Deutsches Institut für Bautechnik

Eine vom Bund und den Ländern gemeinsam getragene Anstalt des öffentlichen Rechts

Zulassungs- und Genehmigungsstelle für Bauprodukte und Bauarten

Date: 28/06/2022

References: I 88-1.14.4-64/21

National technical approval/ General construction technique permit

Number:
Z-14.4-784

Validity period
from: **28 June 2022**
to: **28 June 2027**

Applicant:
Sikla Holding GmbH
Ägydiplatz 3
A-4600 THALHEIM BEI WELS
AUSTRIA

Subject matter of this notice:
Sikla Beam Clip SPA 5P

The aforementioned subject matter of the regulation is hereby national technical approved/permitted.
This notice comprises eight pages and five annexes.
This national technical approval /general construction technique permit replaces the national technical approval /general construction technique permit No. 14.4-784 dated 29 November 2017.
The subject matter was national technical approval for the first time on 18 April 2017.

Translation of the German original version not verified by the Deutsches Institut für Bautechnik (DIBt)

I GENERAL PROVISIONS

1 This notice verifies the usability or applicability of the subject matter of the regulation within the meaning of the regional construction ordinances.

2 This notice does not replace the permits, approvals and certificates required by law for the implementation of construction projects.

3 This notice is issued without prejudice to the rights of third parties, in particular private property rights.

4 Copies of this notice must be made available to the user or user of the subject matter of the regulation, without prejudice to further provisions in the "Special Provisions". In addition, the user or user of the subject of the regulation must be informed that this notice must be available at the place of use or application. Copies shall also be made available to the authorities concerned upon request.

5 This notice may only be reproduced in its entirety. Excerpts may only be published with the consent of the German Institute for Structural Engineering. Texts and drawings of promotional literature may not contradict this notice; translations must contain the note "Translation of the German original version not verified by the German Institute for Structural Engineering".

6 This decision is issued revocable. The provisions may be supplemented and amended at a later date, in particular if new technical findings so require.

7 This notice refers to the information provided and documents submitted by the applicant. Any change to these principles is not covered by this notice and must be disclosed to the German Institute for Structural Engineering without delay.

II SPECIAL PROVISIONS

1 Subject matter of the regulation and area of use or scope of application

1.1 Subject matter of the regulation and area of use of application

The subject of approval are Sikla beam clips SPA 5P with base plates AU in types M12 and M16 in accordance with Annex 1.

1.2 Subject matter of the regulation and scope of application

The subject matter of the regulation is the planning, design and execution of clamping connections made with Sikla beam clips with structural screw sets for static and quasi-static effects.

The clamped components, including all front plates and screw sets, are not the subject of this general building approval and must be verified separately with the information in Section 3. Application examples are given in the annexes.

2 Provisions for construction products

2.1. Properties and composition

2.1.1 Dimensions

The main dimensions of the beam clips and the associated base plates can be found in Annex 1. Information on further dimensions is available from the German Institute for Structural Engineering.

2.1.2 Materials

The Sikla beam clips and base plates are made of steel S355J2, material number 1.0577 in accordance with DIN EN 10025–2[1] .

2.2 Manufacturing, packaging, transport, storage and labelling

2.2.1 Manufacture

The beam clips and base plates are drop-forged.

Unless otherwise specified below, the requirements of DIN EN 1090–2[2] apply.

2.2.2 Packaging, transport and storage

The products must be packaged, transported and stored in a manner that protects them against corrosion and is compatible with the materials used.

2.2.3 Labelling

The packaging of the Sikla beam clips and base plate must be marked by the manufacturer with the conformity mark (Ü mark) in accordance with the conformity mark regulations of the states. Labelling may only take place if the requirements in accordance with Section 2.3 are fulfilled. Each package must also contain information on the manufacturing plant, the designation of the construction product and the material.

