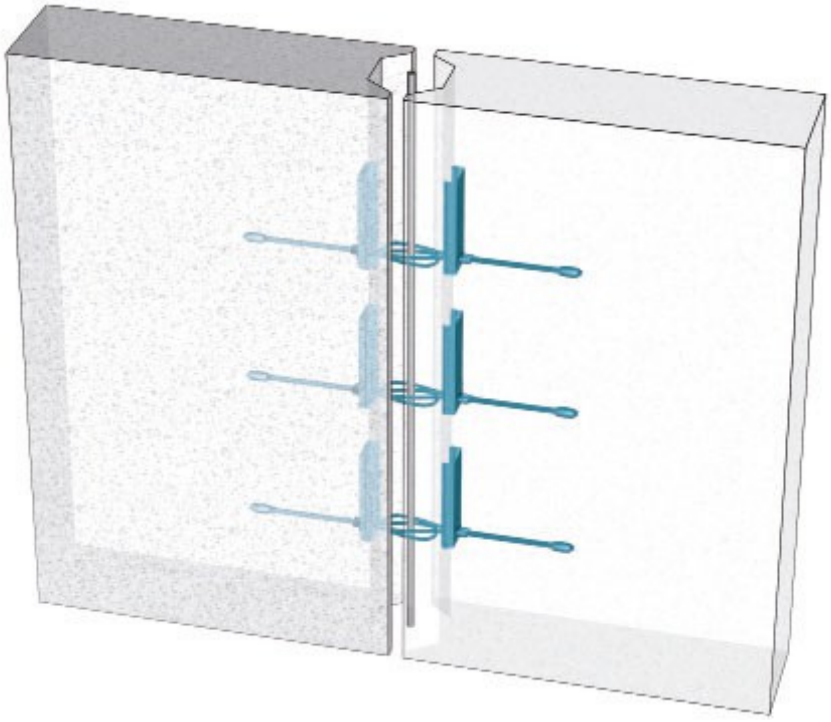


Figure 4.1. . PVL Connecting Loops in the joint of wall panels

The benefits of PVL

• Easy to install, individual boxes are installed to the formwork.
• Flexible wire loop stays in opened position due to patented structure.
• Anchoring tail is easy to place into reinforcement.
• Stepped box shape secures the box in to the concrete.

2.7. Material

Constructively the rope loop PVL has a high-strength steel wire, Galvanized sheet steel, a steel clamp and a metal lock. The ends of the cable are summarized in parallel in one direction and compressed together using a metal collar - formed in such a way that the loop is threaded through a hole in the bottom of the metal casing and is fixed in position by means of a metallic castle, which, in turn, is fixed in the same hole. During the production of a reinforced concrete element, the connecting part of the loop inside the metal case is closed and the plastic top cover is attached to the body with tape. A general view of the junction stenosis of new panels using rope loops PVL is given in Appendix 2, the elements and dimensions of cable loops PVL are also given in Appendix 2.

The product is manufactured of galvanized sheet steel Q195 by mechanical cutting and creasing according to standard GB / T 700-1988 (China) or steel grade S185 standard EN 10025-2: 2004 (Europe) or steel St0 GOST 380-94 (Russia).
The loop product is made of high strength steel (1770 N/mm2 6x19 + SE) according to DIN 3060 (Europe) or GOST 3070-88 (Russian) by mechanical cutting and crimping homa-how. Material Grade clamp - 16Mn in accordance with the standard GB / T 1591-94 (China) or S355J0 standard EN 10025-2: 2004 (Europa) or steel 17GS to GOST 19281-89 (Russia).

Castle products are made of:
- Q235 steel grade in accordance with standard GB / T 700-1988 (China) or S235JR standard EN 10025-2: 2004 (Europe) or St3ps or GOST 380-94 (Russia).
- Magnesium alloy AZ91D standard EN 1753-1997 (Europe) or MA8ts GOST 2581-78 (Russia).
Plastic top cover is made of ABS plastic in accordance with GB 12672-1990 (China) or ABS plastic TU 2214-019-00203521-96 (Russia).

2.8. Loading and environmental conditions

The resistances of PVL Connecting Loop connections are defined according to loop spacing and compression strength of the concrete grout in the joint. Resistances are calculated according to Eurocode 2 parts 1-1 and 1-2.
It is assumed that no forces, compression or tension, parallel to wall panels and loops effect the joint. Only shear force effecting in the vertical joint is taken into account. Concrete grout shall have the minimum same compression strength as the concrete of the wall panels, minimum C25/30.

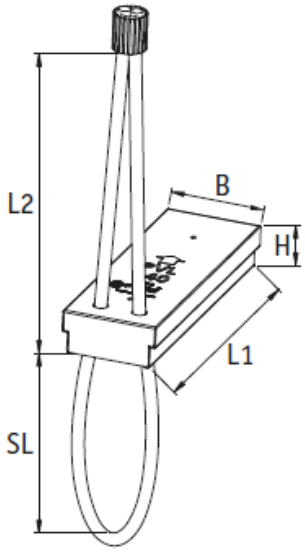
PVL Connecting Loops must not be used
• In joints, which are exposed to such a seismic or dynamic strains which exceed the deformation capacity of concrete grout in the joint.
• For lifting or as a lifting loop.
If PVL connecting loops are used in fire resistant load bearing walls, the concrete cover thickness must be eff ective enough so that the wire loop will not reach its critical temperature Tcrit. = 350°C.

2.9. Other properties

Peikko PVL Connecting Loops are manufactured of the following materials in Peikko China factory:

Box	Q195, thickness 0,7 mm Steel sheet, zinc plated and passivated	GB/T 700-1988
Ferrule	16 Mn	GB/T 8162-1999
Cover	Tape	
Wire Loop	6x19+IWS 1770 N/mm²	GB/T 20118-2006
	Patented structure solid core wire based on standard EN12385-2.	

The dimensions of PVL Connecting Loops are shown in Table 2.



Peikko Group's production units are externally controlled and periodically audited
on the basis of production certifications and product approvals by various organizations,
including Inspecta Certification, VTT Expert Services, Nordcert, SLV, TSUS and
SPSC among others.

Figure 4.4. Dimensions of PVL

Table 4.4. The main dimensions of PVL Connecting Loops

Table 2. Main dimensions of PVL Connecting Loops

PVL	L1	L2	B	H	SL	wire Ø
	[mm]					
PVL 140	200	232	70	32	140	9
PVL 120	160	182	50	22	120	6
PVL 100					100	
PVL 80					80	
PVL 60					60	

3. Principles of design

2.10. Structural behavior

PVL Connecting Loop resists shear forces with ”a tension bar”, which consists of loops and the vertical rebar in the joint, and ”a compression bar”, which forms between the edges of the recess boxes from concrete.

2.10.1. Resistance

The resistances of PVL Connecting Loop connections are defined according to loop spacing and compression strength of the concrete grout in the joint. Resistances are calculated according to Eurocode 2 parts 1-1 and 1-2.

Table 5.1.1. Design Shear resistance V_{Rd} [kN/m] of PVL 60, 80, 100 and 120 Wire loop for the joint

Table 3. Design Shear resistance V_{Rd} [kN/m] of PVL 60, PVL 80, PVL 100 and PVL 120 Wire Loop for the joint described in Picture 2, Annex A, Additional reinforcement.

Concrete strength (EC 2)	Spacing of loops [mm]										
	250	300	350	400	450	500	550	600	650	700	750
C25/30	153	132	116	105	96	89	83	78	74	70	67
C30/37	156	134	119	107	99	91	86	81	77	73	70
C35/45	158	137	122	110	101	94	88	83	79	76	73
C40/50	162	141	126	114	105	98	92	88	83	80	77
C45/55	165	144	128	117	108	101	95	90	86	83	80
C50/60	168	146	131	120	111	104	98	93	89	85	82

Table 4. Design Shear resistance V_{Rd} [kN/m] of PVL 140 Wire Loop for the joint described in Picture 2, Annex A, Additional reinforcement.

Concrete strength (EC 2)	Spacing of loops [mm]							
	350	400	450	500	550	600	650	700
C25/30	170	153	137	123	112	103	96	90
C30/37	185	165	148	134	121	111	103	97
C35/45	197	177	158	143	130	119	110	103
C40/50	209	188	167	151	138	128	117	109

Table 5.1.2. Design Shear resistance V_{Rd} [kN/m] of PVL 140 Wire loop for the joint

PVL Wire Loop is selected according to wall thickness and joint width. Generally PVL 80 is used for non-load bearing walls and PVL 120 for load bearing / stiffening walls. PVL 140 is used for higher loads in load bearing and stiff ening structures.

Spacing of PVL Wire Loops is selected according to shear force effecting to the joint in ultimate limit state.

Shear resistance in direction perpendicular to the wall panels surface depends on the shape of the cross-section of the joint and reinforcement of the panels around the joint.

Concrete dowel defines the shear resistance perpendicular to the wall.

Picture 4. Shear force perpendicular to the joint.

