

National Technical Approval

Fradiflex[®] INOX

Metal waterstop for use in storage and filling systems of liquid manure/slurry/silage effluent (JGS) and biogas plants

Z-74.101-217 | 15.05.2023

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National Technical Approval / General Design Approval

Number:

Z-74.101-217

Applicant:

Max Frank GmbH & Co. KG
Mitterweg 1
94339 Leiblfing

Validity

from: **15 May 2023**

to: **15 May 2028**

Subject of approval:

**Fradiflex INOX metal waterstop for use in storage and filling systems of liquid
manure/slurry/silage effluent (JGS) and biogas plants**

The above-mentioned regulation subject is herewith granted national technical
approval/approved.

This notice contains 12 pages and 8 annexes.

I GENERAL PROVISIONS

- 1 The usability or applicability of the regulation subject within the meaning of the Landesbauordnungen (Building Regulations of the Land) is verified with this notice.
- 2 This notice does not replace the legally required approvals, consents and certificates for the execution of construction projects.
- 3 This notice will be granted without prejudice to the rights of third parties, in particular private property rights.
- 4 Notwithstanding further regulations in the “Specific Provisions”, copies of this notice are to be provided to the user of the regulation subject. The user of the regulation subject is also to be informed that this notice is to be present at the place of use. Copies are also to be provided to the authorities involved on request.
- 5 This notice may only be duplicated in full. Partial publication requires the consent of the German Institute of Building Technology (DIBt). Texts and drawings of advertising brochures may not be in contradiction to this notice; translations must contain the note “Translation of the original German version not checked by the German Institute of Building Technology”.
- 6 This notice is issued revocably. The provisions may subsequently be supplemented and amended, in particular if this is required by new technical findings.
- 7 This notice is based on the data and documents submitted by the applicant. Any change in these principles is not included in this notice and must be disclosed to the German Institute of Building Technology without delay.

II SPECIAL PROVISIONS

1 Regulation subject and area of use or application

(1) The subject of this notice is the coated metal waterstop “Fradiflex INOX metal waterstop” from Max Frank GmbH & Co. KG (hereinafter referred to as metal waterstop). The metal waterstop (see Annex 1) consists of stainless sheet steel with a double-sided coating on the basis of a thermoplastic elastomer.

The metal waterstop is a product in the form of a strip or band, with or without a fixing angle, that is completely concreted into components made of concrete, reinforced concrete and pre- or posttensioned concrete. Mounting clips and clamping brackets are used as accessories. The metal waterstop is manufactured in the variants and dimensions according to Annex 2.

(2) The metal waterstop may be used in uncoated storage and filling systems of liquid manure/slurry/silage effluent and biogas plants in the following areas:

- containers with a max. filling height of 8 m, in which exclusively liquid manure, slurry and silage effluent are stored in accordance with Art. 2 (13) AwSV¹, where in each case a mixture portion with max. 10 % by vol. silage effluent is to be adhered to,
- containers with a max. fill height of 8 m, in which exclusively fermentation substrates from an agricultural origin according to Art. 2 (8) AwSV are stored, excluding fermentation substrates containing vegetable oil as well as digestate produced therefrom, where in each case a mixture portion with max. 10 % by vol. silage effluent is to be adhered to,
- bunker silos in which silage is stored in accordance with Art. 2 (13) AwSV and in which silage effluent produced during ensiling is discharged, as well as
- bunker silos on which exclusively fermentation substrates from an agricultural origin according to Art. 2 (8) AwSV (except fermentation substrates containing vegetable oil) are stored.
- areas on which water pollutants according to Art. 2 (13) AwSV are stored and filled,
- areas on which exclusively fermentation substrates from an agricultural origin according to Art. 2 (8) AwSV (except fermentation substrates containing vegetable oil) as well as digestate produced therefrom are stored and filled.

(3) The metal waterstop is used for sealing working joints in cast-in-situ concrete structures and may not be damaged with regard to its sealing function.

(4) In compliance with the provisions of the MVV TB (Model Administrative Provisions – Technical Building Rules [Germany]), seq. nos. C 2.15.26 and C 2.15.27, the metal waterstop may be used as an internal seal for working joints of containers pursuant to 1 (2) with a maximum opening width of the working joint of 0.2 mm.

In addition, the metal waterstop may be used in bunker silos and areas according to 1 (2) in compliance with the provisions of MVV TB no. C 2.15.29 and no. C 2.15.30. The concrete next to or above the working joint must be dimensioned in such a way that the opening width of the working joint at the exposed surface is ≤ 0.2 mm, so that no damage or penetration of silage effluent into the concrete is to be expected during intended use.

(5) The metal waterstop may be used to seal working joints against water-polluting liquids in sealed constructions made of uncoated concrete in accordance with the provisions of DIN 11622-2² or DIN 11622-5³ or with a German National Approval/General Design Approval in liquid manure/slurry/silage effluent or biogas plants, observing section 1 (4).

1	AwSV	Verordnung über Anlagen zum Umgang mit wassergefährdenden Stoffen (Ordinance on Facilities Handling Substances that are Hazardous to Water [Germany]) of 18 April 2017 (German Civil Code vol. I, p. 905), amended by Article 256 of the Regulations of 19 June 2020 (German Civil Code vol. I, p. 1328)
2	DIN 11622-2:2015-09	Ensilage silos, slurry containers, containers in biogas plants, bunker silos – part 2: ensilage silos, slurry containers and containers in biogas plants made of concrete
3	DIN 11622-5:2015-09	Ensilage silos, slurry containers, containers in biogas plants, bunker silos – part 5: bunker silos

(6) The metal waterstop should be installed at normal ambient, component and material temperatures (usually within a range from -5 °C to +45 °C).

(7) This notice also takes into account the requirements under water laws for the approval and regulation object. According to Art. 63 Section 4 nos. 2 and 3 WHG⁴ (German Federal Water Act), the approval and regulation object is thus deemed suitable.

(8) The notice takes into account the requirements under water laws for the storage and filling of liquid manure, slurry and silage effluents. The approval/regulation object may be used or applied in accordance with section 2.1 of Annex 7 AwSV in liquid manure/slurry/silage effluent plants.

(9) The notice is issued notwithstanding the testing and approval caveats of other legal fields.

2 Provisions for the construction product(s)

2.1 Properties and composition

2.1.1 General

The metal waterstop must correspond to the technical characteristic data of the annexes of this notice. The material characteristic values, compositions, recipes, dimensions and tolerances of the metal waterstop or coating not specified in this notice must correspond to the specifications deposited with the German Institute of Building Technology (DIBt), the certification body or the externally monitoring body, see General Provisions on this Notice, item 7.

