Translation of the German original document

Deutsches Institut für Bautechnik

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Approval body for construction products and types of construction Building inspection authority

General building supervision authority permit/ General type approval

Date: 07-Sep-2021

Reference: I 88-1.14.4-92/21

Number:
Z-14.4-493

Applicant:
MTH Befestigungstechnik GmbH
Weinleite 1
91522 Ansbach / Germany

Period of validity
from: September 7, 2021
until: September 7, 2026

Items subject to this approval:
MTH beam clamp joints

The aforementioned item regulated is herewith approved/authorised by the general building supervision authority.
This approval consists of nine pages plus seven appendices.
The project first received a general building supervision authority permit on February 07, 2006.

I GENERAL RULES

1 This approval is proof that the item regulated can be used and/or applied within the meaning of the provincial building regulations.

2 This approval does not replace the legally prescribed approvals, agreements and/or certifications necessary in conducting any building project.

3 This approval being granted does not affect the rights of third parties, particularly private industrial property rights.

4 The user of the item regulated, regardless of any provisions in the "Special Regulations", is to make copies of this approval available. Moreover, the user of the item regulated is to be made aware that this approval must be available at the place of use. Such copies are also to be made available to relevant authorities on request.

5 This approval may only be copied in its entirety. Any partial publication requires the prior approval of the Deutsches Institut fuer Bautechnik. Advertising texts and drawings may not contradict this approval, and translations must include the statement that "This is a translation of the German original not approved by the Deutsches Institut für Bautechnik".

6 This approval is granted on a revocable basis. The terms and conditions may be retroactively amended and/or supplemented, should new technical knowledge require it.

7 This approval is based on the details provided and documents submitted by the applicant. Any change in these fundamentals is not covered by this approval and is to be disclosed to the Deutschen Institut fuer Bautechnik without delay.

II SPECIAL RULES

1 Items regulated and scope of applicability

1.1 Items approved and scope of applicability

Items approved are MTH beam clamps, MTH beam clamps of the type Nova Grip M10 to M24, Nova Grip M12 LA, Nova Grip M16 RF and Inova M16 ZW with concave disc,

1.2 Items approved and scope of applicability

Items approved are the planning, dimensioning and types of beam clamp connections with the building products according to Section 1.1 serving as force transmitting joints of interconnected beams or with substructures according to Appendix 1,
e.g.:

- beams crossing one another under an angle of 80° to 100° (Example 1 in Appendix 1)
- beams lying on top of one another with the identical flange widths (Example 2 in Appendix 1)
- beams with base or top plates fastened to substructures (Example 5 in Appendix 1)

Instead of individual beams, combined cross-sections may also be used, on which the joint between the cross-sections is adequately rigid and stress-resistant and there is a mechanical effect equivalent to that of the I-section (Examples 3 and 4 in Appendix 1).

A connecting plate is installed between the beams to be clamped together that projects beyond the beam flange and that has drill holes on the four projecting corners. Screws pre-tensioned to a set torque are inserted in these holes that press the beam flange against the connecting plate via an MTH clamping plate on the screw head end and another on the nut end.

In the attachment of beams on base or top plates joined to the substructure, the MTH clamping plates are only located on one side, preferably under the screw head. Otherwise the connection is to be implemented as with the connecting plates.

Up to three spacer discs with a total thickness of a maximum of 15 mm may be inserted between the MTH clamping plates and the connecting plates or the base or top plates to compensate for differing flange thicknesses (see Appendix 1).

This general building supervision authority permit applies to MTH beam clamp joint static, quasi static and dynamic effects.

2 Construction product standards

2.1 Characteristics and composition

2.1.1 Dimensions

The main dimensions of the clamping plates and concave discs in the individual connection types are given in Appendices 2 and 3. Additional dimensional details are filed with the Deutschen Institut fuer Bautechnik.

The dimensions of the connecting plates, base or top plates and spacer discs are given in Appendix 7.

The dimensions of the screws, nuts and discs can be extrapolated from the data in the Appendices and that in section 3.1.

2.1.2 Materials

The clamping plates and concave discs are made of C45+N tempered steel to DIN EN 10083-2[1] standards.

The connecting plates, base or top plates and washers, along with the steel sections to be joined, are to be made of structural steel to DIN EN 10025-1[2] standards of rigidity class S235 or higher.

2.2 Manufacturing, Packaging, Transport, Storage and Labelling

2.2.1 Manufacturing

Unless otherwise specified below, the requirements of DIN EN 1090-2[3] applies. Manufacturing is only allowed to be conducted by firms that have a valid certificate per DIN EN 1090-1[4] for the execution class (EXC2).

2.2.2 Packaging, Transport and Storage

The products are required to be packaged, transported, and stored with proper corrosion protection and in a manner appropriate for the material.