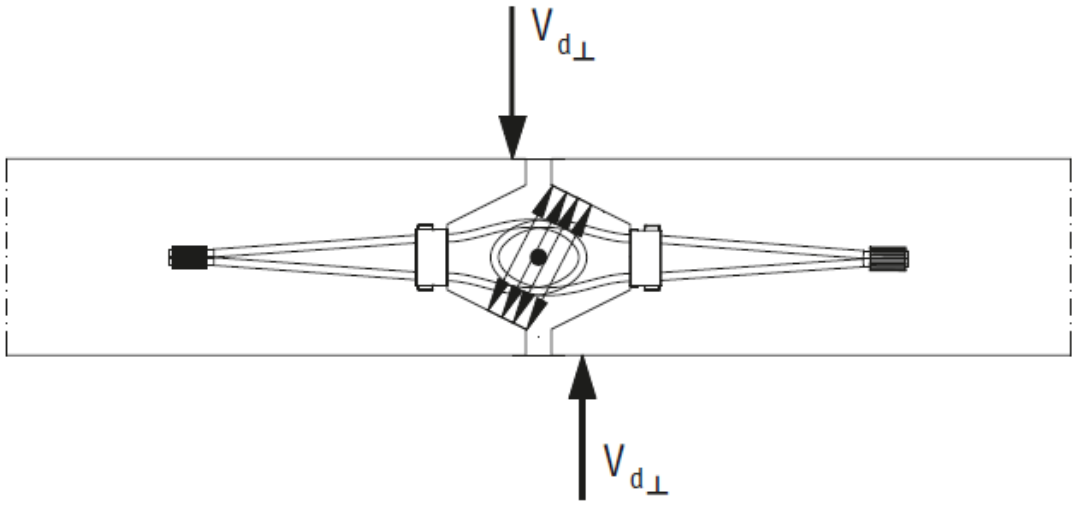
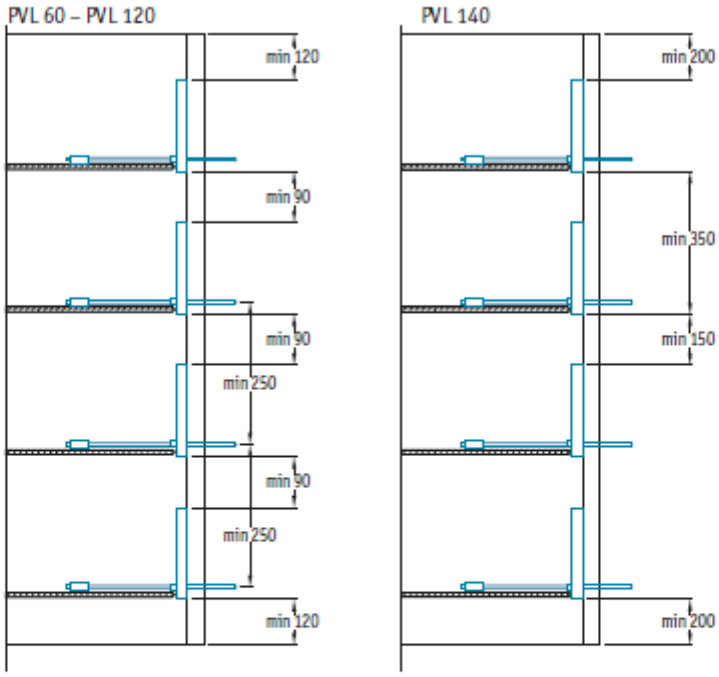


Figure 5.1. Shear force perpendicular to the joint

2.11. Position of PVL-loops in jointing

Figure 5.2.1. Minimum distance for PVL

Picture 2. Minimum distances for PVL Connecting Loop.



Picture 3. Height tolerance of the loops [mm].

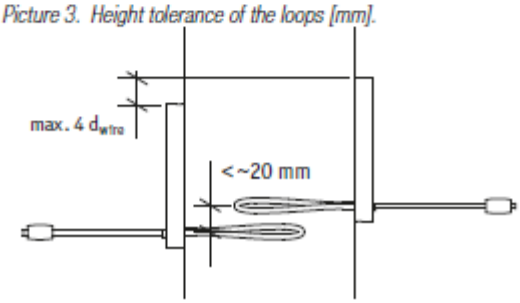


Figure 5.2.2. Height tolerance of the loops (mm)

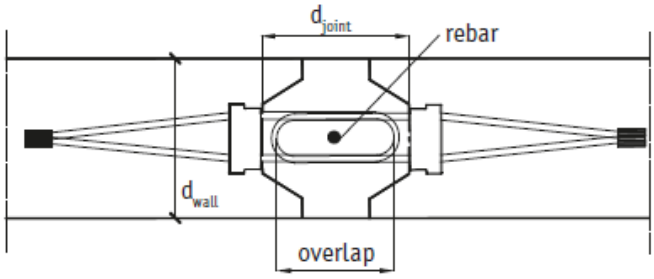
2.12. Interaction in the joint

The minimum value for the thickness of the wall panels and the ideal joint width is given in Table 5.3.

Table 5.3. Minimum value for thickness of the wall panels and ideal joint width

Table 1. Minimum value for thickness of the wall panels and ideal joint width.

PVL	d_{wall}	d_{joint} [mm]	overlap L
PVL 140	150	160	120
PVL120	80	140	100
PVL 100	80	120	80
PVL 80	80	100	60
PVL 60	80	80	40



2.13. Additional reinforcement

Reinforcement: B500B.

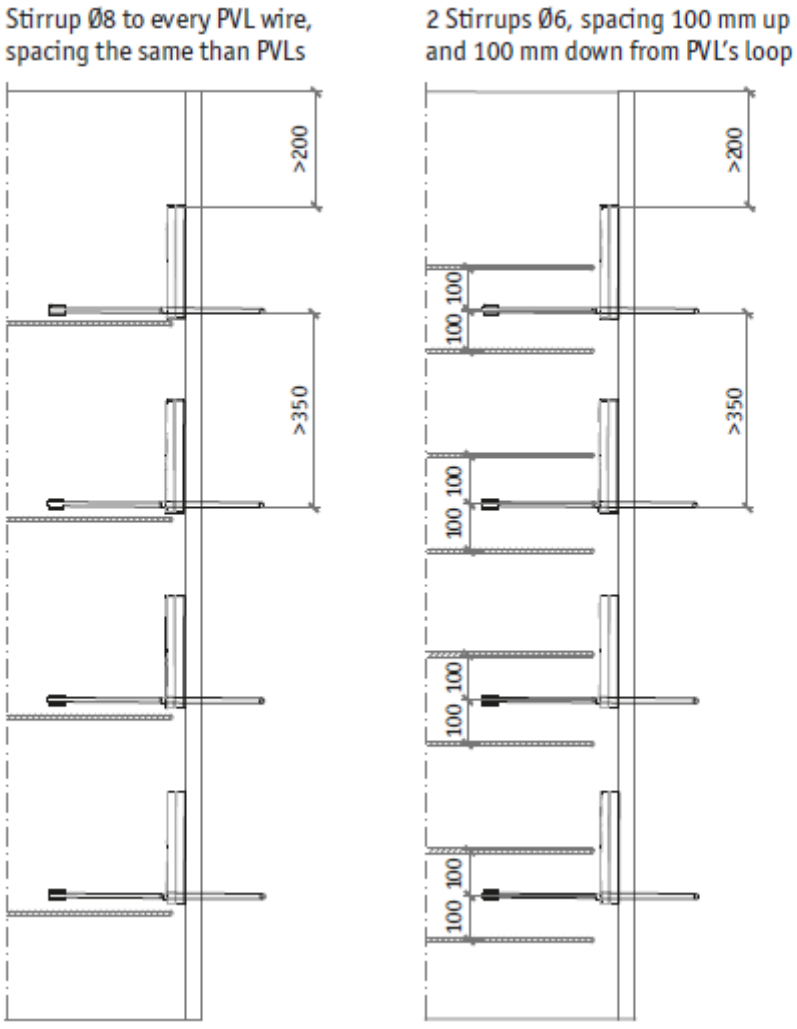


Figure 5.4.1. Additional reinforcement

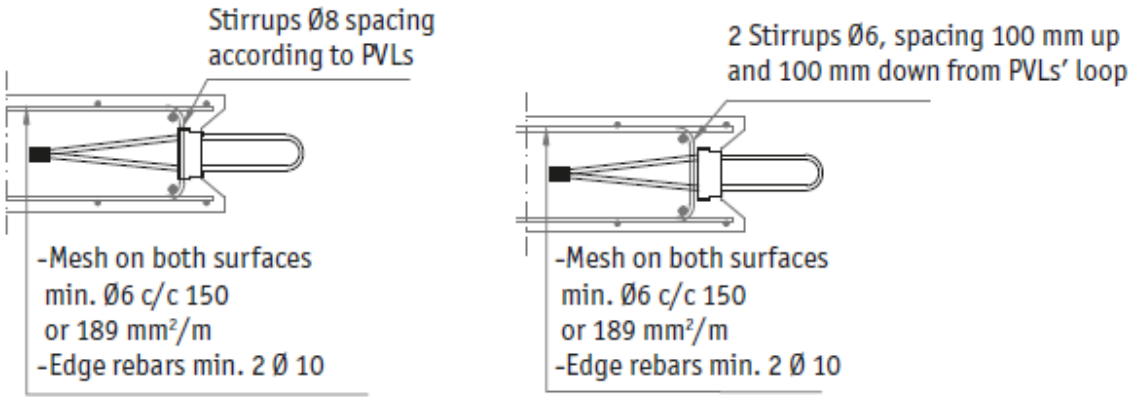


Figure 5.4.2. Additional reinforcement (stirrups)

2.14. Installation of PVL Connecting Loop

2.14.1. In precast factory

PVL Connecting Loops are fixed to the formwork with nails. The common way is to make a plywood strip, which forms the recess shape to wall paneling. Then PVLs are nailed with correct spacing to this reusable plywood strip.

When concrete has hardened and the formwork is removed, protective tapes can be removed and loops opened for example with hammer. Due to the patented structure of the wire, loops will remain in opened horizontal position.

Figure 5.5.1. Installation in precast factory
Figure 5.5.2. Installation on construction site

2.14.2. On construction site

Wall panels are installed according to plans and supported. The vertical rebar is installed into a joint, and the horizontal position of the loops is checked. After the formwork has been done, concrete grout is poured or pumped into the joint.

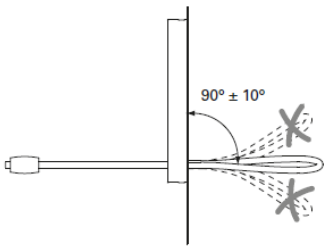


Figure 5.5.3. 3 open-close bendings takes place.
NOTE: Wire maintains its full strength in normal use, where maximum 3 open-close bending takes place.

4. Technical manual

This specification is applicable to the construction of metal products, consisting of high-strength steel wire and galvanized metal body of the Finnish company PEIKKO (hereinafter rope loop PVL), for connecting precast concrete wall elements together vertically.