2.1.2 Properties

(1) With regard to its composition and processing, the stainless steel sheet must correspond to a steel sheet with the material numbers deposited with the DIBt in accordance with EN 10088-2⁵.

(2) The coating of the metal waterstops consists of the components according to Annex 1. It must:

- be resistant to the liquids listed in section 1 (2) and
- have adhesive strength and be resistant to aging.

(3) In the installed state, the metal waterstop must:

- be resistant and impermeable to the liquids listed in section 1 (2),
- prevent lateral infiltration of the liquids listed in section 1 (2),
- meet at least the requirements of building material class B2 pursuant to DIN 4102-1⁶ and
- be suitable for use in sealed constructions made of concrete, reinforced concrete and pre- or posttensioned concrete in liquid manure/slurry/silage effluent or biogas plants.

(4) In addition, the metal waterstop must guarantee the leak-tightness/liquid impermeability of the sealed construction in the installation area, taking into account the provisions pursuant to section 1 (3) up to an opening width of the working joint of max. 0.2 mm at a container filling height of max. 8 m.

(5) The properties pursuant to paragraphs (1) to (4) have been proven to the DIBt.

4	WHG	German Federal Water Act (Wasserhaushaltsgesetz - WHG) of 31 July 2009 (German Civil Code vol. I, p. 2585), last amended by Article 1 of the Act of 4 July 2023 (German Civil Code vol. I, p. 5)
5	EN 10088-2:2014-12	Stainless steels – Part 2: Technical delivery conditions for sheet and strip metal made of corrosion-resistant steels for general use; German version EN 10088-2:2014
6	DIN 4102-1:1998-05	Fire behaviour of building materials and building components – Part 1: Building materials; concepts, requirements and tests

2.1.3 Composition

(1) The specifications for the metal waterstop itself and the mix or composition of the coating for the manufacture of the metal waterstop have been deposited with the German Institute of Building Technology (DIBt).

(2) Annex 1 contains further details of the characteristic material values of the metal waterstop and the coating.

2.2 Manufacture, packaging, transport, storage and marking

2.2.1 Manufacture

(1) The metal waterstop is manufactured by coating stainless steel sheet with a coating based on a thermoplastic elastomer. The coating material is applied by machine to the respective carrier sheet. A peelable two-part protective film is applied to the coating (see Annex 2).

The description of the manufacturing process has been deposited with the German Institute of Building Technology. Changes are not included in this notice and must be disclosed to the German Institute of Building Technology without delay.

(2) The metal waterstop is coated and converted in Plant 1 of Max Frank GmbH & Co. KG. The components of the coating are manufactured in Plant 101 and Plant 102 of Max Frank GmbH & Co. KG.

(3) The addresses of Plant 1, Plant 101 and Plant 102 have been deposited with the DIBt.

2.2.2 Packaging, transport, storage

The metal waterstop and accessories:

- must be packed, transported and stored in such a way that their usability is not negatively affected. In particular, the metal waterstop and accessories are to be stored in accordance with the manufacturer's specifications. The specified storage conditions must be observed. The maximum storage period of 12 months from the date of manufacture is to be adhered to.
- may be packed and delivered in transport containers.
- are to be stored until installation in the undamaged and unopened original packaging according to the manufacturer's specifications and protected against contamination as well as moisture, high temperatures (> +35 °C), direct sunlight and damage.
- are to be stored in winter in such a way that the material temperature is higher than -5 °C at the time of installation.

2.2.3 Marking

(1) The construction product and/or packaging of the construction product and/or the package insert for the construction product and/or the delivery note for the construction product must be marked by the manufacturer with the conformity mark according to the conformity mark regulations of the federal states. The marking may only take place if the prerequisites laid down in section 2.3 are fulfilled.

(2) The components of the construction product must be unmistakably identifiable before the installation. All details that are important for the installation must be clearly given on the packaging and/or on a package insert. All details must be given in a form that is clear and understandable.

(3) Furthermore, the package insert or the delivery note must be marked with the following details:

- complete description of the construction product:
"Fradiflex INOX metal waterstop for use in liquid manure/slurry/silage effluent/biogas plants pursuant to notice no. Z-74,101-217" as well as
- manufacturer's name and sign.

2.3 Attestation of conformity

2.3.1 General

(1) Confirmation of the conformity of the construction product (metal waterstop) to the provisions of the German National Approval encompassed by the notice must take place for every manufacturing plant with a manufacturer's declaration of conformity on the basis of a factory production control and a certificate of conformity issued by a recognised certification body as well as regular external monitoring by a recognised inspection body in accordance with the following provisions.

(2) The manufacturer of the construction product must appoint a recognised certification body and a recognised inspection body for the issuing of the certificate of conformity and the external monitoring respectively, including the associated product checks to be carried out.

(3) The manufacturer must issue the conformity declaration by marking the construction product with the German conformity mark (Ü-mark), with reference to the purpose of use.

(4) The German Institute of Building Technology is to be provided by the certification body with a copy of the certificate of conformity that it has issued as well as a copy of the initial test report (according to section 2.3.3) for its information.

2.3.2 Factory production control

(1) Factory production control needs to be set up and carried out in the manufacturing plant. Factory production control means the continuous monitoring of production to be carried out by the manufacturer to ensure the conformity of the construction products it manufactures to the German National Approval encompassed by this notice.

(2) The manufacturer must have the required properties according to Annex 3 for the raw materials of the coating as well as for the stainless sheet steel proven by the respective production plant by means of an acceptance test certificate "3.1" pursuant to EN 10204⁷. In addition, the completeness and correctness of the declarations of conformity, acceptance test certificates and delivery notes accompanying the materials must be checked during the incoming goods inspection.

(3) The factory production control should include at least the measures listed in Annexes 3 and 4.

(4) The results of the factory production control must be recorded, compared with the characteristic values according to Annex 1 and evaluated. The records must include at least the following details:

- description of the metal waterstop sealing system,
- type of inspection or test,
- date of manufacture and testing of the metal waterstops or the raw material,
- result of the checks and tests according to Annexes 3 and 4 and comparison with the requirements according to Annex 1 and
- signature of the person responsible for the factory production control.

(5) The records must be archived for at least five years and submitted to the inspection body appointed to carry out the external monitoring. They must be submitted on demand to the German Institute of Building Technology and the responsible supreme building supervisory authority.

(6) If the test result is unsatisfactory, the manufacturer must immediately take the necessary measures to eliminate the shortcoming. Metal waterstops that do not meet the requirements must be handled in such a way that confusion with conforming products is ruled out. After the elimination of the shortcoming, the test concerned must immediately be repeated if this is technically possible and necessary for proof of elimination of the shortcoming.