2.2.3 Labelling

The packaging of the MTH clamping plates must be labelled by the maker as required by the compliance mark ("Ü mark") directives of the federal states. Such labelling is subject to section 2.3 provisions being met. All and any packaging must also be labelled with details of the manufacturing works, construction product data and material information.

2.3 Declaration of Compliance

2.3.1 General

Confirmation of the MTH clamping plates' compliance with the provisions of this general building authorisation covered by this approval must be provided for each and every manufacturing works via a manufacturer's declaration of compliance based on an initial check by the manufacturer and production monitoring by the works concerned.

The manufacturer must mark the MTH clamping plates ("Ü mark") as conforming to the declaration of compliance and include information on the intended purposes.

2.3.2 Internal production monitoring

Production monitoring must be implemented and conducted in each and every manufacturing works. Production monitoring is understood here to mean constant checking by the manufacturer of production to ensure construction product compliance with this general building authority approval.

Internal production monitoring must include the following measures at least.

The dimension of MTH clamping plates must be checked regularly in the works (per section 2.1.1 as well).

All MTH clamping plates must be inspected for external faults.

Proof of the mechanical materials characteristics of forged parts in section 2.1.2 being met is to be rendered by an inspection certificate 3.1 per DIN EN 10204[5].

1	DIN EN 10083-2:2006-10	Tempered steels - Part 2: Technical Terms and Conditions of Delivery for Non-alloy Steels
2	DIN EN 10025-1:2005-02	Hot-rolled products made of structural steels - Part 1: General Technical Terms and Conditions of Delivery
3	DIN EN 1090-2:2018-09	Construction of steel structures and aluminium structures - Part 2: Technical rules for the design of steel structures
4	DIN EN 1090-1:2011-10	Construction of steel structures and aluminium structures - Part 1: Proof of conformity procedure for load-bearing components
5	DIN EN 10204:2005-01	Metal products - types of inspection certificates

The results of internal production monitoring must be recorded and evaluated. Said records must include at least the following information:

- name of the construction product, the original material, and the components/ingredients.
- Type of monitoring or inspection.
- Date of manufacture and testing/inspection of the construction product, original material, or components/ingredients.
- Result/s of monitoring and testing/inspection and comparison of same with the specifications.
- Signature of the person responsible for internal production monitoring.

Said records must be kept for at least five years and submitted to the monitoring body entrusted with third party monitoring. They are to be submitted to the Deutsche Institut fuer Bautechnik and the supervisory building supervision department on demand.

If the results of testing/inspection are not up to standard, the manufacturer must promptly take the necessary measures to remedy matters. Construction products not up to the required standard are not allowed to be used and must be so handled that they cannot be confused with those that meet said standard. Once the defect has been remedied the relevant inspection/testing should be repeated as far as technically feasible and necessary to prove defect remedy.

3 Rules for planning, dimensioning and types

3.1 Planning

The steel sections to be joined must be made of structural steel to DIN EN 10025-1[2] standards of rigidity class S235 or higher.

The MTH clamping plates and spacer discs are galvanised or hot dip galvanised. In all other respects DIN EN 1090-2[1] applies to MTH beam clamp joint corrosion protection, whereby deviating from DIN EN 1090-2[1], Appendix F.4, the maximum permissible dry film bonding strength for connecting plates and steel sections is 220 µm.

Only screw sets in rigidity class 8.8 or 10.9 per DIN EN 14399-1[6] with the matching washers or per DIN EN 15048-1[7] with washers per DIN EN ISO 7089[8] of a minimum 100 HV hardness are to be used, whereby in sets of rigidity class 10.9 two washers must be inserted under each nut.

3.2 Dimensioning

3.2.1 General

The method of proof in DIN EN 1990[9] in association with the national appendix applies.

The DIN EN 1993[10] range of standards applies to the dimensions of the components, including any existing base or top plates, unless otherwise determined below.

3.2.2 Axial stress of screws (tensile forces)

3.2.2.1 Static and quasi static stress

The metrology values for tensile capacity (tensile force limit) $F_{t,Rd}$ per clamped joint (4 screws) are given in Appendix 4, Table 6.

6	DIN EN 14399-1:2015-04	High-strength pre-loadable sets for screw connections in metal construction - Part 1: General Requirements
7	DIN EN 15048-1:2007-07	Sets for unplanned pre-loaded screw connections
8	DIN EN ISO 7089:2000-11	Flat washers - normal series, product class A
9	DIN EN 1990:2010-12	Eurocode: Fundamentals of Structural Planning
10	DIN EN 1993	Eurocode 3: Structural Design and Construction of Steel Structures

3.2.2.2 Stress relevant to fatigue

DIN EN 1993-1-9[11] in association with national appendices applies to proof of fatigue resistance testing. The nominal diameter of M12, M20 and M24 and the nominal diameter M16 Table 2 of this general building authority approval applies in deviating from DIN EN 1993-1-9 for the assignment of the notch class category for clamp joints with screw sets of rigidity class 10.9 per DIN EN 14399-4[12].