1	DIN EN 10025–2:2005–04	Hot-rolled structural steel products – Part 2: Technical delivery conditions for unalloyed structural steels
2	DIN EN 1090–2:2018–09	Design of steel and aluminium structures – Part 2: Technical rules for the construction of steel structures

2.3 Declaration of conformity

2.3.1 General

The declaration of conformity of the Sikla beam clips and base plates with the provisions of the general building approval covered by this notice must be carried out for each manufacturing plant with a manufacturer's declaration of conformity based on an initial inspection by the manufacturer and in-house production control.

The manufacturer must submit the declaration of conformity by marking the Sikla beam clip and base plate with the conformity mark (Ü mark) with reference to the intended use.

2.3.2 Internal production monitoring

An internal production control must be set up and carried out in each manufacturing plant. The internal production control refers to the continuous monitoring of production by the manufacturer to ensure that the construction products manufactured by them comply with the provisions of this general building approval.

The internal production control should include at least the measures listed below.

The dimensions of the Sikla beam clips and base plates must be checked by regular measurements in the manufacturing plant (see also Section 2.1.1).

All Sikla beam clips and base plates must be visually inspected for external defects.

Verification of the mechanical material properties of the forged parts required in Sections 2.1.2.1 shall be provided by an acceptance test certificate 3.1 in accordance with DIN EN 10204[3] .

A component test corresponding to the load-bearing tests filed with the German Institute for Structural Engineering shall be carried out for each 3000 units of the manufactured components, but at least on 10 components per manufacturing batch and system size. The tests shall be carried out up to the point of flattening. The load at the start of flow must be recorded.

Each individual test must meet the following criteria:

- Load-bearing capacity: The load-bearing capacity value is filed with the German Institute for Structural Engineering.
- Ductility: The beam clip must not fail before it is completely flattened.

The results of the internal production control must be recorded and evaluated. The records must contain at least the following information:

- Designation of the construction product as well as the raw material and components
- Type of control or test
- Date of manufacture and testing of the construction product or raw material or components
- Result of controls and tests and comparison with requirements
- Signature of the person responsible for the internal production control.

The records must be kept for at least five years and submitted to the inspection body commissioned for external monitoring. They must be submitted to the German Institute for Structural Engineering and the responsible supreme building supervisory authority on request.

3 DIN EN 10204:2005–01 Metallic products – Types of test certificates

If the test result is unsatisfactory, the manufacturer must immediately take the necessary measures to remedy the defect. Construction products that do not comply with the requirements must not be used and must be handled in such a way that any confusion with conforming products is excluded. After the defect has been remedied, the relevant test must be repeated immediately – as far as technically possible and necessary to prove the elimination of the defect.

3 Provisions for planning, design and execution

3.1 Planning

The Sikla beam clips and base plates are hot-dip galvanised in accordance with DIN EN ISO 1461[4] . DIN EN 1090–2[2] applies to the corrosion protection of the connections made with the beam clips.

3.2 Design

3.2.1 General

The verification concept specified in DIN EN 1990[5] in conjunction with the National Annex DIN EN 1990/NA[6] applies.

The standards of the DIN EN 1993[7] series apply to the design of the components to be connected, including any existing base or head plates, unless otherwise specified below.

3.2.2 Verification of the beam clips, base plates and screw sets

The Sikla beam clips and base plates can absorb the following planned screw forces without further verification:

$F_{p,C,max}$ = 32 kN for beam clip SPA 5P-M12

$F_{p,C,max}$ = 54 kN for beam clip SPA 5P-M16

For the screw sets in accordance with Section 3.3.2, the load-bearing capacity is verified by this notice.

The following verifications must be provided for the beam clips and base plates: N

$N_{E,d} / N_{R,d} \leq 1.0$ and $V_{E,d} / V_{R,d} \leq 1.0$

$N_{E,d}$ Rated value of the acting longitudinal tensile force $N_{R,d}$ Rated value of the longitudinal tensile load capacity

$V_{E,d}$ Rated value of the acting transverse force

$V_{R,d}$ Rated value of the transverse load-bearing capacity

This notice provides proof of interaction for acting tensile and transverse forces.