2.3.3 External monitoring

(1) The factory and the factory production control must be checked regularly, at least twice per year, by an external monitoring body. Sampling and tests are the responsibility of the respective recognised inspection body. The samples are to be taken representatively from the running production.

(2) An initial inspection of the metal waterstop is to be carried out as part of the external monitoring.

(3) In the **initial inspection** of the metal waterstop, the properties according to Annex 1 as well as the change of mass and adhesive tensile strength are to be determined by means of individual tests according to the DIBt test schedule of Max Frank GmbH & Co. KG after storage in a test liquid of Group 2 of the current DIBt list 7. These tests can be dispensed with if the usability tests based on the German National Approval encompassed by this notice were performed on samples that were taken representatively from the running production by an independent third-party body.

(4) Within the scope of the **external monitoring** of the metal waterstop, the properties according to Annexes 3 and 4 are to be determined and compared with the specifications in Annex 1. Furthermore, the marking of the metal waterstop must be checked and documented.

(5) The results of the certification and external monitoring are to be recorded and evaluated. The records must include at least the following details:

- description of the construction product or of the raw material and the components as well as their batch numbers,
- type of inspection or test,
- date of manufacture and testing of the construction product or of the raw material or the components,
- result of the checks and tests according as well as comparison with the requirements according to Annexes 3 and 4 as well as
- signature of the person responsible for the external monitoring.

(6) The results of the certification and external monitoring are to be archived for at least five years. They must be submitted by the certification body or the inspection body on demand to the German Institute of Building Technology and the responsible supreme building supervisory authority.

3 Provisions for planning, design and execution

3.1 Planning and design

(1) Taking into account the regulations under water law and the chemical and mechanical stresses to be expected, verifiable calculations and design documents (e.g. joint diagrams) must be drawn up by an expert planner.

(2) The applicant must draw up installation and processing instructions for the proper installation of the metal waterstop.

(3) A prerequisite for the proper functioning of the metal waterstop is that the concrete containers or bunker silos in which the metal waterstop is used are planned and erected in accordance with DIN 11622-2² or DIN 11622-5³.

(4) When drafting and designing, the following must be observed:

- The metal waterstop must be able to withstand the movements in the working joint without damage.
- Joints must be sufficiently leak-tight and resistant to water-polluting liquids, taking into account mechanical, thermal and weather-related effects.
- The bond between the concrete and the metal waterstop must be so strong and load-bearing that it can absorb the stresses that act on it through the metal waterstop.
- When planning the joint waterproofing, the instructions for planning and design in accordance with Annexes 5 to 7 must be taken into account for determining the installation depth.
- The metal waterstop must be embedded at least 3.5 cm into the concrete.
- The metal waterstop must be installed centrally in the concrete component in accordance with the instructions and illustrations in Annexes 5 to 7.
- Cutting the metal waterstop to length on the building site should be avoided as far as possible. Otherwise, in the case of one-sided loading, e.g. in the case of containers or single bunker silos, the metal waterstop must be arranged in the component in such a way that the metal waterstop cut on site is arranged on the side facing away from the material to be filled.
- The metal waterstop may be installed in containers where the maximum filling height of 8 m is not exceeded.
- The applicant's installation and processing instructions must be taken into account.

(5) In order to ensure permanent leak-tightness/liquid impermeability, an injection hose system with German National Approval/General Design Approval can also be planned for use in biogas/liquid manure/slurry/silage effluent systems in the working joint area.

3.2 Execution

3.2.1 General

(1) The executive company (in accordance with the regulations of the AwSV), including its specialists, must be trained and authorised by the applicant or its authorised representatives for the activities named in this notice.

(2) When using the sealing system in liquid manure/slurry/silage effluent systems, reference is made to Annex 7, Section 2.4 of the AwSV, according to which the executive company must specialise in these activities in accordance with Art. 62 AwSV, unless the activities are exempt from the specialist company obligation according to the AwSV.

(3) The metal waterstop is to be installed in accordance with the provisions of this notice, the design drawings (section 3.1 (1)) and the applicant's installation and processing instructions. The advices laid down in the installation and processing instructions must be followed.

3.2.2 Installation

(1) When installing the metal waterstop, the specifications drawn up by the applicant or expert planner (e.g. type, material, position and installation) must be complied with.

(2) The metal waterstop must not shift or tilt when the concrete is poured.

(3) Damaged metal waterstops or metal waterstops with a damaged or dirty coating may not be installed. To avoid damage, care must be taken, e.g. when stripping the formwork. Metal waterstops with a missing or damaged protective film must not be used. The protective film may only be removed shortly before the respective concrete pour.

(4) The position of the metal waterstop must be arranged in such a way that the concrete in the joint environment achieves the same degree of compaction as is decisive for the entire surface.

(5) The metal waterstop is to be installed in sealed concrete structures, taking into account the instructions and illustrations in Annexes 5 to 7. The metal waterstop must always be positioned in accordance with the provisions of this notice before concreting; it must not be pressed into the concrete afterwards. The metal waterstop must be embedded at least 3.5 cm into the concrete.

(6) The metal waterstop must be installed centrally in the concrete structure (see Annexes 5 to 7).

(7) The metal waterstop is fixed via the fixing angles with binding wire or with the associated mounting brackets and binding wire at a distance of 70 cm to 80 cm on or to the reinforcement (see Annexes 5 to 7).

(8) The connection of the metal waterstop in working joints is done by overlapping and pressing the metal waterstops directly against one another in accordance with Annex 7. Prior to that, the protective films of both plates must be peeled back at the connection point. The overlap length must be at least 100 mm. Each splice joint is to be additionally secured with a clamping bracket.

(9) If metal waterstops are joined that have been cut to length on the building site, the metal waterstops must be arranged in the component in the case of one-sided loading, e.g. in the case of containers or single bunker silos, in such a way that the metal waterstop cut on site is on the side facing away from the material to be filled.

(10) If the metal waterstop is bent on the building site, the bending radius must be selected in such a way that there is no negative effect on the metal waterstop coating, e.g. crack formation.

(11) In addition, if necessary, an injection hose system suitable for use in biogas/liquid manure/slurry/silage effluent systems must be used in the working joint area.