Wire loop PVL is produced in a specialized factory with automation equipment and is designed for installation in the wall construction elements for sensing the shear forces which arise in the junctions of wall panels.

Wire loop PVL may be used only for connections of wall anchors or precast concrete products in which the transverse forces are transmitted predominantly parallel to the static load and / or perpendicular to the seam. Systematic tensile stresses in the seam (at the level of structural elements) should be excluded or taken through the adoption of additional measures.

The list is of documents to which these links, or that are used in the preparation of this specification are given in Appendix 1 of this specification.

Rope loop PVL is set to normal, reinforced concrete, which has the minimum strength class C25/30 and maximum - S50/60 in accordance with EN 206-1:2000-07 ÷ B55 or B25 for SP 52-101-2003, GOST 25192-82.

Constructively the rope loop PVL has a high-strength steel wire, Galvanized sheet steel, steel clamp and a metal lock. The ends of the wire are summarized in parallel in one direction and are crimped together by a metal clip - thus formed loop is threaded through the hole in the bottom of the metal body and fixed in position by the metal lock, which in turn is fixed in the same bore. During the production of reinforced concrete element, the connecting part of the loop inside the metal case is closed and the plastic top cover is attached to the body with tape. A general view of the junction of wall panels using rope loops PVL is given in Appendix 2, the elements and dimensions of cable loops PVL also given in Appendix 2.

2.15. Technical requirements

Wire loop PVL must meet the requirements of this specification.

The product should be constructed in accordance with the requirements of these specifications and technical documentation approved in the established order.

The composition and value of the product specifications, requirements for which are set in the specifications and documentation shall comply with the conditions provided for use in the construction of buildings or structures, as well as the conditions of manufacture, storage, transportation and installation.

In the manufacture of wire loops PVL the materials should be used as listed in these specifications.

2.15.1. The requirements for the source materials.

The product is manufactured from galvanized sheet steel Q195 by mechanical cutting and creasing according to the standard GB / T 700-1988 (China) or steel grade S185 standard EN 10025-2: 2004 (Europe) or steel St0 GOST 380-94 (Russian).

Loop products are made of high-strength steel (1770 N/mm2 6x19 + SE) in accordance with DIN 3060 (Europe) or GOST 3070-88 (Russia) by mechanical cutting and crimping collar. Material Grade clamp - 16Mn in accordance with standard GB / T 1591-94 (China) or S355J0 standard EN 10025-2: 2004 (Europe) or steel 17GS GOST 19281-89 (Russia).

Lock products are made of:

- Q235 steel grade in accordance with standard GB / T 700-1988 (China) or S235JR standard EN 10025-2: 2004 (Europe) or St3ps or GOST 380-94 (Russia);
- Magnesium alloy AZ91D standard EN 1753-1997 (Europe) or MA8ts GOST 2581-78 (Russia);
- Plastic top cover is made of ABS plastic in accordance with GB 12672-1990 (China) or ABS plastic TU 2214-019-00203521-96 (Russia);
- Wire loop PVL and its components shall conform to the drawings and be specified in these specifications.

2.15.2. Basic requirements for the application and design

Rope loop PVL is used to connect the wall concrete panels together vertically and are used for the perception and transmission of static and quasi-static loads.

Rope loop PVL must take into account the Seismology of the construction site (SNIP II-7-81) and the current classification by the level of responsibility (Federal Law of 30.12.2009 № 384-FZ). Examples of determining the possibility of using rope loops to the respective PVL SNIP II-7-81 and the Federal Law of 30.12.2009 № 384-FZ are given in Appendix 3 of this specification.

Rope loop PVL is determined in accordance with the manufacturer's instructions for installation and data specifications.

The distance between the end faces (recessed portion) abutting panels should be in the range of from 80 mm to 140 mm (distance D in Figure 5 of appendix 2).

Tether loop type is selected depending on the distance D between the end surface of the element (see 1.2.4.).

The wall thickness of the finished parts made of reinforced concrete should be at least 140 mm. When transferring shear forces perpendicular to the seam the minimum wall thickness should be increased to 180 mm.

Existing connection elements made of reinforced concrete must endure the shear force perpendicular and / or parallel to the seam from predominantly static load. The tensile stresses in the seam (at the level of structural elements) should be excluded or taken through the adoption of additional measures.

The strength of cement injected into the compound should be at least class C25/30 (B25) in accordance with EN 206-1:2000-07 or SP 52-101-2003, GOST 25192-82.

The height of the joint must be no more than 3.5 meters. Seams greater height are permitted only if the subsequent filling of seams is produced in lengths of 3.5 m with the filling hose.

The step installation of cable loops PVL varies between 250 ÷ 750 mm between the loops.

The compound should be reinforced by concrete elements according to the draft. The vertical rebar should go through all the holes formed overlapping the opposite rope loops (Appendix 2, page 18, figure 3). The minimum diameter of the rebar is 12 mm. Rope loop PVL should be installed with the valve overlap of the product. When installing the rope loops PVL increments of 250 - 400 mm, the wall panel must be reinforced mesh with the side of the cell and 150 mm diameter rods in 6 mm. Rope loop PVL is additionally reinforced with U-shaped clips on each side of the connection. If the step installation of cable loops PVL is 450 - 700 mm, additional reinforcement U-shaped clamps can not be produced. Also, they do not require additional reinforcement, if the step is set higher than 700 mm. If the rope loop PVL is set at an angle of 90 º to the plane of the plate (Appendix 2, figure 4), a compound necessary to cement reinforcing bar is ds = 10 mm.

Calculation and design of connections with the cable loops PVL should be made on the basis of the strength of concrete and the adjustment ranges of cable loops PVL, in accordance with the recommendations and estimates on sheets 20-25 Annex 3. The basis for the method of calculation and design of the compound wall panel with the cable loops PVL are the requirements and guidance EN 1992-1-1:2004 (E) with those obtained by testing the results described in Section 1.2.13.

For the rated carrying capacity of the junction with the use of cable loops PVL under various conditions of uploading the following tests are made:

- Shear strength parallel to the vertical seam in the different steps of the loops 250 ÷ 750 mm and a concrete class C25/30 (B25) ÷ S50/60 (B55), the distance between the end panels on top of D = 120 mm (see Section 1.2.4);

- Tensile strength in the plane of the wall panels and parallel rope loop by concrete classes C20/25 (B20) and the distance between the end panels on top of D = 120 mm (see section 1.2.4), step loops 300 mm;

- Shear perpendicular to suture when the distance between the end surface panels D = 80 mm (see paragraph 1.2.4) and the intervals between the centers of the loops 300 mm, grade concrete C30/37;

In determining the carrying capacity of the connection the necessary safety factors in accordance with the design documentation and applicable regulations should be taken into consideration.

Additional stresses on the temperature and weather conditions in the material interface should be deleted. If you can not exclude the additional stresses in the connection of prefabricated elements of reinforced concrete from temperature changes or inclement weather, it is necessary to confirm that the connection area of prefabricated elements of reinforced concrete crack opening width due to the action of these stresses is limited to wk ≤ 0,3 mm.

With the formation of cracks due to shear forces parallel to the seam width counted cracking wk = 0,1 mm.

Calculation and design of connections with the cable loops PVL should be performed by competent professionals.

Location and binding rope loops in PVL panel design is indicated on the design drawings and documentation.

2.15.3. Installation requirements

Installation should only be performed by qualified personnel under the supervision of the responsible technical personnel in accordance with the requirements of project documents, this specification and the manufacturer's instructions.

Rope loop PVL is attached to the formwork using nails that are driven through specially prepared holes in the body. Joining the crimped end of the loop with the valve wall element is not required. During the production of the wall element, the connecting part of the loop inside the metal case is closed and the plastic top cover attached to the body with the aid of tape.

To limit the additional deformation due to shrinkage of the finished parts before releasing, stored under appropriate conditions.

When installing the concrete elements overlapping loops are connected in such a way that rebar could pass between. Rope loops should be installed directly opposite to each other (the maximum level difference of heights in rope loops can not be more than 20 mm). Rebar is passed through the holes formed due to the overlap of opposing loops. The corresponding diagrams are shown in Appendix 2.

Pouring concrete in vertical connection should be made as quickly as possible. Application of the solution, the setting process is already started, and the restoration of its plasticity by adding water is not allowed. Installation of each upper-tier panel lot storey building should be done after the concrete (solution) grouted joints designs strength stated in PPR (3.2 SNIP 3.03.01-87).

Concrete for filling joints is mixed according to the manufacturer's instructions and poured into the mix. Concrete for filling joints must meet the required specifications in the data characteristics.

2.15.4. The requirements for protective coating

Additional protective coating of finished articles is not needed because all materials used in the manufacture of rope loops PVL have the necessary corrosion resistance.

2.15.5. The requirements for fire resistance

Fire rating of cable loops PVL must meet the requirements of the design documentation for structures for fire resistance in accordance with applicable building codes in terms of providing for fire protection of reinforced concrete structures and products.

In the event of a claim on the overall design in terms of saving time fire position DIN 4102-4:1994-03 operate in conjunction with DIN 4102-22:2004-11 (Europe) and SNIP 21-01-97, SP 52 -101 - 2003 (Russia).

If the compound is used in load-bearing structures exposed to high temperatures, it is necessary to create a layer of concrete to protect the rope loop from heating to the critical temperature of 350 º TCR = S.

2.15.6. Requirements for geometric accuracy

The type and size of loops trossovyh PVL must comply with the specifications on sheet 2 of Annex 2.

The tolerated dimensions of cable loops PVL should not exceed the values given in this specification:

Length of steel cable ± 20 mm;
The length of the sheet metal body ± 3 mm (EN ISO 9013 - 442);
The width of the sheet metal body ± 3 mm (EN ISO 9013 - 442);
The height of the metal case ± 2 mm (EN ISO 13920-BF);
The width of the metal case ± 2 mm (EN ISO 13920-BF

2.15.7. Completeness and supply conditions

Rope loop PVL should be delivered in accordance with the agreement (contract) for delivery.