Table 1 - Notch case classification for M 12, M20, M24

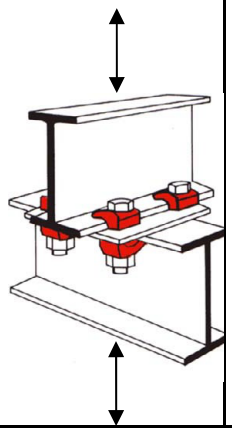
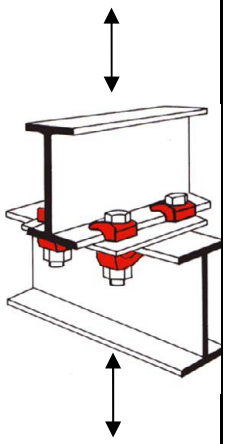
Notch case	Design detail	Description	Requirements
50 m = 3		MTH beam clamps (with 4 screws) under screw axis stress. Screw sets with a nominal diameter of M12, M20 and M24 per section 2.1.2.2 and MTH clamping plates, connecting, base or top plates and spacer discs if needed per section 2.1.2.1 of this general building authority approval are to be used.	Δσ is to be determined for a beam clamp joint with the aid of the tensile stress area of one screw. The screws are to be pretensioned per section 4.3 in association with Table 5 of this general building authority approval. A reduction of the longitudinal stress range due to pretensioning is not permissible.

Table 2 - Notch case classification for M 16

Notch case	Design detail	Description	Requirements
47 m = 6		MTH beam clamps (with 4 screws) under screw axis stress. Screw sets with a nominal diameter of M16 of rigidity class 10.9 per section 2.1.2.2 and MTH clamping plates, connecting plates, base or top plates, and spacer discs if needed per section 2.1.2.1 of this general building authority approval are to be used.	Δσ is to be determined for a beam clamp joint with the aid of the tensile stress area of four screws. Compressive stress levels ($\sigma_{min} < 0$) are not taken into account in determining the longitudinal stress range Δσ. The screws are to be pretensioned per section 4.3 in association with Table 5 of this general building authority approval. A reduction of the longitudinal stress range due to pretensioning is not permissible.

Supplementary to Table 2, the following formulas apply for stress spectrums with longitudinal stress ranges above and below the fatigue strength $\Delta\sigma_D$:

$\Delta\sigma_R^m \bullet N_R = \Delta\sigma_c^m \bullet 2 \bullet 10^6$ with m = 6 for N ≤ $5 \bullet 10^6$

$\Delta\sigma_R^m \bullet N_R = \Delta\sigma_D^m \bullet 5 \bullet 10^6$ with m = 11 for $5 \bullet 10^6$ ≤ N ≤ 10^8

11 DIN EN 1993-1-9:2010-12 Dimensioning and Construction of Steel Structures Part 1-9 Fatigue
12 DIN EN 14399-4:2015-04 High-strength pre-loadable sets for screw connections in metal construction - Part 4: System HV - Sets of hexagonal screws and nuts;

For HV screws per DIN EN 14399-4[12] of rigidity class 10.9 under pure fluctuating tensile stress (R = 0), depending upon the load cycles to be attained in Table 9 in Appendix 6 of this general building supervision authority permit, the permissible upper loads for the partial safety factors $\gamma\gamma_{Ff}$ = 1,0 and $\gamma\gamma_{Mf}$ = 1.0 are specified as metrology values.

3.2.3 Stress at right angles to the screw axis (shear)

3.2.3.1 Static and quasi static stress

The shear stress capacity (limit sheer stress) $F_{v,Rd}$ per clamp join (4 screws) is as below:

$F_{v,Rd} = \mu \cdot (F_{t,Rd} - F_{t,Ed})$ with:

μ = 0.2 friction coefficient

$F_{t,Rd}$ Metrology value of tensile capacity (limiting tensile force) per Table 1

$F_{t,Ed}$ Metrology value of the exerted tensile force

If shear is exerted longitudinally and laterally simultaneously on the beam, then the resultant value applies.

Shear capacities for selected tensile force/s exerted are given in Appendix 5, Table 6, and Table 7.

3.2.3.2 Additional requirement for stress relevant to fatigue

Only brief shear stress such as in crane travel beams due to crane starting and stopping, mass forces due to drives or the angled movement of a crane is permissible.

3.2.4 Bending moment stress

If the clamp joints have to transmit bending moments e.g. in crane track beams due to vertical crane wheel loading with torsion-resistant support beams or horizontal lateral stress crosswise to the crane track beam then the moment may be allowed for applying equivalent tensile force. The tensile force must be so determined that it leads to the same stress as the bending moment in the most heavily stressed screws and MTH clamping plate pairs.

