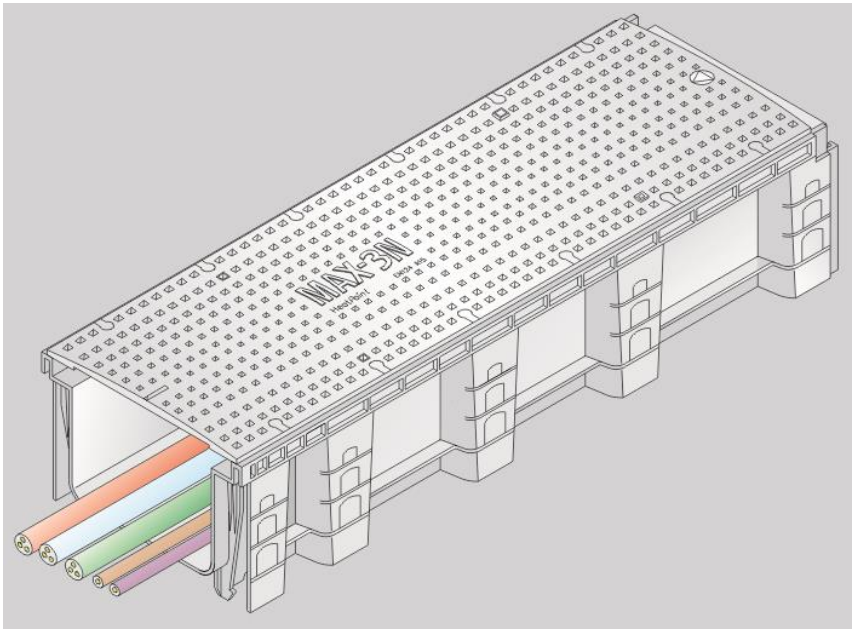
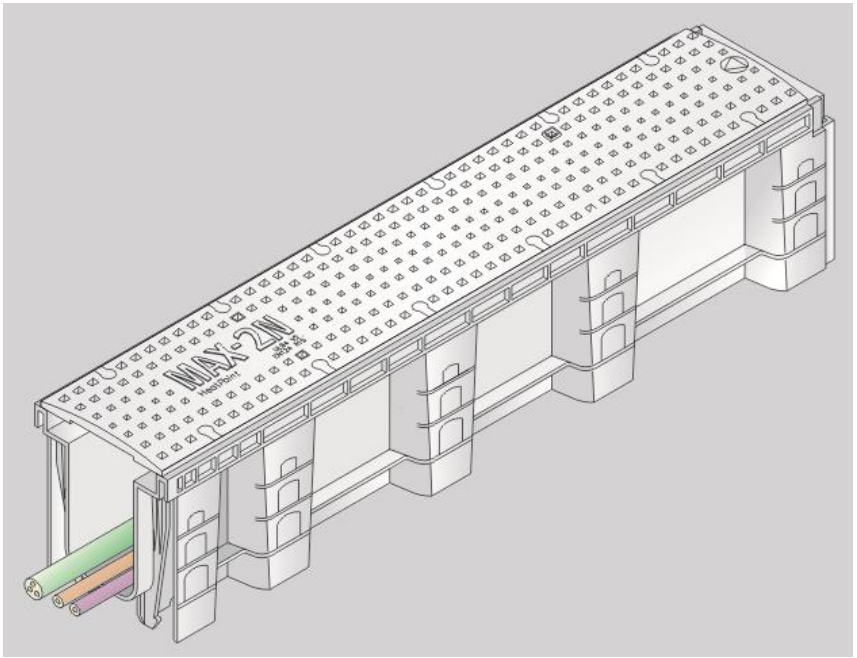
Manual for plastic MAX-N cable ducts (incl. installation- and technical information)

For cabling and tube systems





The sustainable, very strong and tough plastic cable duct

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1. General

These installation instructions describe how and under which conditions the plastic cable duct should be installed and the possible requirements for the building process.




1.1 Scope

These instructions contain specifications and guidelines for using and mounting the plastic cable duct for cabling protection in railway companies.

The cable duct consists of a duct on to which a sealable plastic lid is fitted.
The cable duct is lightweight and easy to handle which ensures that the installation can be performed efficiently and in accordance with Occupational Health and Safety regulations (weight and safety).

1.2 Versions

The cable duct including cover is available in two sizes and both are available in standard light gray. Upon request, both are also available in black/dark gray.