The package should include:

Made rope loop PVL;
A document on the quality of products (passport) and shipping documentation;
Illustrated instructions for installation.

The certificate must contain the following:

Symbol of the production - rope loops PVL (labeling);
Manufacturer's name or trademark;
The name of the consumer;
Order number;
The batch number;
The number of cable loops PVL in each package and the party;
The number of technical specifications;
The date of manufacture;
Stamp Department.
List of documents about the quality of the materials used for the manufacture of cable loops PVL

Rope loop is delivered in batches, belonging to a single work order.

2.15.8. Packaging

Rope loop PVL must be supplied in the original container, stored and transported in accordance with the instructions provided by the manufacturer, following measures to avoid the change of geometric shapes, pollution, and to ensure the safety of the appearance of the structures at the time of loading, unloading and storage.

The maximum packet sizes and box pallets must meet the transport w / traffic, water, road and air transport requirements applicable to these types of vehicles.

Means of transport cargo in bond packages operate according to GOST 21650.

2.15.9. Labeling

Marking rope loop PVL depends on its type. Each product must be stamped in accordance with the plant leaf 2 of Annex 2.

Each batch of product is supplied with tag: paper, metal or plastic.

The label states:
The name or trademark of the manufacturer;
The address of the manufacturer;
The name and brand of the product;
The date of manufacture;
The basic rules of handling, storage and transportation;
The mass of products included;
The number of this specification;
Number of the document authorizing the sale and use in construction (certificate of conformity);

Symbols on the tags must also meet the requirements of the Regulation on the international mark of conformity.

2.16. The requirements of environmental protection and production safety

The production of rope loops PVL Peikko is guided by the rules and safety standards:

- GOST 30775-2001 "Waste Management. Classification, identification and coding of waste. General Provisions ";
- GOST 12.1.004-94 "SSBT. Fire safety. General requirements ";
- GOST 12.1.019-79 "SSBT. Electrical safety. General requirements and range of types of protection ";
- GOST12.2.029-88 "Adaptations. Safety requirements ";
- GOST 12.2.107-85 "SSBT. Noise. Metal-cutting machine. Allowable noise characteristics. "

When servicing equipment is special care and accuracy is needed. Maintenance of equipment should be made not less frequently than every 100 hours of operation.

The general condition of electrical, welding and machining equipment, and automated equipment is checked each time before use.

Workplaces must be provided with personal protective equipment in accordance with safe working conditions.

2.17. Rules of admission

1) The manufacturer shall check the quality of the products and provide the buyer with information on the performance of this test.

The check is done in the process of receiving batches of finished products by technical control of the manufacturer.

The composition of the product includes a batch type, now successively produced by the same technology for not more than one day, one kind of material. In the manufacture of parts or irregularly in a small amount while ensuring the uniformity of product quality in the batch it is allowed to include products made for several days, but no more than one week.

The purpose of monitoring the quality of cable loops PVL is to ensure product compliance with this specification. The manufacturer is free to use for the manufacture of cable loops PVL only those raw materials that are specified in the technical documentation to these specifications.
2) During manufacturing ropes loop PVL main task is the sample size section and length.
3) When accepting the rope loops made PVL should be possible to their inspection and control of all measurements and inspections. Acceptance inspection should be carried out for each batch of products. The tests should be carried out on five randomly selected controls from 1000 pieces. Finished rope loops in an accredited laboratory.
4) The results of factory production control are recorded and evaluated. The protocols include, at a minimum, the following information:

- Identify the products, basic materials and components;
- Type of control or testing;
- The date of production and date of the test product or basic material and components;
- The results of monitoring and testing. If necessary - a comparison with the applicable requirements;
- Signature of person responsible for the conduct of the factory production control.

5) Made rope loop PVL, in which there was a discrepancy between the requirements of this specification and SP 53-101-98, returned to the correction of defects, and then imposed on the acceptance again.

2.18. Methods of control

The manufacturer must carry out continuous monitoring of the quality of products, including factory production control and additional sample testing at the factory.

The factory quality control at the factory includes:

- Testing of materials for compliance with the specifications indicated in the certification documents provided by the manufacturer of materials;
- Inspection and testing during the manufacturing process is carried out by the manufacturer in accordance with the rules and standards established in the documentation of the manufacturer, adapted to the technology used to produce products with the desired characteristics.

Linear dimensions are tested by a measuring tool: a caliper according to GOST 166-89, GOST metal tape measure 7502-98, measuring scale according to GOST 427-75.

The results of factory production control have systematically logged tests. Each batch of products should be recorded in the log of tests.

The mark, chemical composition and mechanical properties of materials for the manufacture of cable loops PVL documents must be certified by the quality of the supplier.

The quality of the materials used is checked by comparing them with the requirements specified in the certificate and standards.

Checking the bearing capacity of the cable loops and connections using rope loops PVL is on the certified equipment.

The frequency of controls and tests performed during production, should be specified in the schedule of control, taking into account the features of the process of production.

The certification body shall establish, in accordance with the schedule of control, in particular the staff and equipment, and the factory production control system provides continuous and orderly process of production in accordance with these specifications.

The certification body visits the factory at least once a year and a half in order to control and confirm the operation of the system of factory production control and efficiency.

Ongoing monitoring and evaluation of the system of factory production control are carried out in accordance with the schedule of control.

The results of product certification and continuous monitoring are available upon request by certification or inspection bodies.

At default of the provisions of this TC and schedule control is revocation of conformity.

Labelling and packaging are checked by inspection.

2.19. Transportation and storage

The ready rope loop PVL is transported by any mode of transport in accordance with the rules and conditions of carriage of cargo loading and securing acting kind of transport. Bond packages of finished products should be conducted in accordance with GOST 21650-76.

Packaging rope loops PVL during transportation must be stacked on wooden or other material lining of uniform thickness of 50 mm, a width of 150 mm and a length greater than the overall size of packaging not less than 100 mm, located not less than 1.0 m.

Packaging during transport must be securely fastened and secured against movement and mechanical effects.

The conditions of transportation and storage of rope loops PVL at the impacts of climate factors of the environment must comply with the terms of 5 to GOST 15150-69. Do not store items in an open area.

2.20. Notes on operation

Installation of cable loops PVL should be in accordance with the instructions given in these specifications and design documents.

Mounted in concrete structures rope loop PVL must be operated under load and the conditions provided for project documentation.

Supervision of the technical state of the exploited concrete structures that contain rope loop PVL must be in accordance with the requirements of normative documents on the technical operation of structures, buildings and structures.

2.21. Manufacturer's warranty

The manufacturer guarantees the finished rope loops PVL requirements of this specification in the conditions of transportation, storage, instructions for use, installation and operation.

The guaranteed shelf life of cable loops PVL is 24 months from date of manufacture, the warranty period is 12 months from the date of commissioning, but not more than 36 months from the date of shipment to the manufacturer.

5. The calculation test (according to EN 1992-1-1:2004)

The shift at the boundary interaction between concrete parts, cast at different times:

The calculation method reference to formulas and diagrams - EN 1992-1-1:2004 (Eurocode 2: Design of concrete structures. General rules and rules for buildings)

The shear stress at the boundary of the interaction between concrete parts, cast at different times, must satisfy the following:

$$V_{Edi} \le V_{Rdi}, \quad (6.23)$$

where:

V_{Edi} – calculated value of the shear stress at the boundary of the interaction is given by the formula:

$$V_{Edi} = \beta V_{Ed} / (z\, b_i), \quad (6.24)$$

where:

- β - the ratio of the longitudinal force in the area of new concrete to the general area of the longitudinal force in expansion or contraction, which in both cases are calculated for the section under consideration;
- V_{Ed} - transverse shear force;
- z - the lever arm of the composite section;
- b_i - border width interaction (see Figure 7);

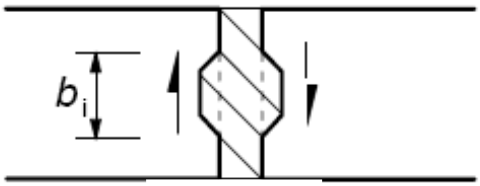


Figure 7 Design of concrete structers

Figure 7 Design of concrete strucreced

- V_{Rdi} - design shear resistance on the border of interaction, which is given by:

$$V_{Rdi} = c f_{ctd} + \mu\sigma_n + \rho f_{yd} + (\mu \sin\alpha + \cos\alpha) \le 0{,}5\, \nu f_{cd}, \quad (6.25)$$

where:

- c and μ - coefficients depending on the roughness of the interaction;
- f_{ctd} - the calculated value of the tensile force, which is given by:

$$f_{ctd} = \alpha_{ct} \times f_{ctk,0,05} / \gamma_c, \quad (3.15)$$

где:

γ_c - reliability coefficient of the concrete;

α_{ct} - safety factor that takes into account long-term effect tensile load and adverse conditions of load;

σ_n - stress per unit area generated by the minimum normal force perpendicular to the external boundary of the interaction, which operates simultaneously with the shear positive compression so σn <0,6 fcd, and negative for stretching. If σn is taken for stretching, cfctd should be set to 0;

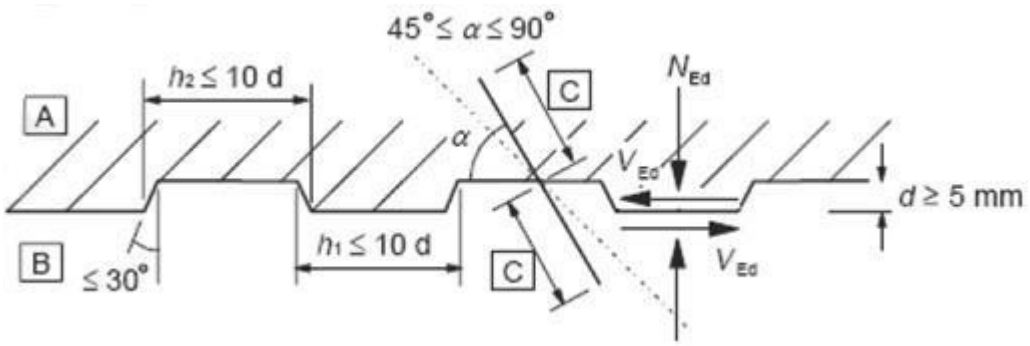
ρ $= A_s / A_i$;