For pre-tensioned clamp joints equivalent tensile force of the bending movement stress may be approximated using the following formula:

$$\Delta N = \frac{3 * \mathrm{M}}{\mathrm{b}}$$

M here is the bending moment, ΔN the equivalent tensile force of the beam clamp joint (4 screws) and b the flange width of the support beam with torsional load.

3.2.5 Local bending stress in the support flanges

Exertion of additional bending stress on the support flanges due to forces exerted by the clamp joint perpendicular to the flanges is to be proven. The force exerted by each clamping plate is to be assumed to be a quarter of the longitudinal force exerted on the clamp joint. This is not allowed to exceed the strain capacity of the flange $F_{f,Rd}$.

The strain capacity of the flange $F_{f,Rd}$ is to be to be proven per DIN EN 1993-6[13], formula 6.2, whereby the following applies:

x_e - the distance from the beam end to the middle of the fastening bolt of the clamping plate

x_w -the distance between the fastening screws in the Longitudinal direction of the beam (corresponds to L1 and L3 per Appendix 7)

n - values according to Table 3

13 DIN EN 1993-1-9:2010-12 Dimensioning and Construction of Steel Structures Part 6 Crane supporting structures

Table 3 – Load of the lower flange

Clamping system	n [mm]
M10	5
M12	6
M16	12
M20	16
M24	21
M12 LA	17
M16 RF	29
M16 ZW	12

3.2.6 Additional rules for joints using beams running parallel above and below one another

Joining such beams with two pairs of clamps (2 screws and 4 clamps) is permissible if the system has adequate rigidity (e.g. several clamp joints in sequence on one beam). 50% of the metrology values for joints using 4 screws apply.

3.3 Type (assembly)

3.3.1 General

The company carrying out the construction is to submit a statement of conformity according to Article 16a Section 5 in connection with Article 21 Section 2 Model Building Regulation (MBO) for confirmation of conformity of the products manufactured with the beam clamp joints with this general type approval.

Where the design of the components to be joined together and MTH clamping plates are concerned, the requirements of DIN EN 1090-2 apply unless otherwise stated below.

For the type of connections, the specifications in Section 1 and in Appendix 1 apply.

The contact surfaces of the components to be joined using the connection, base or top plate must be level and parallel to one another by design.

To transmit differing forces screws of sizes M 10, M 12, M 16, M 20, and M 24 may be used with the appropriate MTH clamping plates. The screws in a clamp joint must all be of identical size, however.

3.3.2 Assembly design

Joining beams with angled flanges is only permissible if the stress is static or quasi static and no crosswise forces will be exerted by design.

Screw length must be such that at least one thread projects out of the nut.

3.3.3 Installation rules

The components mentioned in section 2.1 may only be installed if the packaging, delivery note or accompanying literature bears the Ü or CE symbol.

MTH beam clamp joints may only be installed by companies with the requisite experience. Other companies may only do so if provision has been made for personnel from such an experienced company to familiarise the personnel involved.

The prescribed torques are given in Appendix 4, Table 5. In the case of tightening methods which do not ensure that the required tightening torque is maintained (e.g. with impact spanners), this must be checked or applied using a calibrated torque spanner. There is no need for any additional lock washer. If screw sets of the rigidity class 10.9 are used then two discs must be used under the nut.

The pre-loaded beam clamp connections must be re-tightened in any case and at the earliest 12 h after assembly with the required tightening torque.

MTH beam clamp joints must be accessible enough when installed that the torque can be checked at any time.

Each clamping plate and set of fixtures and fittings must be checked for condition before use. Do not use damaged parts. The screws in particular must not be deformed or have thread damage or corrosion traces.

Joint friction surfaces (beam and connecting plates, MTH clamping plates and beam flanges) must not be contaminated with oil, grease, or other substances if that reduces friction.

Screws and MTH clamping plates that have been subjected to dynamic stress may not be reused.

The construction company must certify in writing (e.g. screw fastening report) that the clamp joint, including the pre- and re-tightening of the screw sets, has been properly executed according to the provisions of this approval.

4 Use, maintenance, and servicing rules

The person responsible for the state of any construction or system using clamp joints or the like or someone authorised by them must check the condition of the clamping joint every 2 years at the latest using sampling by means of visual inspection.

The joints are to be examined for corrosion and cracks in the screws and MTH clamping plates in the process. Should there be crosswise stress mainly in one direction and movement not be excluded by design (e.g. by means of cleats welded onto the beams), then regular inspection must be employed to ensure that no impermissible crosswise movement occurs.