The rated values of the longitudinal tensile and transverse load-bearing capacity of the connection shall be determined as follows:

$N_{R,d} = N_{R,k} / \gamma_M$ and $V_{R,d} = V_{R,k} / \gamma_M$

with

$N_{R,k}$ Characteristic value of the longitudinal tensile strength of the connection

= 16.62 kN for beam clip SPA 5P-M12

= 23.65 kN for bea clip SPA 5P-M16

4	DIN EN ISO 1461:2009–10	Zinc coatings applied to steel by hot-dip galvanising (batch galvanising) - Requirements and tests
5	DIN EN 1990:2010–12	Eurocode: Basic principles of structural planning
6	DIN EN 1990/NA:2010–12	National annex – Nationally defined parameters – Eurocode: Basic principles of structural planning
7	DIN EN 1993	Eurocode 3: Design and construction of steel structures

$V_{R,k}$ Characteristic value of the transverse load-bearing capacity of the connection
= 3.79 kN for beam clip SPA 5P-M12
= 5.24 kN for beam clip SPA 5P-M16

γ_M for the component resistance, partial safety factor = 1.5

3.2.3 Verification of the clamped components

The load-bearing capacity verifications for the clamped components including all end plates and including the clamping joint are not provided by this approval and must be maintained separately. Local loads at the support points of the beam clips, punching through the metal sheet on the nut-side and plate loads must be taken into account.

The load-bearing capacity of girder flanges can be verified according to DIN EN 1993–6[8], equation 6.2.

If the clamped components are not level (e.g. inclined girder flanges), proof shall be provided that the clamped components cannot move against each other.

The absorption of the additional bending stress in the girder flanges as a result of the forces introduced by the clamp connection perpendicular to the flanges shall be verified.

3.3 Execution

3.3.1 General

Unless otherwise specified below, the requirements in accordance with DIN EN 1090–2 apply to the installation of Sikla beam clips and base plates, screw sets and the components to be connected.

3.3.2 Screws, nuts and washers

High-strength structural screw sets of strength class 8.8 or 10.9 in accordance with DIN EN 14399–1[9] including the associated washers in accordance with DIN EN 14399–5[10] or 14399–6[11] must be used. The screw sets to be used must comply with k-class K1 in accordance with DIN EN 14399–4[12].

M12 screw sets must be used for the SPA 5P AU M12 beam clip, and M16 screw sets for the SPA 5P AU M16 beam clip. The regulations in accordance with DIN EN 1090–2[2], para. 8.2 must be observed, particularly with regard to the screw length and the arrangement of washers. The procedure in accordance with DIN EN 1090–2[2], para. 8.5 or EN 1993-1-8/NA[13]. Tables NA.A.1 to NA.A.3.

A beam clip set may only consist of beam clips, base plates and screw sets with the same nominal diameter.

8	DIN EN 1993–6:2010–12	Design and construction of steel structures Part 6 crane runways
9	DIN EN 14399–1:2015–04	High-strength structural fittings for screw connections in metal construction – Part 1: General Requirements
10	DIN EN 14399–5:2015–04	High-strength structural fittings for screw connections in metal construction - Section 5: Flat washers
11	DIN EN 14399–6:2015–04	High-strength structural fittings for screw connections in metal construction - Section 6: Flat washers with chamfer
12	DIN EN 14399–4:2015–04	High-strength structural fittings for screw connections in metal construction - Section 4: System HV – Hexagon screws and nut sets
13	DIN EN 1993-1-8/NA:2010–12	National annex – Nationally defined parameters – Eurocode 3: Design and construction of steel structures – Part 1–8: Design of connections

3.3.3 Installation requirements

The components listed in Section 2.1 may only be installed if the packaging, the leaflet or the delivery note of these components bears the Ü mark.

Each beam clip set must be checked for perfect condition before installation. Damaged parts must not be used. The screw sets must also not show any deformation or damage to the thread or corrosion damage.

The contact surfaces of a connection (girder, beam clip, base plate) must not be contaminated with oil, grease, or other matter that reduces friction.