A_s - area of reinforcement crossing the border interactions, including ordinary transverse reinforcement (if any), with sufficient anchoring on both sides of the border interaction;

A_i - weld area;

α - Set in Figure 10, and must have the following limitations: 45 ° ≤ α ≤ 90 °;

v - strength reduction factor shall be taken in accordance with paragraph 6.2.2 (6) EN 1992-1-1:2004;



A – new concrete, B – old concrete, C – anchorage

Figure 7.1. The seam concreting with projections

$V_{Rdi} = c \times f_{ctd} + \mu \times \sigma_n + A_s / A_i \times f_{yd} (\mu \times \sin \alpha + \cos \alpha)$,

where:

V_{Rdi} - design shear resistance N/mm^2 ;

c = a rough surface 0,40 ;

$f_{ctd} = \alpha_{ct} \times f_{ctk,0,05} / \gamma_c$,

α_{ct} = 0,85 ;

μ = 0,7 a rough surface;

σ_n = 0, with the proviso that the seam does not apply normal force;

$\rho = A_s / A_i$ = 0,000497 ,

A_s = 29,8 mm^2 ;

A_i = 60 000 mm^2 ;

α = 90 degrees, perpendicular to suture loop;

$$V_{ed} \leq \frac{V_{Rdi} \times (z \times b_i)}{\beta\ (=1)} ,$$

z = 1000 mm;

b_i = 60 mm ;

f_{yd} = f_{yw} / Y_s ,

f_{yd}= 1539,13 N/mm^2 ;

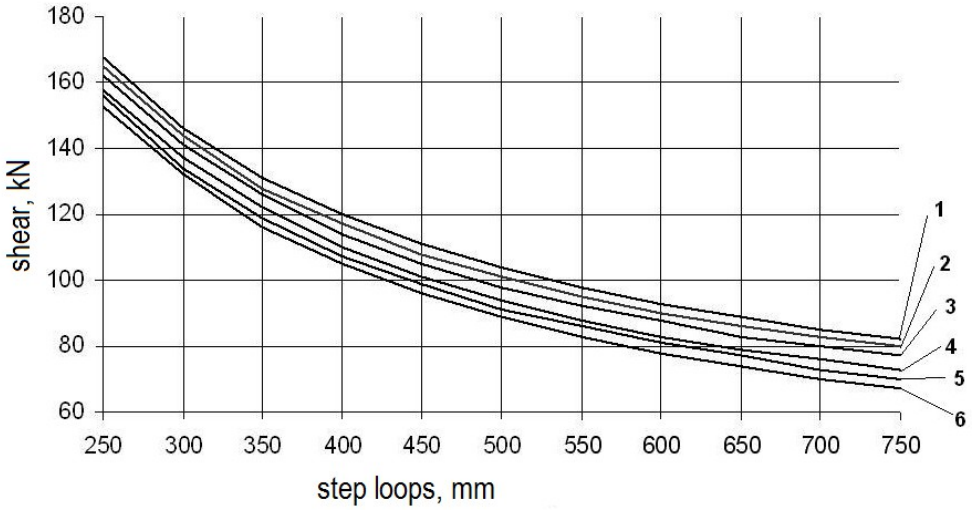
f_{yw}= 1770 N/mm^2 ;

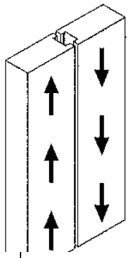
γ_s = 1,15 ;

γ_c = 1,5 ;

Testing Shear parallel vertical seam

Pattern for an effort and a plot of the shear resistance of the step loops for different types of concrete are shown in Figure 7.2.
Test results are summarized in Table 7.



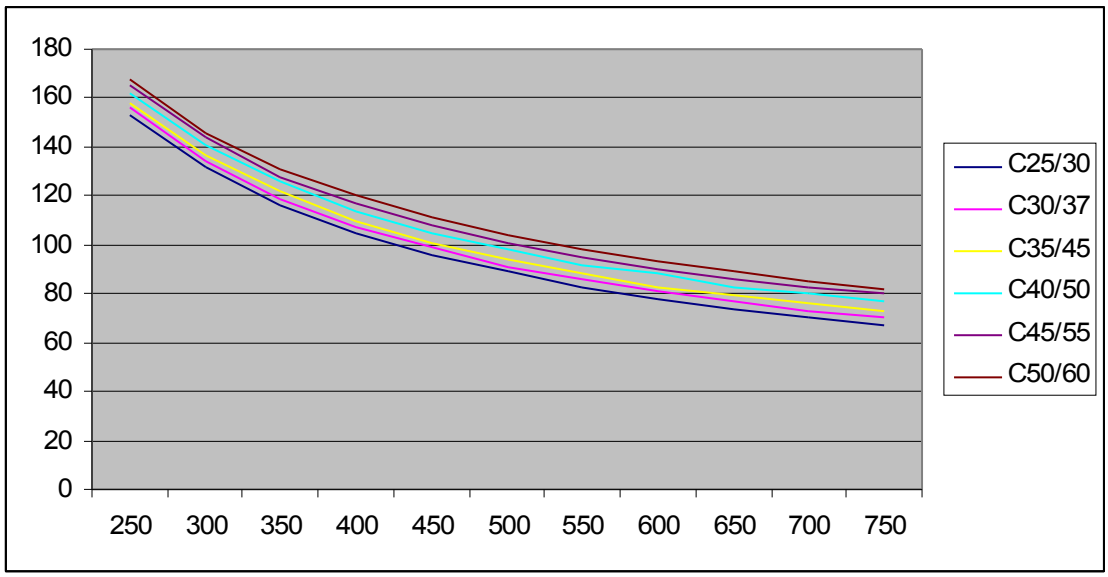


line number	the strength of concrete
1	C50/60
2	C45/55
3	C40/50
4	C35/45
5	C30/37
6	C25/30

Figure 7.2. Test results

Table 7: Resistance shear parallel to the vertical seam, kN:

the strength of concrete	250	300	350	400	450	500	550	600	650	700	750
C25/30	153	132	116	105	96	89	83	78	74	70	67
C30/37	156	134	119	107	99	91	86	81	77	73	70
C35/45	158	137	122	110	101	94	88	83	79	76	73
C40/50	162	141	126	114	105	98	92	88	83	80	77
C45/55	165	144	128	117	108	101	95	90	86	83	80
C50/60	168	146	131	120	111	104	98	93	89	85	82



Tensile test parallel to the wall panels and a wire loop wire

Scheme of conducting the test is shown in Figure 7.3.
Test conditions: concrete class C20/25 step loops 300 mm, the distance between the end faces of D (see section 1.2.4). 120 mm.

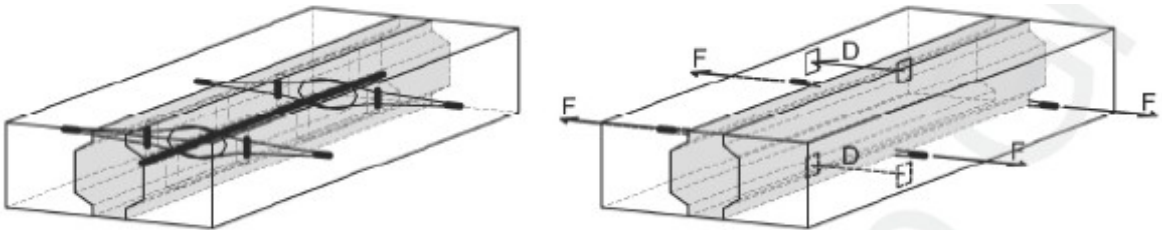


Figure 7.3. Scheme of tensile test parallel to the wall panels

In this laboratory test the strength of concrete was defined as 29 MPa - a cube 150x150x150.
Test results: from 41.4 kN to 45.1 kN for the two pairs of loops.
The results confirmed the condition of the calculation shown in Figure 13.

Shear Test perpendicular seam

Scheme of conducting the test is shown in Figure 7.4.
Test conditions: concrete class C30/37, step loops 300 mm, the distance between the end faces of D (see Section 1.2.4). 80mm.

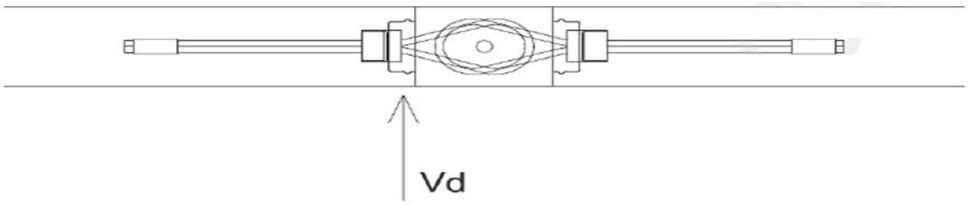


Figure 7.4. Scheme of test perpendicular seam

The calculated shear strength: 2.8 kN / m, i.e. 0.93 kN for a couple of loops.

Examples of determining the applicability of the rope loops PVL in accordance with the seismic zoning.

Example 1:
The construction site - St. Petersburg.
Excerpt from the SNIP II-7-81 (Section 1.3, 1.4):

"Set of cards SRF-97 (A, B, C) can be assessed on three levels, the degree of seismic hazard and provides for the implementation of anti-seismic measures during construction of the three categories that take into account the responsibility of structures:
Map A - massive construction;

Maps B and C - the objects of increased responsibility and a very important objects.