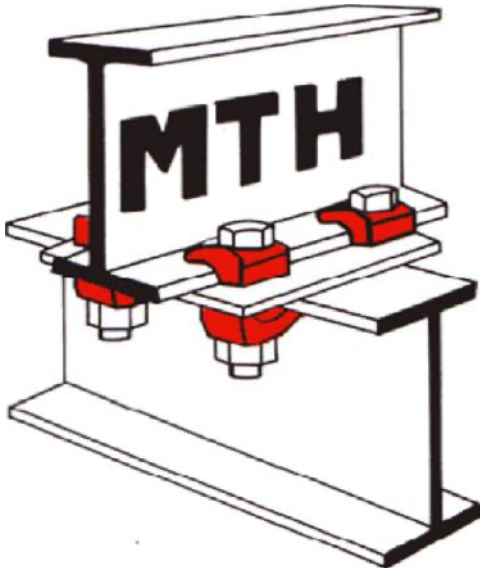
Renew corrosion protection if there's any corrosion damage (see section 3.1). Damaged parts must be immediately replaced with new ones.

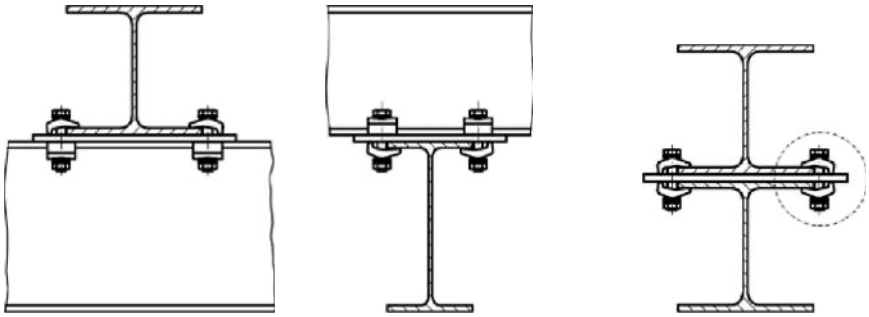
Beam clamp connections are considered maintenance-free.

The company entrusted with installing beam clamps must advise the person responsible for the construction in writing of the above obligation and include a copy of that written advice in the construction files.

Dr.-Ing. Ronald Schwuchow
Head of Division

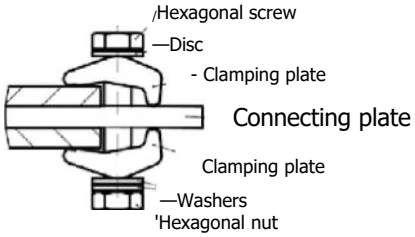
Certified



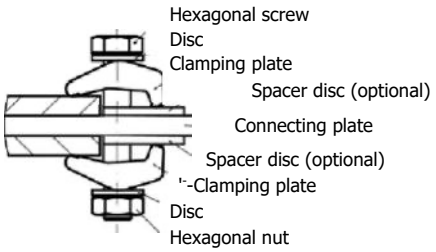


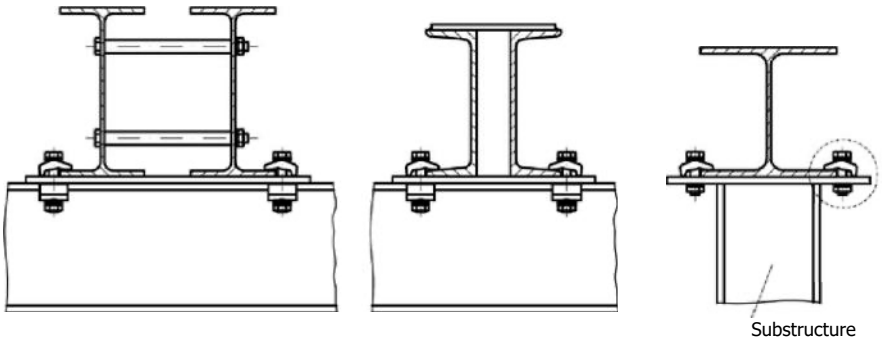
Example 1 Example 2

If fixtures of rigidity class 10.9 are used



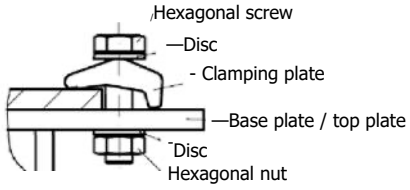
If fixtures of rigidity class 8.8 are used