Sikla beam clips may only be installed by companies with the necessary experience. Other companies may only install the Sikla beam clips with base plates if the installation personnel have been instructed by experienced specialists in this area. Irrespective of this, installation may only be carried out by companies that have a valid certificate in accordance with DIN EN 1090–1[4] , whereby the required design class is determined by the type of components or supporting structure used.

The arrangement of all components during assembly shall correspond to Annex 5.

The surfaces of the clamping joint must be flat and parallel to each other. The thicknesses of the clamped components shall correspond to Annex 5, Table 1. The clamped components must also have a suitable shape and suitable dimensions so that both the beam clip with all five support points and the washer rest on the entire surface, but do not abut on the sides of other components. The through hole and its edge distances in the component clamped on the nut side shall comply with the limit values for edge and hole distances in accordance with DIN EN 1993-1-8[14] Chapter 3.5.

For the beam clip SPA 5P-M12, a planned tightening torque of 60 Nm and an additional prevailing angle of 90° must be used.

For the beam clip SPA 5P-M16, a planned tightening torque of 140 Nm and an additional prevailing angle of 90° must be used.

Make sure that no plastic deformation of the beam clips occurs ("flattening"). The specifications from DIN EN 1090–2[2] apply to the tightening of the screws.

If the beam clip connection is to transmit a certain clamping force required from a static point of view, the applied tightening torque must be checked after at least 24 hours and retightened if necessary. Repeat this procedure until the tightening torque no longer decreases. Here, too, it must be ensured that no plastic deformation of the beam clips occurs ("flat pressing").

Installed Sikla beam clips and base plates must be accessible in such a way that the tightening torque can be checked at any time.

To confirm the conformity of the type with the type approval covered by this notice, the company carrying out the work must provide a declaration of conformity in accordance with Section 16 a (5), in conjunction with Section 21 (2) MBO.

14 DIN EN 1993-1-8:2010–12 Eurocode 3: Design and construction of steel structures – Part 1–8: Design of connections

4 Conditions for use, maintenance and servicing

The person responsible for the condition of a structure or structural system manufactured with the beam clip connections (or a person appointed by them) must check the condition of the clamp connections by means of a random visual inspection.

The connections must be examined for corrosion and cracks on screws, beam clips and base plates. Any displacement/twisting of the connections must also be checked.

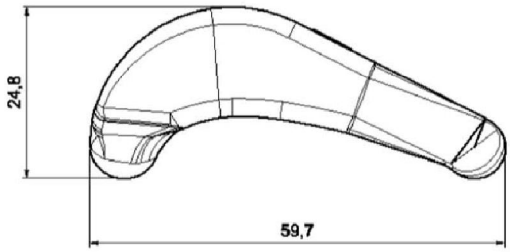
In the event of corrosion damage, the corrosion protection must be renewed (see Section 3.1). Damaged parts must be replaced immediately.

The company entrusted with the installation of the clamp connections must inform the person responsible for the structural system of this obligation in writing and place a copy of this letter in the construction files.