The decision about which card in the design of a particular object is received by the customer on the proposal of the general designer, except as otherwise provided in other regulations. "

In accordance with the above, the cards OCP-97 and the table "List of settlements of the Russian Federation located in seismic areas, indicating the estimated seismic intensity scale in points M8K-64 for average soil conditions and three levels of seismic risk - A (10%) , B (5%), C (1%) for 50 years, "for St. Petersburg and Leningrad:

Map SRF-97	Balls
Map A	-
Map B	-
Map C	6

Thus, the use of cable loops PVL in St. Petersburg possible during construction of large-scale construction, as well as objects of increased responsibility (with proper

calculation and coordination). The exception is the special responsibility of subject matter covered in accordance with the Town Planning Code of the Russian Federation to the technically challenging, particularly dangerous or unique objects (Federal Law of 30.12.2009 № 384-FZ).
Example 2:
The construction site - Kizlyar, Dagestan.

In accordance with the cards SRF-97 and the table "List of settlements of the Russian Federation located in seismic areas ... "For the city of Kizlyar:

Map SRF-97	Balls
Map A	7
Map B	8
Map C	8

Thus, the use of cable loops PVL in Kizlyar is not possible.

6. Conclusion

Availability of technical conditions for the production of this document is indispensable. This greatly simplifies the work of many companies, as well as the logistics companies. Suppliers can show customers real product data, found in the laboratory that makes it easier for everyone. To create the technical conditions requires a lot of time.

The current technical specifications are an integral part of the set product literature, to which they apply. Specifications, standard and technical regulations are the basic regulations on the basis of which the products are produced on the territory of Russia.

Development of technical conditions is required if :

-the conditions of production are not defined in GOST or technical regulations ;
-it is required to supplement standard or combine multiple requirements of different rules existing state standards.

Developed technical specifications replace and complement the guests, making it easier to use for manufacturers and product developers, providing technical

conditions necessary for the execution of documents certifying the quality of the products. The certification for compliance with the specifications: a certificate of conformity, declaration of conformity , certificate of state registration of Epidemiology.

The process for obtaining specifications consists of the following steps :

-Providing descriptions of product manufacture;
-Development of technical specifications ;
-Coordination and approval ;
-Registration in case of need.

The product description of production should not be limited to generalities - it should indicate the name, the look and the list of modifications (if any). In addition it should provide instructions for use, detailed diagrams, drawings, and specification products. And a list of all the components is desirable to provide certificates for them. You may also want to specify the procedure of industrial control manufacturer for acceptance - what methods and means tests applied. Need and description of packaging material, packaging techniques, a list of documents are invested in the package. Parameters of transportation and means of transport should also be reflected in the specification, as well as the requirements for storage, maintenance and, of course, the warranty periods.

For the production of mechanical engineering and instrument making a fundamental document for the development of specifications is a specification , and for substances and materials, prescription or process of the document.

The main part of TS is always the sections that go in a strict sequence:

technical requirements;
safety requirements;
acceptance rules ;
transport and storage conditions ,
labeling requirements ;
methods of control ;
instructions for use;
the manufacturer's warranty .

Coordination and approval

Featuring a draft document is approved by the customer . Reconciliation should not exceed twenty days from the receipt of the customer. The title page of the signature of the head of an organization classified as «Agreed». The approval of specifications is provided by the developer of the document. The title page shall

be signed by the head stamped «Approved». Any change in the technical specifications is agreed upon and approved in the same order.

TS has designed a unique number - the code of nomenclature for GST , registration number assigned to the developer, the developer's code Enterprise All-Russian classifier organizations (OKPO) and the last two digits of the year of approval of the document , which is submitted in a single register specifications.

In conclusion, on the calculation that I cite in comparison: calculation of the Eurocodes is easier and more constructive. It is much easier and faster than the one in Russia.

The invention relates to the construction and can be used to connect the wall panels to the supporting structures of buildings in areas of high seismic activity. The invention is aimed at reducing the production of a bonded joint of metal wall panels with columns and reducing the complexity of their installation. A disadvantage of the above invention is that the compound does not act as retention panel from moving panel in a vertical plane and in a horizontal holding plane, i.e. pressing it to another panel.

The invention decreases metal compounds and simplifies installation.
The problem is solved in that the panels have a recess which provides access to one of the rebars. The column has a through hole from the front to the back wall at a predetermined height , while the side wall panels have a conical expansion orifice. On the opposite side extension to accommodate the fastener , wherein each connecting element is a flexible closed loop. One end binds reinforcement wall panel and the other is passed through the through hole in the casing and fixed to mounting member configured to form a trident whose tooth on average dressing the second end of the flexible closed loop.

7. Figures

8. Tables

REFERENCES

Peikko PVL loops brochure

Peikko production drawings for PVL loops

Baikov V.N. 1991. Reinforced concrete design textbook for high schools. Moscow. Stroyizdat.

Kylakova N.A. 2008. Reinforced Concrete Structures. Common course. Moscow. Methodical instructions of the Russian State University of Railway Transport

EN 1992-1-1:2004 Design of concrete structures

SNIP 52-01-2003 Concrete and reinforced concrete

SP 63.13330.2012 Concrete and reinforced concrete

ADDITIONAL SOURES

Specifications
http://www.gosttest.ru/41/

Specifications. Content
http://www.pi-ginf.ru/20

Connecting of wall panels
http://www.izmer-ls.ru/w/v84.html

Appendix 1

The list of technical documentation which provides links to technical conditions.

Document number	Document name
EN 206-1:2000-07	Concrete. General technical requirements, production and quality control
СП 52-101-2003	Concrete and reinforced concrete structures without prestressing reinforcement
GB/T 700-1988	Structural carbon steel
СНиП II-7-81*	Construction in seismic regions
Федеральный закон от 30.12.2009 № 384-ФЗ	Technical regulation on safety of buildings and structures.
ГОСТ 380-94	Common quality carbon steel.
DIN 3060	Galvanized steel 6x19
ГОСТ 3070-88	Steel rope-type construction 6x19 (1 +6 +12)
GB/T 1591-94	High-strength low-alloy structural steel
EN 10025-2: 2004	Hot rolled products of structural steels. Part 2. Technical delivery conditions for non-alloy structural steels
EN 1753-1997	Magnesium and magnesium alloys - Magnesium alloy ingots and castings
ГОСТ 2581-78	Magnesium alloys in ingots. specifications
ГОСТ 19281-89	Rental of high-strength steel. General specifications
GB 12672-1990	Acrylonitrile-butadiene-styrene (ABS) resin.
ТУ 2214-019-00203521-96	Acrylonitrile copolymers, ABS.
EN 206-1:2000-07	Concrete. Part 1: Specification, performance, production and conformity.
СНиП 3.03.01-87	Bearing and protecting designs.
DIN 4102-4:1994-03	Fire behavior of building materials and elements. Part 4: Overview and projecting classified building materials, elements and components.
DIN 4102-22:2004-11	Fire behavior of building materials and building components. Part 22: Application of the standard DIN 4102-4 based on the design of partial safety factors.
СНиП 21-01-97	Fire safety of buildings and structures
ГОСТ 25192-82	Concretes. Classification. General technical requirements.
СП 53-101-98	Production and quality control of steel constructions
ГОСТ 21650-76	Bond funds unitized cargo in transport packets. general requirements

ГОСТ 30775-2001	Waste management. Classification, identification and coding of waste. fundamentals
ГОСТ 12.1.004-94	Fire safety. general requirements
ГОСТ 12.1.019-79	Electrical safety. General requirements and range of species protection
ГОСТ 12.2.029-88	Adaptations. safety requirements
ГОСТ 12.2.107-85	Noise. Metal-cutting machine. Allowable noise characteristics.
ГОСТ 166-89	Calipers. specifications
ГОСТ 7502-98	Metal measuring roulette. specifications
ГОСТ 427-75	Rulers measuring metal. specifications
ГОСТ 15150-69	Machinery, equipment and other industrial products. Versions for different climatic regions. Categories, operation, storage and transportation to the impact of climatic factors in the external environment

Appendix 2
Installation, size and reinforcement.

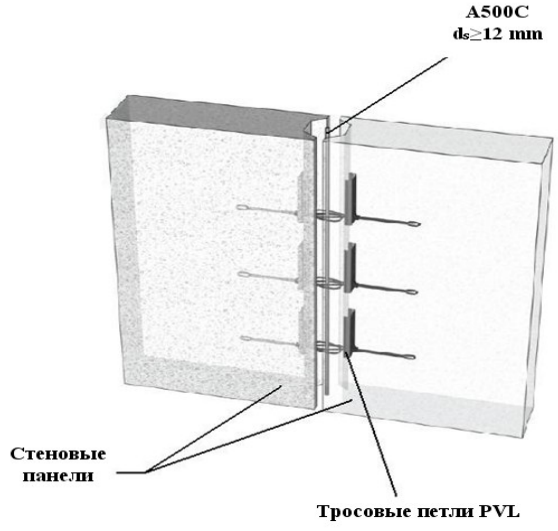
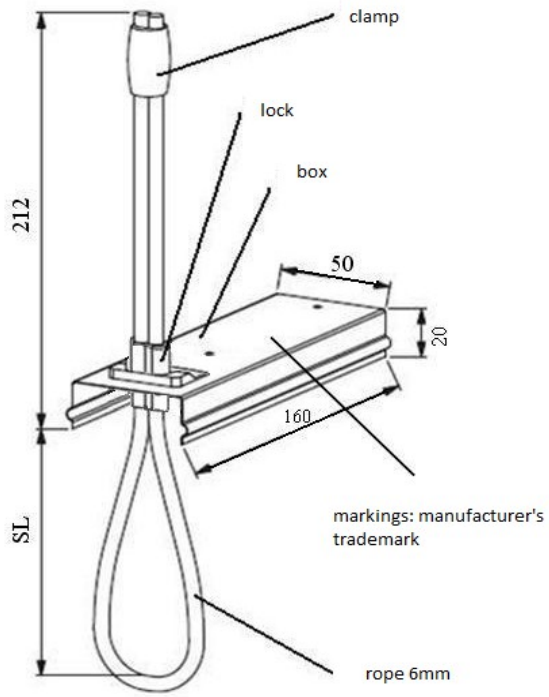
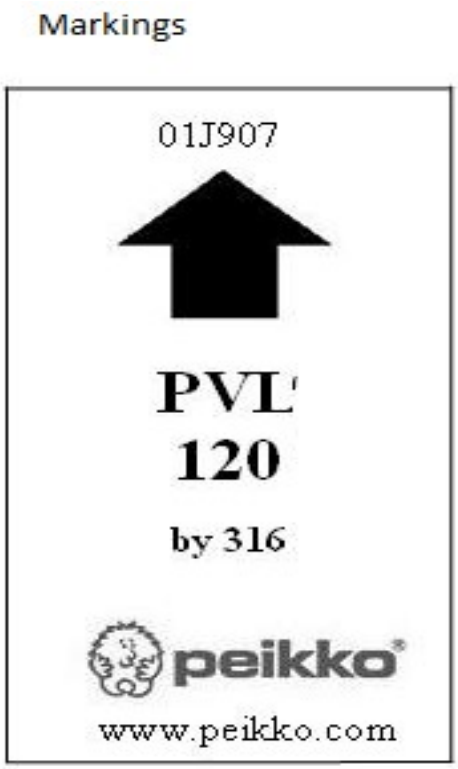