3.2.3 Checking the execution

(1) The following checks are to be carried out before, during and after the installation of the metal waterstop:

- Check that the correct metal waterstop according to this notice is used.
- Check the general condition of the metal waterstop (e.g. free from damage) before concreting. For this purpose the installed metal waterstop must be visually inspected over its entire length.
- Check the installation position (taking into account the requirements set out in section 3.2.2) and compare it with the joint diagram and the installation details of the design documents before and after concreting.
- Check that no displacement or floating of the metal waterstops is possible during concreting.
- The proper execution of the joints and bends of the metal waterstops must be checked before concreting, taking into account the requirements set out in section 3.2.2.

(2) The approval of the concreting must be documented in writing, taking into account the aforementioned checks, and added to the construction files.

3.2.4 Declaration of conformity for the type of construction

(1) The conformity of the type of construction (built-in metal waterstop) to the provisions of this notice must be confirmed by the executive company in accordance with section 3.2.1 (1) with a declaration of conformity and the following additional checks:

- Check that the correct metal waterstop according to this notice was used.
- Check of the execution in accordance with section 3.2.3.

(2) The results of the checks are to be recorded and evaluated. The records must include at least the following details:

- Joint waterproofing system: “Fradiflex INOX metal waterstop for use in storage and filling systems of liquid manure/slurry/silage effluent and biogas plants”
- Notice number: Z-74,101-217
- Applicant: Max Frank GmbH & Co. KG, Mitterweg 1, 94339 Leiblfing
- Executed on: Date
- Executed by: Full name of company
- Type of checks or tests (see section 3.2.3)
- Date of the test
- Result of the checks and tests and comparison with the requirements
- Signature of the person responsible for the execution check

(3) During the manufacture of the joint waterproofing, records of the proof of installation are to be kept by the site manager or his representative. The records are to be handed over to the operating company for inclusion in the construction files and submitted on demand to the German Institute of Building Technology, the competent supreme building supervisory authority and the expert (in accordance with the regulations of the AwSV).

(4) If the test result is unsatisfactory, the installing company must immediately take the necessary measures to eliminate the shortcoming. After the elimination of the shortcoming, the relevant checks or tests must immediately be repeated if this is technically possible and necessary to prove the elimination of the shortcoming.

4 Provisions for use, maintenance and care

4.1 General

(1) You are referred to the necessity of constant monitoring of the leak-tightness and functionality of the liquid manure/slurry/silage effluent system in accordance with AwSV, Annex 7, Section 6.2 by the operator of a liquid manure/slurry/silage effluent system. For this purpose, the criteria set out in Section 4.2 apply in conjunction with Section 4.3.

(2) You are referred to the obligation of the operating company of a liquid manure/slurry/silage effluent system to assign the maintenance, repair and cleaning of the waterproofing system only to such companies that specialise in these activities within the meaning of AwSV, Annex 7, Section 2.4.

(3) You are also referred to the obligation of the operating company of a liquid manure/slurry/silage effluent system to have an inspection carried out by experts in accordance with water laws before commissioning (see AwSV, Annex 7, Section 6.4.).

(4) In the operating instructions of the respective biogas storage & filling systems, the operating company must organise the inspection intervals depending on the duration of use permitted in accordance with this notice. The results of the regular inspections and all events deviating from these operating instructions must be documented. These records must be submitted to the expert (in accordance with the provisions of the AwSV) on demand.

(5) When repairing the joint waterproofing system (restoration of leak-tightness/liquid impermeability) in existing storage & filling systems in accordance with section 4.4, the operating company must, in accordance with the provisions of the AwSV

- have the assessment of the state of the construction and the corresponding repair concept done by an expert planner and
- have the proper state of the restored area checked.

The expert (in accordance with the provisions of the AwSV) must be given the opportunity to take note of the assessment of the state of the construction and the repair concept.

4.2 Tests by the expert in accordance with the provisions of the AwSV

(1) Tests before commissioning

- The expert must be kept informed of the progress of the work. The expert must be given the opportunity to take part in the checks before and after the installation of the joint waterproofing in accordance with section 3.2.3 and to assess the results of the checks.
- The final test of the quality of the working joints is carried out by inspecting the surface of all joints of the respective sealed construction.
- The area of the working joint is to be checked for cracks and deviations from the maximum permissible working joint opening width, taking into account the provisions set out in section 1 (4).
- The expert checks the inspection intervals specified in the operating company's operating instructions (in accordance with section 4.1).

(2) Recurrent checks when used in storage & filling systems of biogas plants

- The examination of the quality of the working joints is carried out by means of visual inspection of all working joint areas of the respective sealed construction. The area of the working joint is to be checked for cracks and deviations from the maximum permissible working joint opening width, taking into account the provisions set out in section 1 (4).
 - On the basis of the documentation of the regular inspections and any events deviating from the operating instructions, checks must be performed to ascertain whether
 - the inspection and cleaning intervals have been complied with by the operating company and
 - there have been any events deviating from the operating instructions.
- The comparison must be made with the stresses permitted in accordance with this notice.
- Further investigations are required if there are doubts about the leak-tightness of the joint waterproofing. For this purpose, samples (drill cores) may have to be taken from the affected area.

4.3 Rectification of deficiencies

According to the provisions of the AwSV, deficiencies found during the tests in accordance with Sections 4.1 and 4.2 must be rectified. The repair of the damage is to be entrusted to a company as described in section 3.2.1 (1), which may use the materials specified in this notice in accordance with the information in the applicant's installation and processing instructions and which meets the requirements of section 3.2.1.

4.4 Restoration of the leak-tightness/liquid impermeability in existing plants

(1) The restoration of the leak-tightness/liquid impermeability must be expertly planned and carried out, taking into account this notice and the German National Approval/General Design Approval for the respective repair system for use in liquid manure/slurry/silage effluent plants and biogas plants.

(2) Before restoring the leak-tightness/liquid impermeability, it must be ensured that the damage to the sealed construction and its causes determined in the construction state assessment have been rectified.

(3) The provisions of this notice as well as the applicant's installation and processing instructions apply to the restoration of the leak-tightness/liquid impermeability of the joint waterproofing.

(4) The subsequent sealing of leaking working joint seals can be done using a suitable injection system with German National Approval/General Design Approval for use in biogas plants and liquid manure/slurry/silage effluent plants.

(5) Only companies that meet the requirements pursuant to section 3.2.1 (1) may be commissioned to carry out work to restore leak-tightness/liquid impermeability.

(6) In the case of significant measures to restore the leak-tightness/liquid impermeability, the operating company must have the proper condition of the restored area checked in accordance with the provisions of the AwSV before putting the plant back into operation.