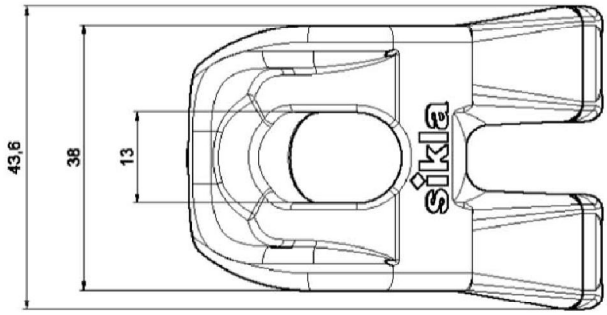
Dr. Ronald Schwuchow
Head of unit

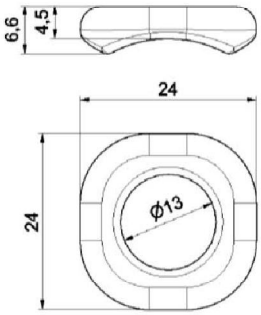
Certified
Hahn

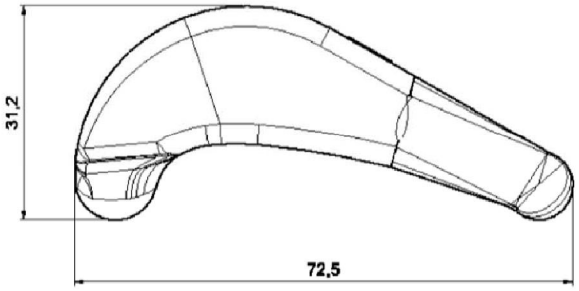
Component dimensions



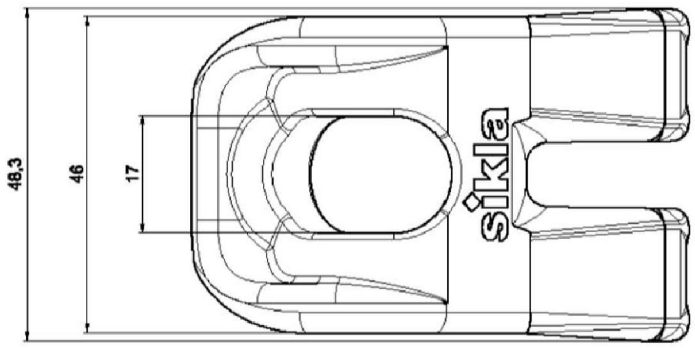
Beam clip SPA 5P-M12 & support plate AU M12