Figure 1. General view of the interface using rope loops PVL

Figure 2. Elements and dimensions of cable loops PVL, marking





Legend hallmarks:

- 01J907 - lot number
- The position of the product in construction (up arrow).

- Brand products

- By 316 - the number of approval
- The logo of the company Peikko
- Www.peikko.com - Web site Peikko

Dementions in мм

Brand loop	SL
PVL 120	120
PVL 100	100
PVL 80	80

Installation and reinforcement

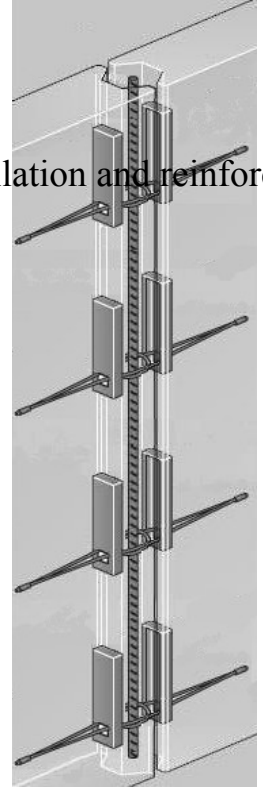


Figure 3

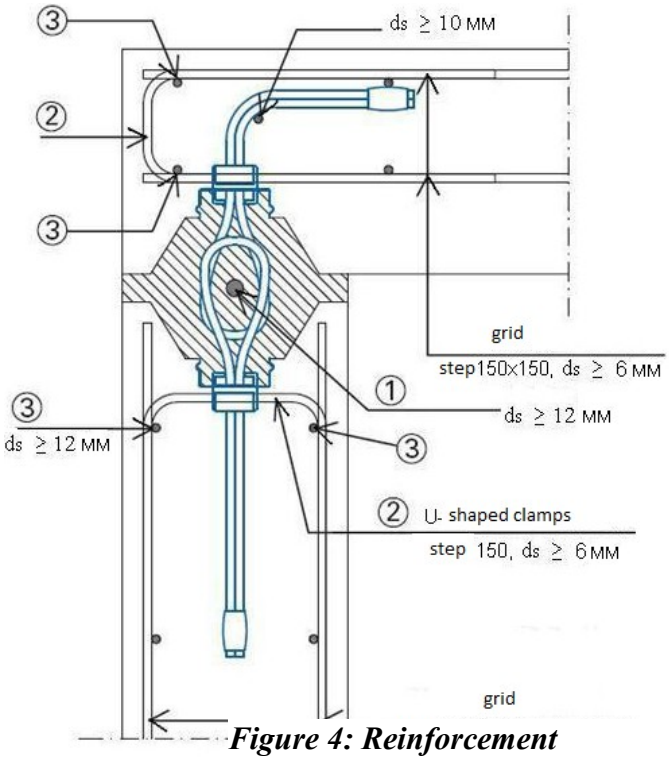
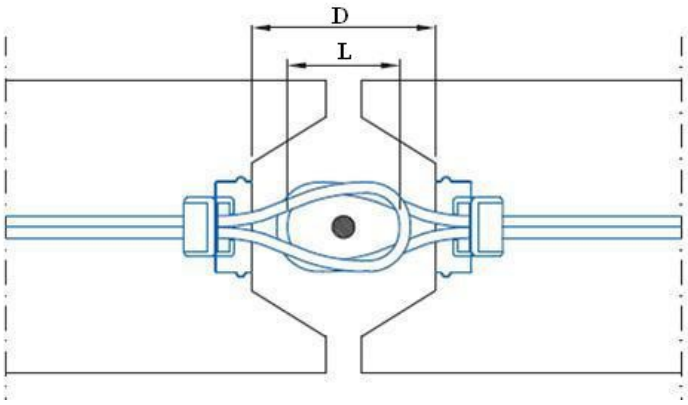


Figure 4: Reinforcement



D – the distance between the end faces (recessed part) the Dock ;
L – the value of the overlap

Figure 5

Table 2: The distance between the end faces (recessed portion) and the value of overlap mm.

Brand loop	D	L
PVL 120	140	100
PVL 100	120	80
PVL 80	100	60

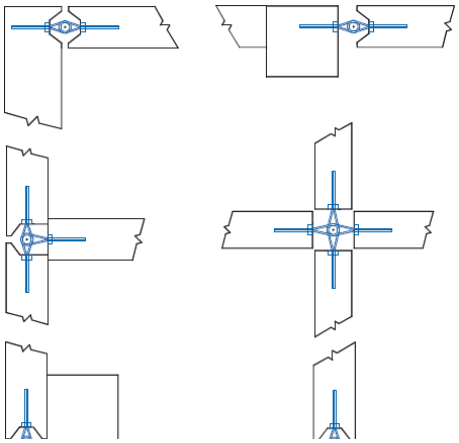


Figure 6. connection options with the cable loops PVL.

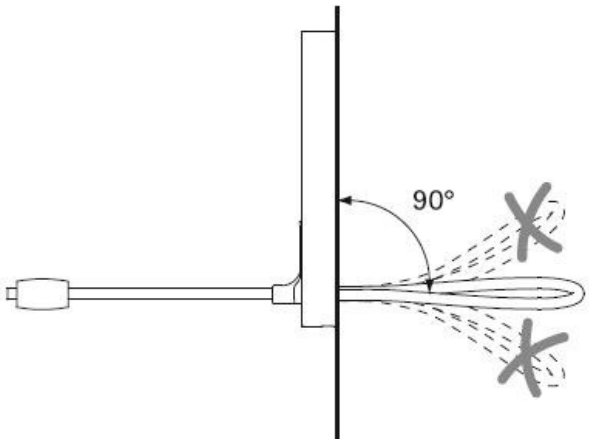


Figure 7. The correct position of hinge structure.

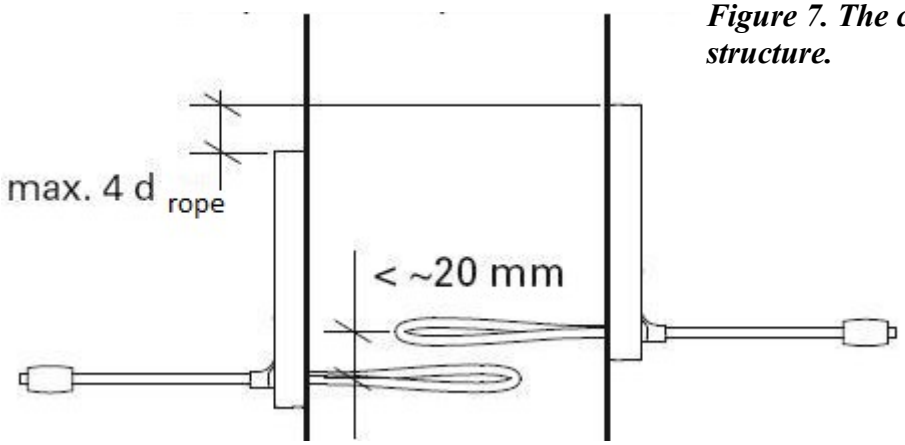


Figure 8. installation tolerances

РОССИЙСКАЯ ФЕДЕРАЦИЯ

СЕРТИФИКАТ СООТВЕТСТВИЯ

(обязательная сертификация)

№ C-RU.ПБ45.В.00091 (номер сертификата соответствия) ТР 0639699 (учетный номер бланка)

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ИЗГОТОВИТЕЛЬ (наименование и место нахождение изготовителя продукции) Открытое акционерное общество «Воздухотехника». Адрес: 121471, г. Москва, ул. Рябиновая, д. 40. ОГРН: 1037739426526. Телефон (495)447-01-11, факс (495)448-53-01.

ОРГАН ПО СЕРТИФИКАЦИИ (наименование и местонахождение органа по сертификации, выдавшего сертификат соответствия) "ПБ ВНИИНМАШ" ФГУП "ВНИИНМАШ". 123007, г. Москва, ул. Шеногина, д. 4, тел. (499)259-43-41, факс (499)259-88-62. ОГРН: 1037739388939, Аттестат рег. № ТРПБ.RU.ПБ45 выдан 14.04.2010г. МЧС России.

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код ОК 005 (ОКП) 48 5484

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СООТВЕТСТВУЕТ ТРЕБОВАНИЯМ ТЕХНИЧЕСКОГО РЕГЛАМЕНТА (ТЕХНИЧЕСКИХ РЕГЛАМЕНТОВ) (наименование технического регламента (технических регламентов), на соответствие требованиям которого (которых) проводилась сертификация) Технический регламент о требованиях пожарной безопасности (Федеральный закон от 22.07.2008 N 123-ФЗ)глава 31, статья 138, п.п. 2, 3.
(См. приложение № ТР 0076370)

ПРОВЕДЕННЫЕ ИССЛЕДОВАНИЯ (ИСПЫТАНИЯ) И ИЗМЕРЕНИЯ Протокол испытаний № С-1/08-2012 от 02.08.2012,ИЦ ПБ ООО «ЦИС НИИЖБ-ПОЛИГОН», 109428, г.Москва, Рязанский проспект, д. 22, корп. 2, рег. № ТРПБ.RU.ИН25 от 25.08.2010.