MAX-2N and MAX-3N in standard light grey or (optional) black/dark grey

The description provided in this installation manual is valid for both versions.

2. Description of the plastic MAX-N duct

2.1 Composition of the cable duct

The plastic cable duct consists of a standard duct and sealable lid.

2.2 Principle of the plastic MAX-N duct

The cable duct is used along the railroad in work areas. The ducts are 1 meter long and are hooked into each other in the laying direction, creating a stable duct route. The lid is hooked in the duct. The result is a duct route, correctly locked into place that is vandalism resistant and can withstand large mechanical loads at low and high ambient temperatures.

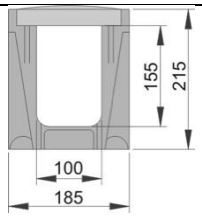
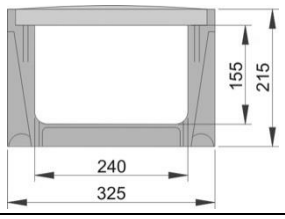
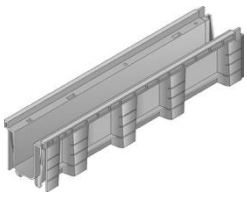
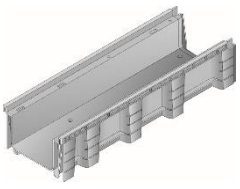
The cable ducts with lids can be installed in different conditions:

1 The upper side of the lid is at ground level thereby eliminating the risk of stumbling.
2 Partially (or completely) built into the ground or on the ground when the substrate is too hard or when the ducts are, for example, temporarily used as protection for aboveground cables.
3 Above ground level on a bridge structure if built into the ground or on the ground is not possible or not desired.
4 Completely underground if desired, for example, because it decreases the risk of cable theft.

2.3 Technical specifications of the cable duct

2.3.1 Dimensions / weight

Type	Dimensions (approx.)		Weight (approx.)
MAX-2N	Internal dimensions: External dimensions:	1000x100x155 mm (LxWxH) 1000x185x215 mm (LxBxH)	3,6 kg
MAX-3N	Internal dimensions: External dimensions:	1000x240x155 mm (Lx WxH) 1000x325x215 mm (LxBxH)	5,1 kg

MAX-2N (in light grey or black)	MAX-3N (in light grey or black)
	
	
	

2.3.2 Material / product properties

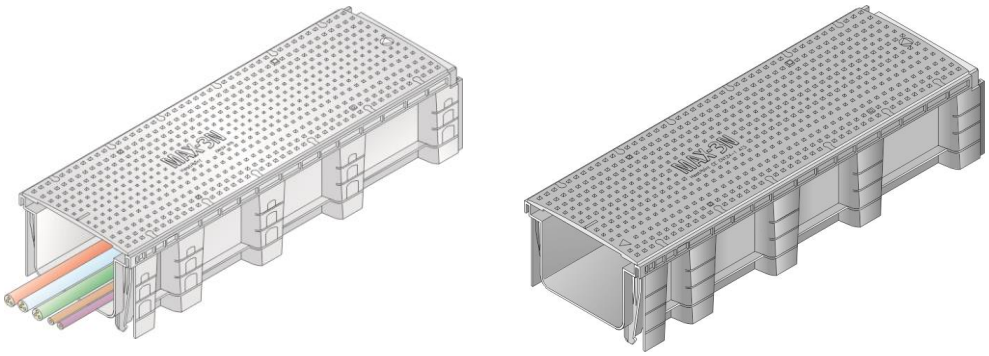
Material	Polypropylene PP
Colour duct / lid	Light grey (duct and lid) or as an option Black/dark grey (duct and lid)
Fire retardant / flammability	Self extinguishing according to IEC 60696-11-10,-20 (UL94V2) / DIN53438-2 K1
Allowed expansion duct / lid	Approx. 1,0% based on extreme temperatures and humidity
Anti-skid lid	According to standard EN124-1 :2015
Thermal characteristics	Durability between -20°C to +80°C while maintaining mechanical properties
Chemical resistance	Water, oil, greases and all other foreign material to be expected in a rail environment
Mechanical (EN124-1 A15)	-Load (repeating) on lid (10kN) ánd steady load on lid 15kN without rupture according EN124-1 :2015 (A15) (**at -10°C and +23°C**). -Internal pressure on lid (surface 10x10cm) >3kN without rupture and detachment of lid (**at +23°C**) -Side pressure on duct (surface 10x10cm) >3kN without rupture and without permanent deformation (<1,0mm). -Side (ground) pressure divided over middle of the duct without lid (surface pressure 10x100cm) is min. 2,5kN making mounting lid on the duct still possible.
UV resistance	UV stable
Environment	-PP does not contain toxic additives and is not mentioned on the European OSPAR & BASTA lists for possible concern substances -Polypropylene is recyclable
Durability duct and lid	25 years (design life-time)