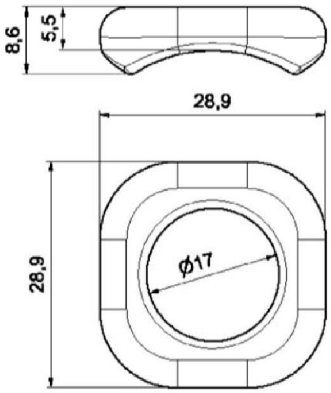






Beam clip SPA 5P-M16 & support plate AU M16





Sikla SPA 5P Beam Clip	Annex 1
Main dimensions of the beam clips and base plates	

Functional dimensions

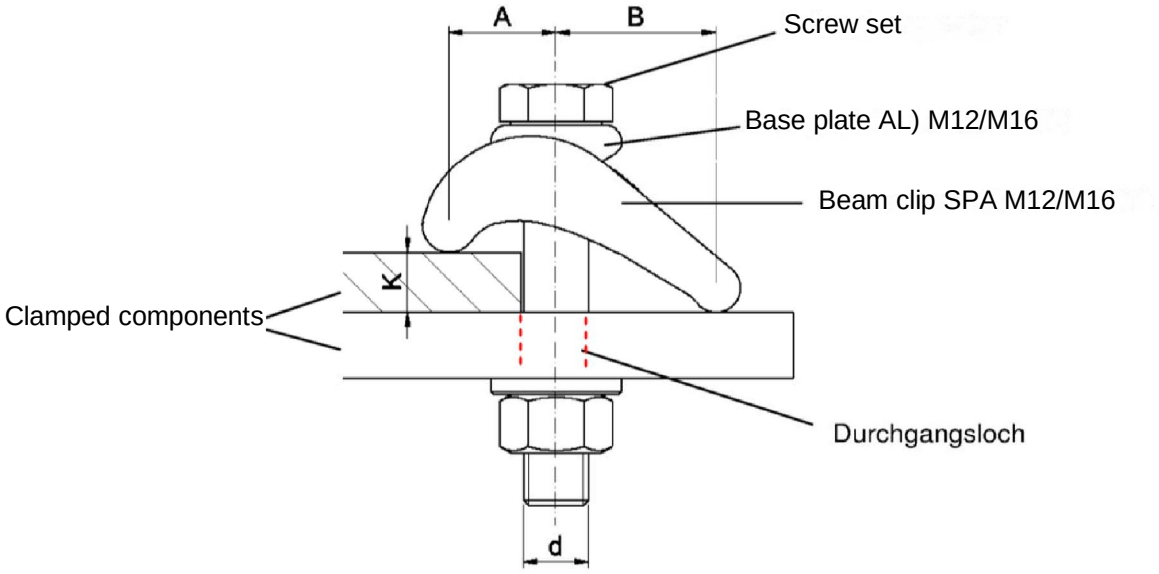
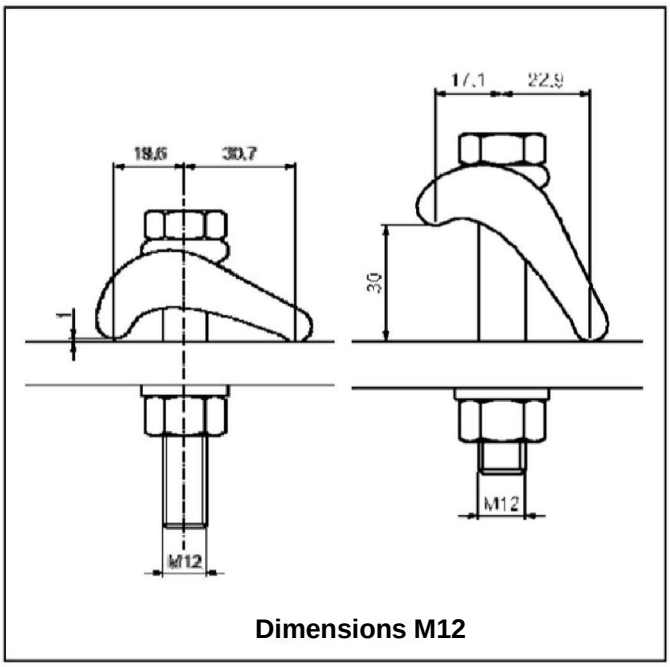
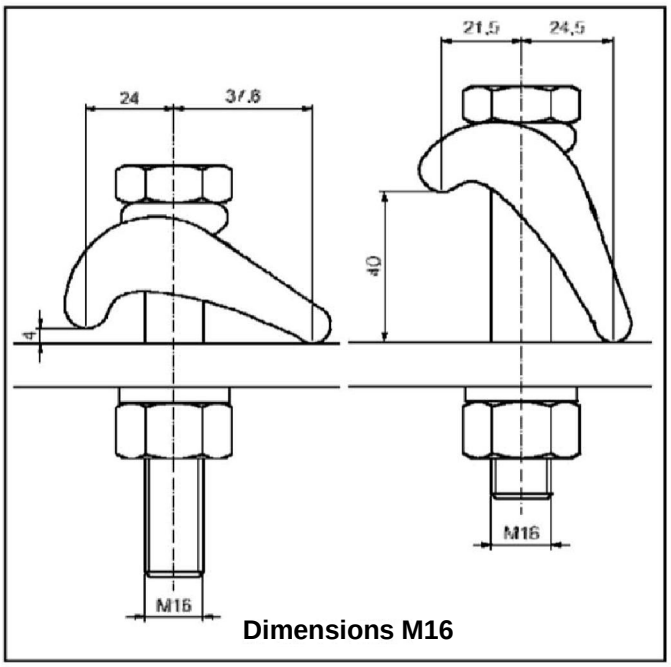


Table 1

Hexagon screw	Clamping area K		Beam clip dimensions (depending on clamping area)		Component width	
Nominal size d	Min. [mm]	Max. [mm]	A [mm]	B [mm]	C [mm]	
M12	1	30	19.6 to 17.1	30.7 to 22.9	44	
M16	4	40	24 to 21.5	37.6 to 24.5	49	