Example 3 Example 4 Example 5

If fixtures of rigidity class 8.8 and 10.9 are used



MTH beam clamp joints

Examples of MTH beam clamp joint use

Appendix 1

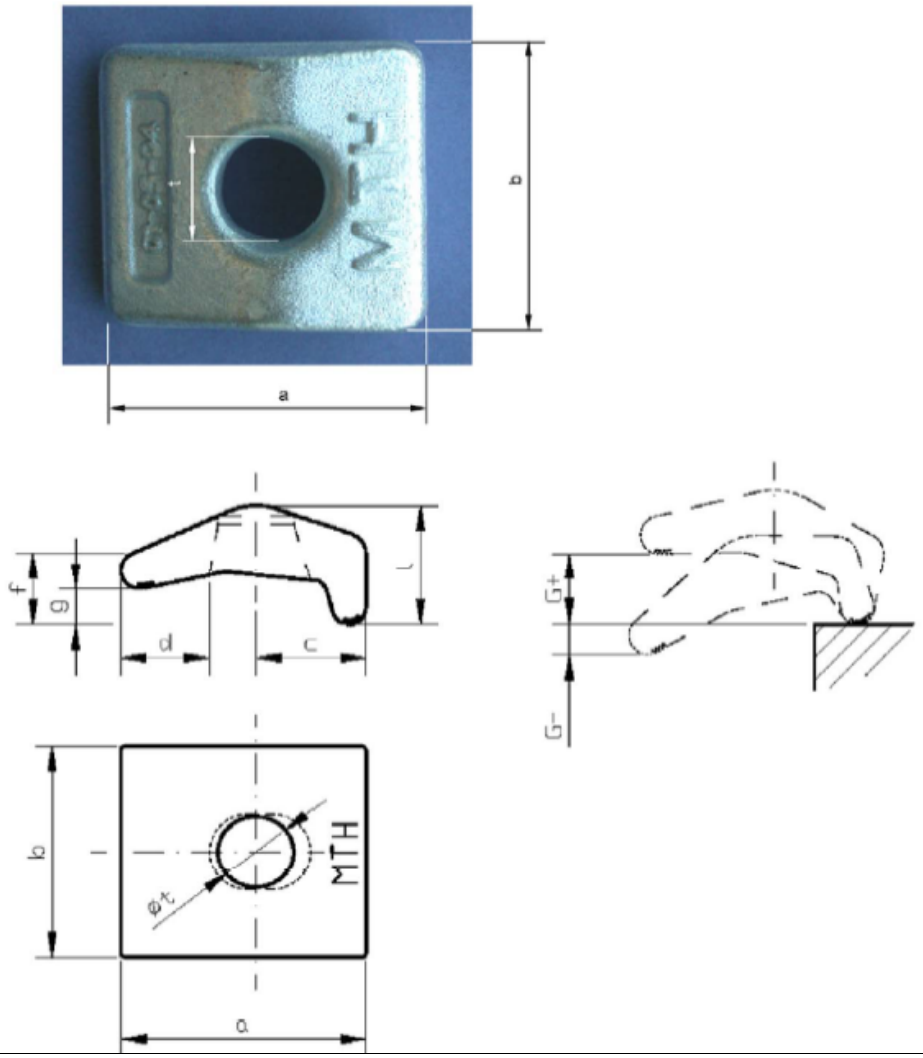


Table 4

Screw	a	b	c	d	f	g	l	*0* t	G -	G +	Weight [kg/100 pcs]
M 10	36	32	16	13	15	8	20	11	6	10	approx. 9
M 12	43	38	19	17	18	10	23	13	6	14	approx. 12
M 16	57	50	25	20	23	12	30	17	7	17	approx. 30
M 20	71	63	31	25	30	16	38	21	11	23	approx. 55
M 24	86	76	38	30	34	17	43	25	10	23	approx. 100