Dr.-Ing. Ullrich Kluge
Head of Division

Certified
Dr.-Ing. Seiffarth

Test object	Property	Unit	Test basis	Monitoring values
1	2	3	4	5
stainless steel sheet	Material	--	EN 10088-2	at least corrosion resistance class II according to the deposited material numbers
	Height	mm	--	Annex 2
	Sheet thickness	mm	--	0.54 ± 10 %
Coating	Completeness and correctness of the raw components	--	Confirm applicant's requirements with acceptance test certificate 3.1	in accordance with deposited specifications
	Mixing ratio of the raw components	--	Applicant's requirements	in accordance with deposited specifications
	Density	g/cm ³	EN ISO 1183-1	0.93 (23 ± 0.5 °C) ± 3 %
	volatile constituents	M.-%	according to deposited test schedule	0.1 ± 10 %
coated metal waterstop	Thickness of the coated metal waterstop (without protective film)	mm	Thickness measurement method in agreement with the external monitoring body	0.94 +10 % / -5 %
	Thickness of the coating per side	mm		0.20 +10 % / -5 %
	Height of the coating per side	mm	Height measurement method in agreement with the external monitoring body	146 ± 10 %
	Weight per unit length	g/m	Weight check	in accordance with deposited specifications ± 10 %
	Adhesive tensile strength of the coating on the sheet	N/mm ²	based on EN ISO 4624	≥ 0.35
	Colour	--	visual inspection	black
	Property	--	visual inspection	Surface homogeneous and free from blemishes
Fradiflex INOX metal waterstop for use in storage and filling systems of liquid manure/slurry/silage effluent (JGS) and biogas plants				Annex 1
Technical characteristic values				

Table 1: Variants and dimensions

Metal waterstop type ¹	Height	Length	Form
Fradiflex INOX metal waterstop strip	150 mm ± 10 %	2.10 m ± 10 %	Straight elements
Fradiflex Inox metal waterstop roll	150 mm ± 10 %	15.00 m ± 10 %	Rolled goods
Fradiflex INOX metal waterstop strip BW	150 mm ± 10 %	2.10 m ± 10 %	Straight element with fixing angle
Fradiflex INOX metal waterstop roll BW	150 mm ± 10 %	15.00 m ± 10 %	Rolled goods with fixing angle

¹ Sheet thickness according to Annex 1

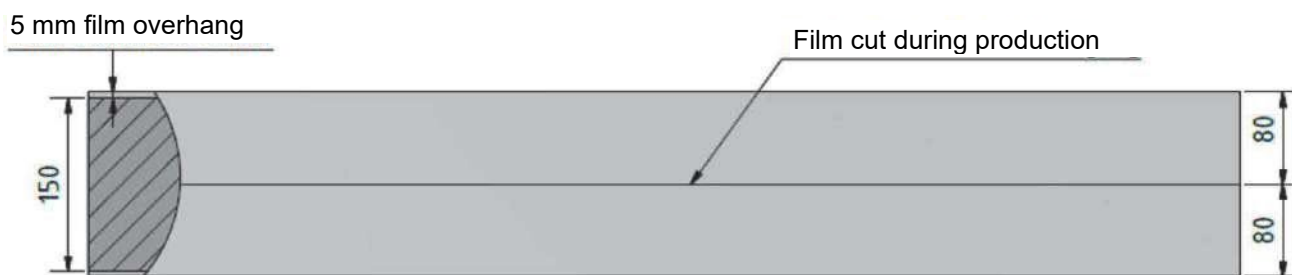


Figure 1: Fradiflex INOX metal waterstop strip or roll (length according to Table 1)

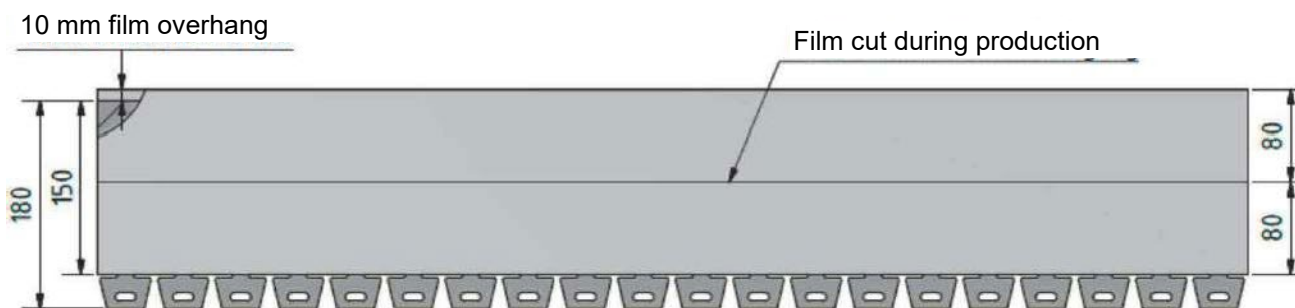
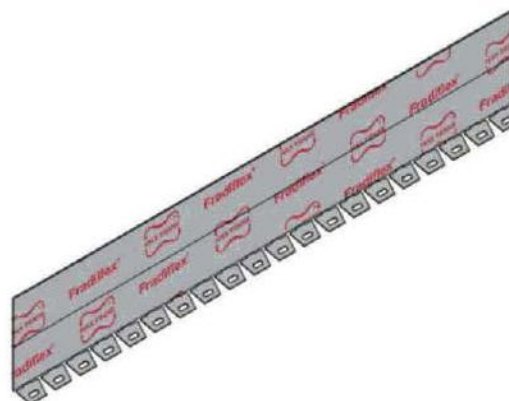


Figure 2: Fradiflex INOX metal waterstop strip or roll with fixing angle (length according to Table 1)



Fradiflex INOX metal waterstop for use in storage and filling systems of liquid manure/slurry/silage effluent (JGS) and biogas plants

Variants and dimensions

Annex 2

Table 1: Basis for the proof of conformity

Subject of approval	Property	Basis	Frequency		Monitoring value
			FPC	External monitoring ¹	
1	2	3	4	5	6
stainless steel sheet	Material	Acceptance test certificate 3.1 pursuant to EN 10204	per delivery	biannually	Annex 1
	Height				
	Sheet thickness				
Coating	Completeness and correctness of the raw components	Acceptance test certificate 3.1 pursuant to EN 10204	per delivery	biannually	Annex 1
	Mixing ratio of the raw components	Applicant's requirements	per batch	biannually	Annex 1
	Density ²	EN ISO 1183-1	--	biannually	Annex 1
	volatile constituents ²	according to deposited test schedule	--	biannually	Annex 1
	Infrared spectrum ²	EN 1767	--	annually	no deviation from deposited data
	Thermogravimetric analysis ²	EN ISO 11358-1	--	annually	

¹ The tests are to be performed on the materials removed representatively from the running production or storage by the inspection body. In the external monitoring, the values documented in the respective acceptance test certificate 3.1 are to be confirmed by testing and documented.