Dimensions M12



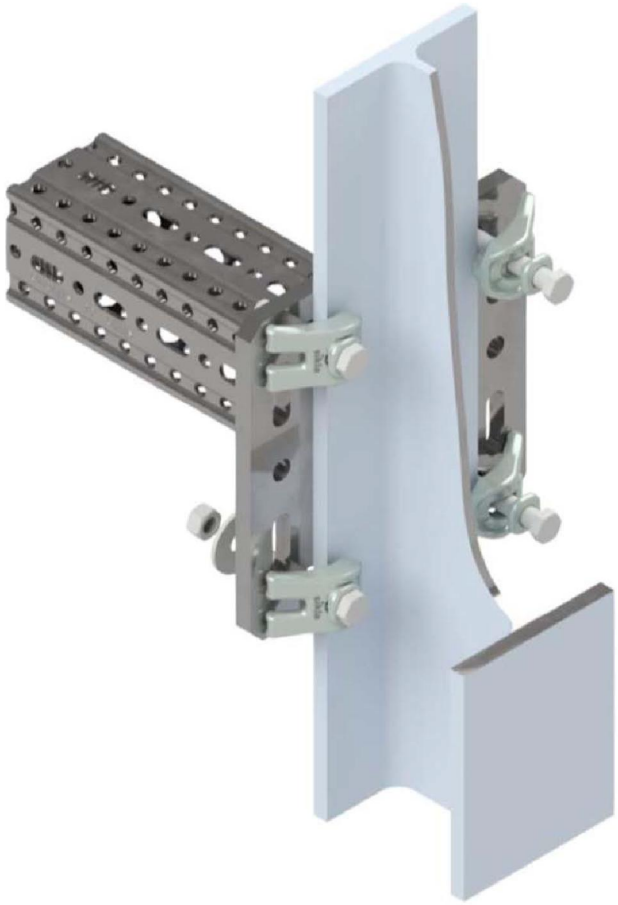
Dimensions M16

Sikla SPA 5P Beam Clip

Assembly

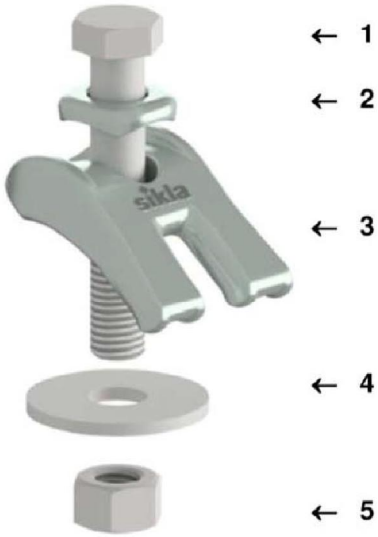
Annex 2

Structure of a Sikla girder clamp connection



1 Hexagon screw[1)]
2 Base plate AU M12/M16
3 Beam clip SPA 5P-M12/M16
4 Washer[1)]
5 Hexagonal nut[1)]

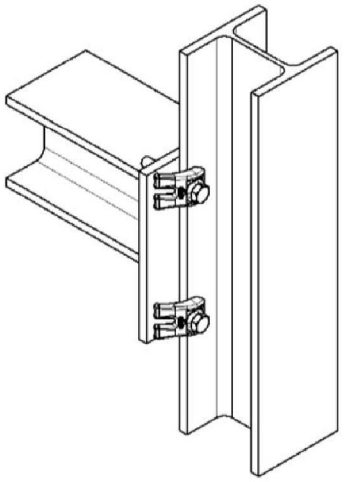
[1)] in accordance with Section 4.2 of this general building approval