all measurements in mm

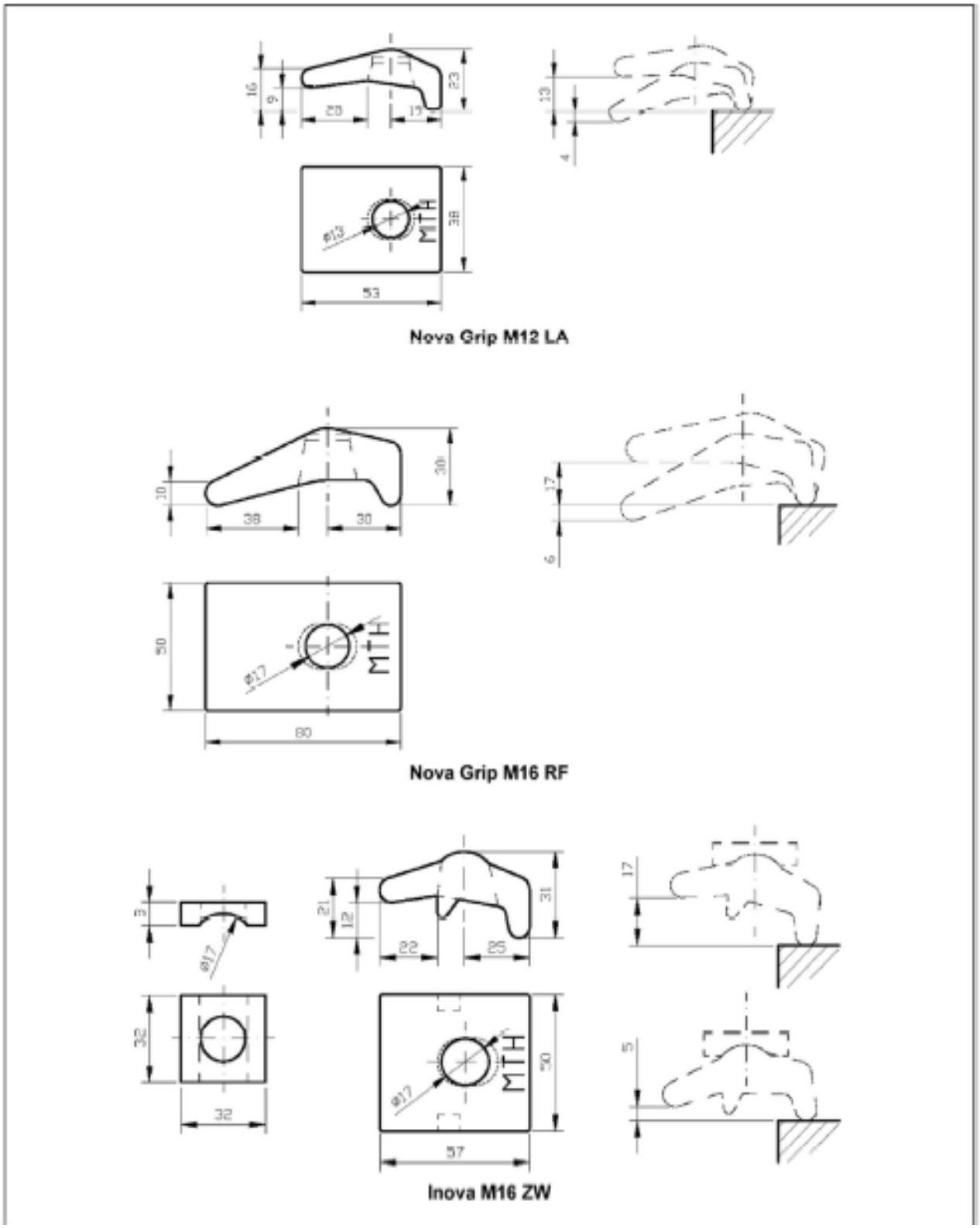
MTH beam clamp joints

Main dimensions of clamping plates of the Nova Grip M 10 to M 24 type

Appendix 2

General building supervision authority permit /
General type approval
No. Z-14.4-493 of September 7, 2021

Deutsches Institut für Bautechnik DIBt



MTH beam clamp joints	Appendix 3
Main dimensions of clamping plates of the types Nova Grip M12 LA, Nova Grip M16 RF and Inova M16 ZW concave disc	

Table 5

Clamping system [1]	**Torque M_A [Nm]** if the screw sets are used of the rigidity class	
	8.8[2]	10.9[3]
M10	40	60
M12	75	85
M16	160	160
M20	290	350
M24	---	500
M12 LA	65	---
M16 RF	160	--
M16 ZW	180	--

1) Only those combinations may be used for which values are given
2) The torque given applies to lightly oiled fixtures
3) The torque given applies to fixtures lubricated with MoS_2

Table 6

Clamping system [1]	**$F_{t,Rd}$ [kN] tensile limit** per clamp joint (4 clamps) if the screw sets are used of the rigidity class	
	8.8	10.9
M10	17.8	30.4
M12	24.7	33.6
M16	42.0	75.2
M20	55.1	95.5
M24	---	134.8
M12 LA	14.8	---
M16 RF	33.0	---
M16 ZW	44.6	---

[1] Only those combinations may be used for which values are given

Table 7

Clamping system	If the screw sets are of the rigidity class 8.8.				
M10	$F_{t,Rd}$	17.8	10.7	5.3	0
	$F_{V,Rd}$	0	1.4	2.6	3.6
M12	$F_{t,Rd}$	24.7	14.8	7.4	0
	$F_{V,Rd}$	0	2.0	3.6	5.0
M16	$F_{t,Rd}$	42.0	25.2	12.6	0
	$F_{V,Rd}$	0	3.4	5.8	8.2
M20	$F_{t,Rd}$	55.1	33.1	16.5	0
	$F_{V,Rd}$	0	4.4	7.8	11.0
M12 LA	$F_{t,Rd}$	14.8	8.9	4.4	0
	$F_{V,Rd}$	0	1.2	2.0	3.0
M12 RF	$F_{t,Rd}$	33.0	19.8	9.9	0
	$F_{V,Rd}$	0	2.6	4.6	6.6
M16 ZW	$F_{t,Rd}$	44.6	26.8	13.4	0
	$F_{V,Rd}$	0	3.6	6.2	9.0