² Identification checks.

Fradiflex INOX metal waterstop for use in storage and filling systems of liquid manure/slurry/silage effluent (JGS) and biogas plants

Basis for the proof of conformity

Annex 3

Continuation of Annex 3, Table 1: Basis for the proof of conformity

Subject of approval	Property	Basis	Frequency		Monitoring value
			FPC	External monitoring ¹	
1	2	3	4	5	6
coated metal waterstop	Thickness of the coated metal waterstop (without protective film)	Thickness measurement method in agreement with the external monitoring body	per batch or every 1000 m ²	biannually	Annex 1
	Thickness of the coating per side				
	Height of the coating per side	Height measurement method in agreement with the external monitoring body			
	Weight per unit length	Weight check			
	Adhesive tensile strength of the coating on the sheet	based on EN ISO 4624			
	Colour	visual inspection			
	Property	visual inspection			
	Change in mass of the coating and change in the adhesive tensile strength of the coating on the sheet after storage in a test liquid of Group 2 of the current DIBt list 7	according to deposited test schedule			

¹ The tests are to be performed on the materials removed representatively from the running production or storage by the inspection body. In the external monitoring, the values documented in the respective acceptance test certificate 3.1 are to be confirmed by testing and documented.
² lower frequency is decisive.

Fradiflex INOX metal waterstop for use in storage and filling systems of liquid manure/slurry/silage effluent (JGS) and biogas plants	Annex 4
Basis for the proof of conformity – continuation of Annex 3	

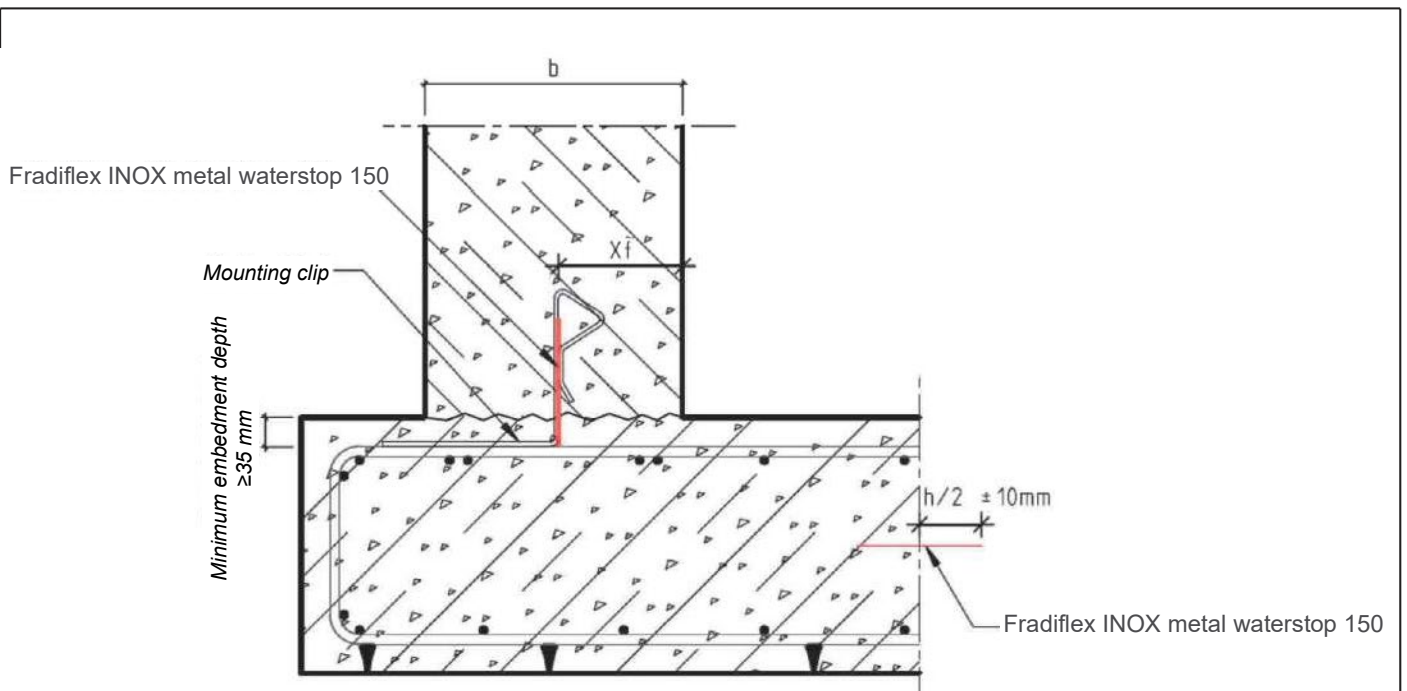


Figure 1: Boundary conditions for the installation of the metal waterstop with non-indented working joints