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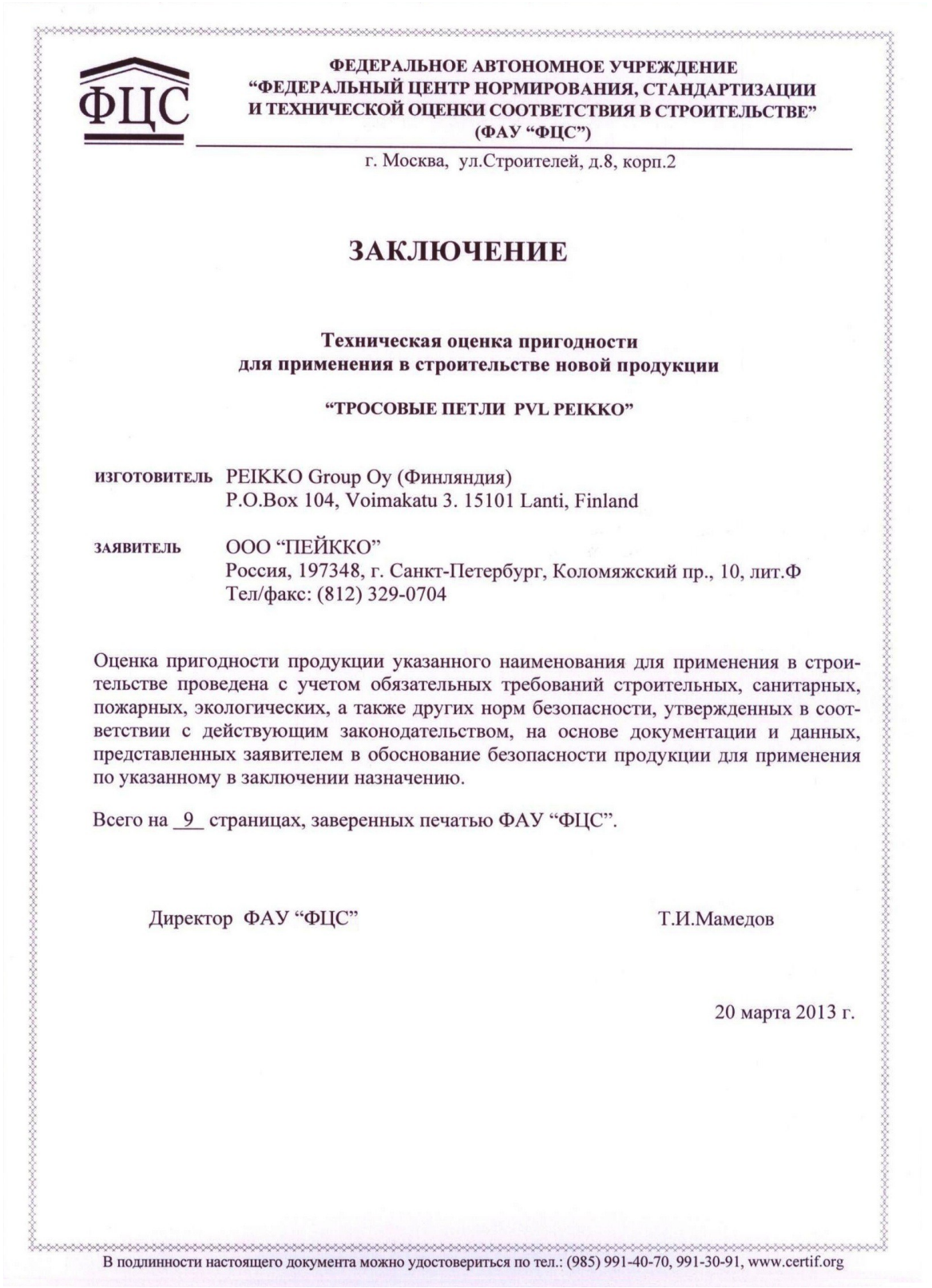
Руководитель (заместитель руководителя) органа по сертификации (подпись, инициалы, фамилия) М. Б. Ясколко

Эксперт (эксперты) (подпись, инициалы, фамилия) Б.П. Жезлов

Figure 9. A general view of a document in Russian About Conformity



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"ФЕДЕРАЛЬНЫЙ ЦЕНТР НОРМИРОВАНИЯ, СТАНДАРТИЗАЦИИ
И ТЕХНИЧЕСКОЙ ОЦЕНКИ СООТВЕТСТВИЯ В СТРОИТЕЛЬСТВЕ"
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для применения в строительстве новой продукции**

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ИЗГОТОВИТЕЛЬ PEIKKO Group Oy (Финляндия)
P.O.Box 104, Voimakatu 3. 15101 Lanti, Finland

ЗАЯВИТЕЛЬ ООО "ПЕЙККО"
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Figure 10. The conclusion of the assessment of the technical suitability for use in construction of new production Peikko

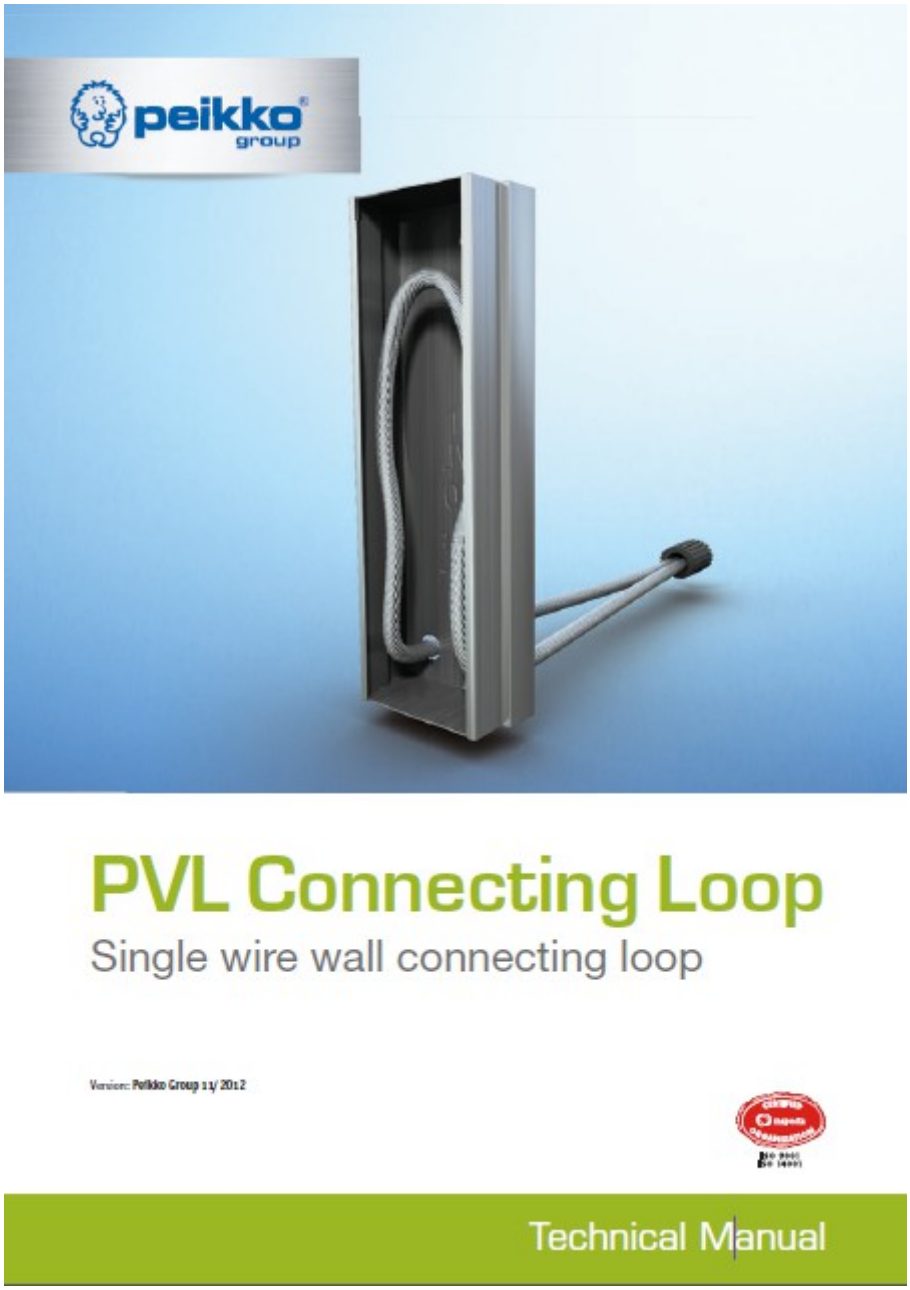

Figure 11. ***Created brochure for production of cable connecting loops PVL***

ООО «Пейкко»

ОКП 52 8530 Группа Ж33

СОГЛАСОВАНО:

Директор ЦНИИСК
им. В.А.Кучеренко
Беляков И.И.
«__» ____ 2011г.

УТВЕРЖДАЮ:

Генеральный директор
ООО «Пейкко»
М.Е. Пироженко
«4» марта 2011г.

«Тросовые петли PVL PEIKKO»
для соединения железобетонных элементов между собой по вертикали.

Технические условия

ТУ 5285-001-94677387-2011

Дата введения в действие «4» марта 2011 г.

Разработаны
ООО «Пейкко»
«4» марта 2011 г.

г. Санкт-Петербург
2011

Figure 12. Title page of approved Technical Specification for PVL wire loops