Table 8

Clamping system	If the sets used are of the rigidity class 10.9.				
M10	$F_{t,Rd}$	30.4	18.2	9.1	0
	$F_{V,Rd}$	0	2.4	4.3	6.1
M12	$F_{t,Rd}$	33.6	20.2	10.1	0
	$F_{V,Rd}$	**0**	2.7	4.7	6.7
M16	$F_{t,Rd}$	75.2	45.1	22.6	0
	$F_{V,Rd}$	0	6.0	10.5	15.0
M20	$F_{t,Rd}$	95.5	57.3	28.6	0
	$F_{V,Rd}$	**0**	7.6	13.4	19.1
M24	$F_{t,Rd}$	134.8	80.9	40.4	0
	$F_{V,Rd}$	0	10.8	18.9	27.0

Data in kN, interim values may be interpolated
$F_{t,Ed}$ Metrology value of tensile forces exerted per clamp joint
$F_{v,Rd}$ Crosswise force resistance (limiting crosswise force) per clamp joint

MTH beam clamp joints	Appendix 5
Load capacity values	

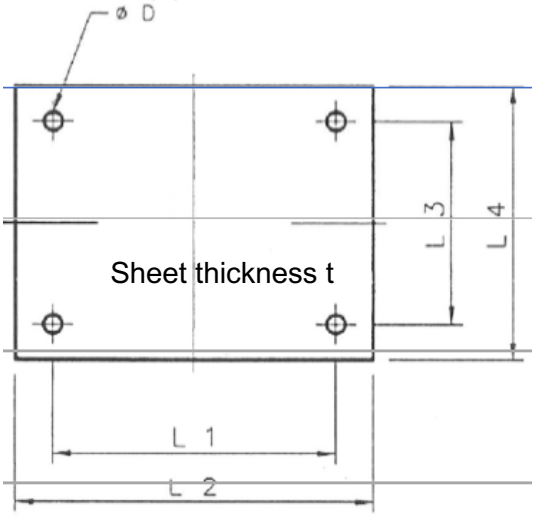
Table 9 permissible upper loads for a cross joint with four HV screws of rigidity class 10.9

Partial safety factors: γ_{Ff} = 1.0 and γ_{Mf} = 1.0 **Stress cycle range**		**Permissible upper loads $F_{zul,R}$=0** For fluctuating tensile stress (R=0)			
From	To	**M12** [kN]	**M16** [kN]	**M20** [kN]	**M24** [kN]
	$1*10^4$	33.60[1)]	75.20[1)]	95.50[1)]	134.80[1)]
$1*10^4$	$2*10^4$	19.56	63.59	56.86	81.92
$2*10^4$	$6*10^4$	13.57	52.95	39.42	56.80
$6*10^4$	$2*10^5$	9.08	43.32	26.39	38.03
$2*10^5$	$6*10^5$	6.30	36.07	18.30	26.37
$6*10^5$	$2*10^6$	4.22	29.52	12.25	17.65
$2*10^6$	$5*10^6$	3.11	25.34	9.03	13.00
$5*10^6$	$1*10^7$	2.70	23.79	7.86	11.32
$1*10^7$	$2*10^7$	2.35	22.34	6.84	9.86
greater than	$1*10^8$	1.71	19.30	4.96	7.14

[1)] Limit tensile force $F_{t,Rd}$ mainly for static stress

MTH beam clamp joints	Appendix 6
Permissible upper loads for a cross joint with four HV screws of rigidity class 10.9 for fluctuating tensile stress (R = 0) as metrology values	

Connecting plate dimensions and base or top plate



Connecting plate
L1 = Flange width + Ø screw + approx. 4 mm roll tolerance
L2 = L1 + approx. 2 x 50 mm
L3[1)] = L1 for connecting identical beam profiles, otherwise for crossed profiles, recalculate as for L1
L4 = L3 + approx. 2 x 50 mm
ØD = screws Ø + approx. 2 mm
t ≥ 10 mm (The panels serve only to adjust screw intervals)

Base or top plate
L1 = Flange width + Ø screw + approx. 4 mm roll tolerance
L2 ≥ L1 + approx. 2 x 50 mm
L3[1)] and L4 per structural requirements
ØD = screws Ø + approx. 2 mm
t per structural requirements, however ≥ 10 mm

Spacer disc dimensions

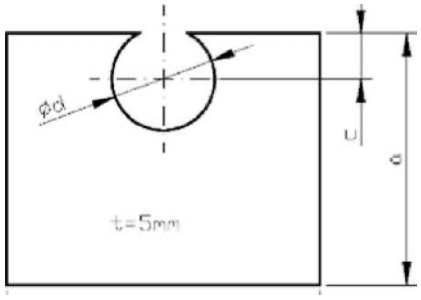


Table 10

	a	b	c	Ød
M10	35	40	5	11
M12	35	40	6	14
M16	44	55	8	18
M20	48	70	9	22

All figures in mm

[1)] L3 applies as a benchmark for beams running atop one another. L3 = 0 in the special case of connecting only two beam clamp pairs for profiles running atop one another or with only two beam clamps on base or top plates

MTH beam clamp joints	
Connecting plate dimensions for beam clamp joints spacer disc dimensions	Appendix 7