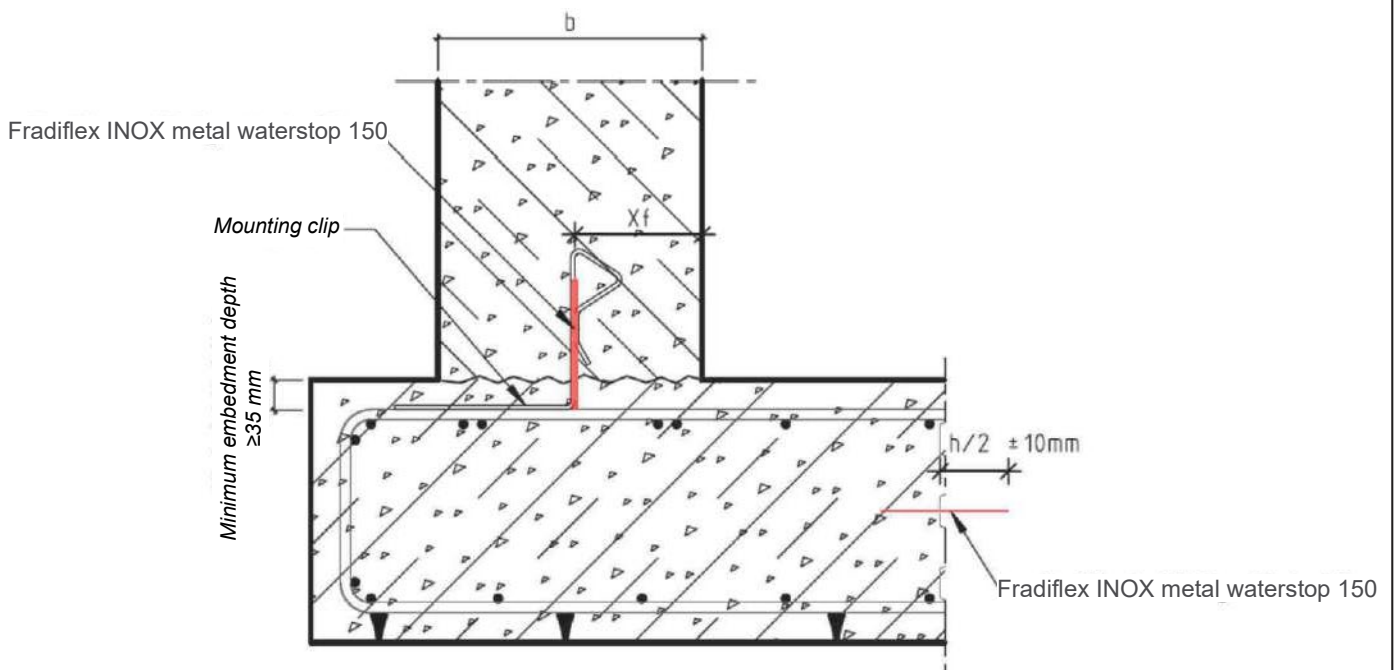


Figure 2: Boundary conditions for the installation of the metal waterstop with indented working joints

The metal waterstop is to be installed centrally in the concrete structure: $\frac{b}{3} \leq X_f \leq \frac{2}{3} b$

A minimum distance of $X_f \geq 90 \text{ mm}$ to the wall surface under load is to be maintained.

Fradiflex INOX metal waterstop for use in storage and filling systems of liquid manure/slurry/silage effluent (JGS) and biogas plants

Notes on planning and design

Annex 5

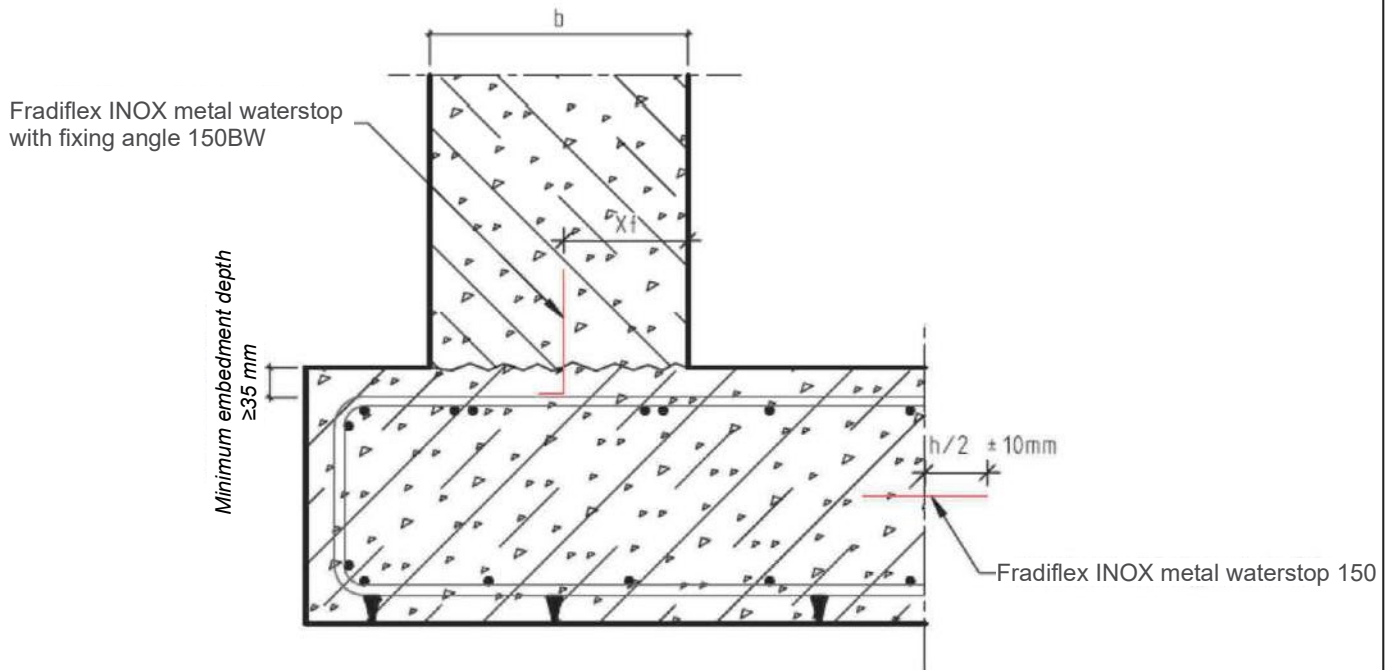


Figure 3: Boundary conditions for the installation of the metal waterstop with fixing angle with non-indented working joints