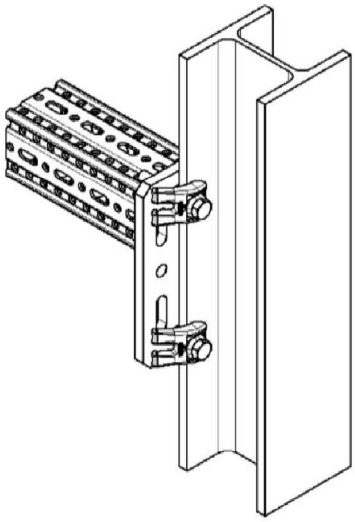


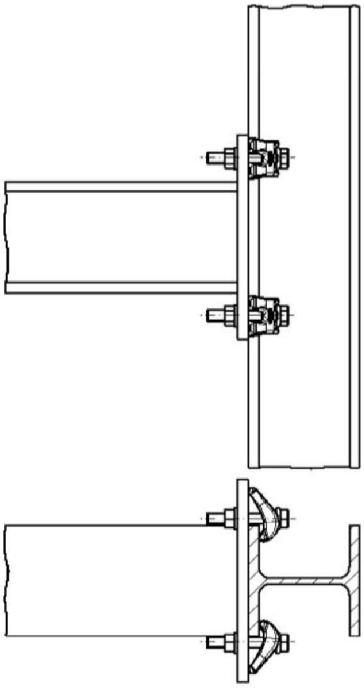
SPA 5P AU-M12 Beam Clip
Beam clip incl. base plate for M12 screw connection

SPA 5P AU-M16 Beam Clip
Beam clip incl. base plate for M16 screw connection

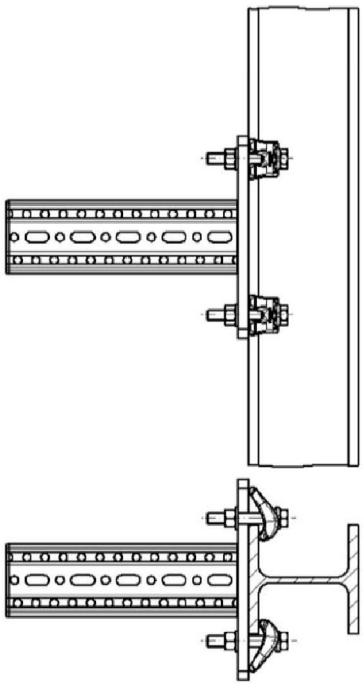
Sikla SPA 5P Beam Clip	Annex 3
Application example for girder connections	







Example 1



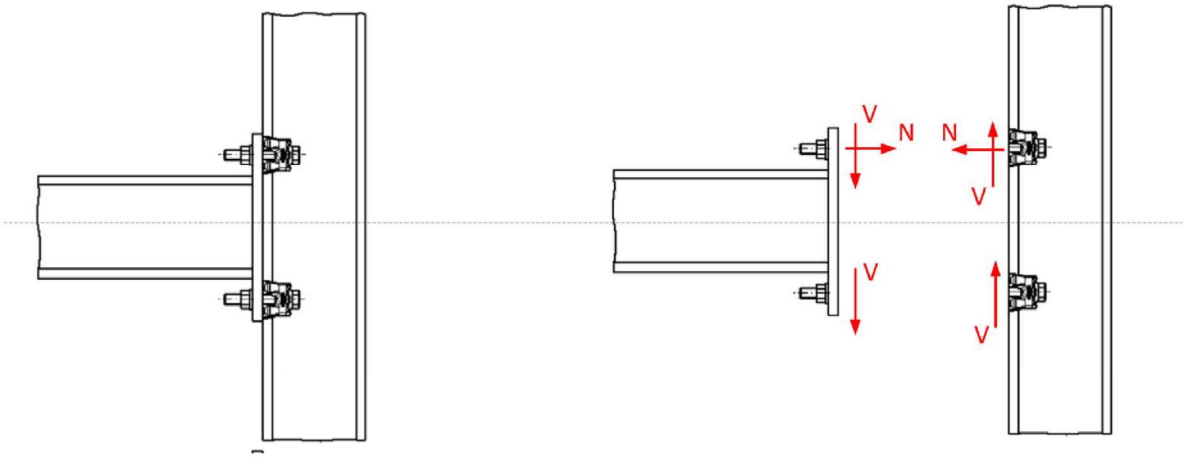
Example 2

Sikla SPA 5P Beam Clip

Application examples for girder connections

Annex 4

Definition of load directions:



Examples of applications:

SIKLA SPA 5P Beam Clip	**Annex 5**
Definition of load directions and application examples	