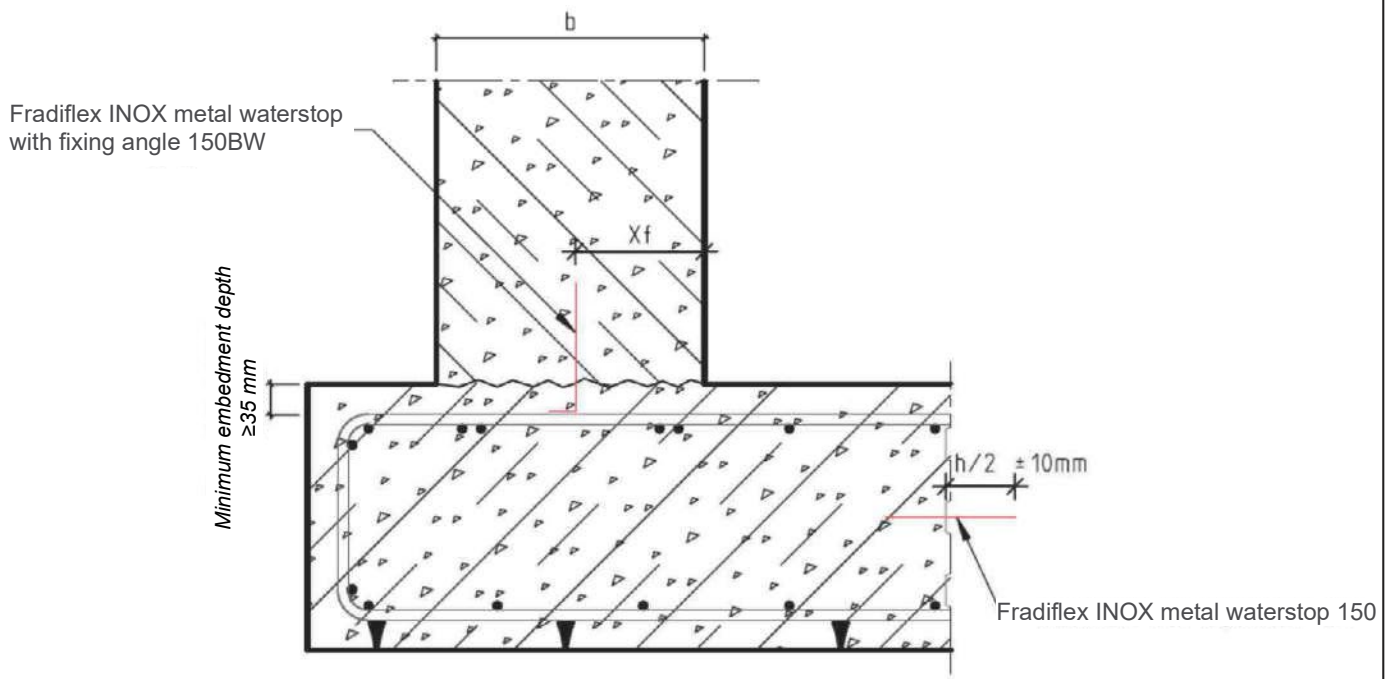


Figure 4: Boundary conditions for the installation of the metal waterstop with fixing angle with indented working joints

The metal waterstop is to be installed centrally in the concrete structure: $\frac{b}{3} \leq X_f \leq \frac{2}{3}b$

A minimum distance of $X_f \geq 90$ mm to the wall surface under load is to be maintained.

Fradiflex INOX metal waterstop for use in storage and filling systems of liquid manure/slurry/silage effluent (JGS) and biogas plants

Notes on planning and design – continuation of Annex 5

Annex 6

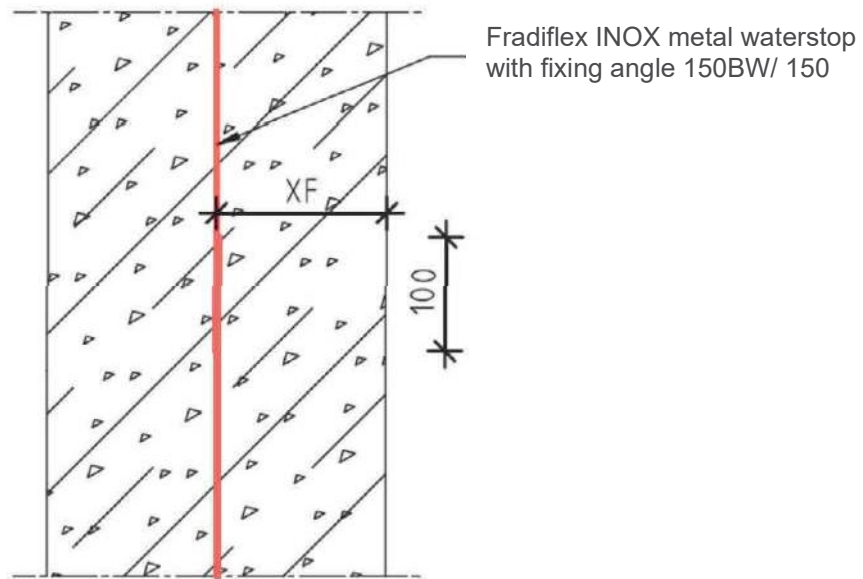


Figure 1: Permissible splice joints for metal waterstops (straight element and rolled goods, with and without fixing angle, see Annex 2)

Connection of the metal waterstops by overlapping and pressing together the self-adhesive coating, overlap distance: min. 100 mm. Fastening by clamping bracket.

Fastening of the metal waterstop on or to the reinforcement with fixing angle or with mounting brackets at distances of 70 to 80 cm.

Cutting the metal waterstop to length on the building site is to be avoided.

The bending radius is to be selected in such a way that there are no negative effects on the metal waterstop coating, e.g. crack formation.

X_f : see Annexes 5 and 6.

Fradiflex INOX metal waterstop for use in storage and filling systems of liquid manure/slurry/silage effluent (JGS) and biogas plants

Execution of overlapping joints, fastening

Annex 7

Seq. no.	Confirmation by the executive company	
1.	Project - Name - Size	
2.	Stored goods:	
3.	Joint waterproofing system Fradiflex INOX metal waterstop for use in storage and filling systems of liquid manure/slurry/silage effluent (JGS) and biogas plants	
4.	Notice: Z-74.101-217 of 15 May 2023	
5.a	Applicant: Max Frank GmbH & Co. KG, Mitterweg 1, 94339 Leiblfing Phone: +49 09427 / 189-0, Email: info@maxfrank.com	
5.b	Company pursuant to AwSV	
5.c	Construction period:	
6.	The specialist personnel from the executive company have been instructed on the proper processing by the applicant of the aforementioned notice.	Confirmation is available yes / no
7.	Assessments and checks before and during the installation of the joint waterproofing system	
	a) Before the installation:	
	- Do metal waterstops and accessories correspond to the installation plan?	yes / no
	- Is the metal waterstop damaged?	yes / no
	- Is the metal waterstop fastened in a stable position?	yes / no
	- Do the system components correspond to the notice?	yes / no
	- Are all components marked in accordance with the notice?	yes / no
	- Is the container filling height less than/equal to 8 m?	yes / no
	- Have all splice joints been executed properly?	yes / no
	b) During and after the installation:	
	- Was the metal waterstop damaged during the installation/concreting/formwork stripping?	yes / no
	- Is the metal waterstop embedded fully and at least 3.5 mm in the concrete?	yes / no
	- Is the axis of the metal waterstop in the centre of the joint, but located at least at a distance of 90 mm to the component edge of the side under load?	yes / no
	- Check by visual inspection: (delete where not applicable)	<div style="display: flex; justify-content: space-around; align-items: center;"> <div style="border: 1px solid black; padding: 2px 10px;">no objections</div> <div style="border: 1px solid black; padding: 2px 10px;">with objections (see remarks)</div> </div>
	Remarks:	
	Date:	Signature / stamp
Fradiflex INOX metal waterstop for use in storage and filling systems of liquid manure/slurry/silage effluent (JGS) and biogas plants		Annex 8
Confirmation by the executive company (SAMPLE)		