2.3.3 Test documents

Norm	Description	Test document
EN124-1 A15	Load on lid	X
EN124-1	Anti-skid lid	X
CE	EU Declaration of Conformity	X

Norm	Description	Product sheet
IEC60696-11-10,-20	Fire retardant UL94V2	X

2.4 Overview of the main features of the MAX-N cable duct



Several important and relevant practical properties of the duct and lid:

•	The cable duct includes 2 closed upper edges along the long sides in which the lid is placed. This prevents the entry of dirt or sand into the duct from *the sides*.
•	The long side of the lid overlaps the closed upper edge of the duct to prevent dirt from entering the duct from *above*.
•	The ducts are closed off to resist vandalism because the method for locking the lid in place is concealed (combined pull-slide movement). No nails, screws, locks or such are used.
•	The interior of the duct is level and smooth, minimizing the risk of damaging cables and tubes during laying.
•	The ducts slide into each other with a dovetail, without requiring separate fasteners.
•	The strong bottom structure and the partial double walls ensure the stability of the duct and resistance to lateral ground loads.
•	The side of the cable duct has horizontal stabilising partitions to withstand ground pressure from above.
•	The duct and the strong (lid) hooks are resistant to heavy loads from above but also interior pressure due to local expansion of cables and tubes.
•	The lid has a standardised anti-skid profile to minimise the risk of slipping in adverse weather conditions (rain, frost, snow, etc.).
•	The lid includes information on the type of duct, load-resistance classification, norm of anti-skid profile and CE quality mark.
•	The bottom of the cable duct has openings for drainage
•	The lid includes a 1 mm ventilation slot for air circulation purposes at one of the crosscut edges.

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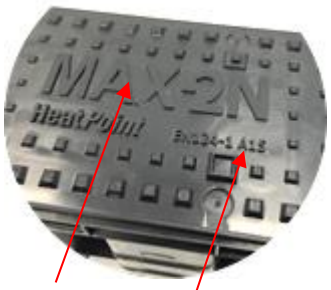
2.5 Other important features of the cable duct

•	The lid has no vulnerable parts (such as hinges or other locking systems) protruding from the sides to minimize the risk of cracks or breakage at low temperatures.
•	The duct and lid retain their properties at very low and very high ambient temperatures with a very low risk on breakage (which could lead in very sharp broken parts).
•	The lid withstand high point loads at low and high temperatures.
•	The dovetail connection has an appropriate tolerance in combination with small position ribs for 'controlled' installation during summer and winter taking expansion / shrinkage into account. Because of this tolerance a certain installation radius is possible without using corner elements.
•	The double side wall of the cable duct has a few holes to discharge the potential upward pressure of groundwater.
•	The cable duct has an indication point foor drilling feed-through holes at both sides of the duct.
•	The duct is suited for the placement of an additional separating duct (for the physical separation of cables and tubes).
•	After installation each individual lid can be opened and closed by using a special hand tool (without affecting the other lid).
•	The interior of the duct is flat and smooth which minimizes the chances of damage to the cables and tubes during laying activities.

2.6 Illustrations of features

(all pictures are of a black duct/lid for better visibility (compared to light gray)

		
Type information on cable duct and lid. Information is based on the EN124-1 A15 standard regarding the lid load and anti-skid classification.	Lid marking to indicate how to open the lid (requires special manual tools).	Strong dovetail connection to connect the cable ducts without additional fasteners.

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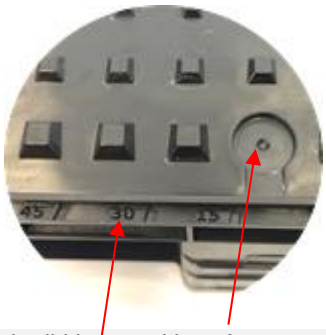
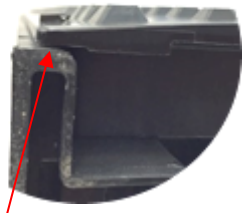
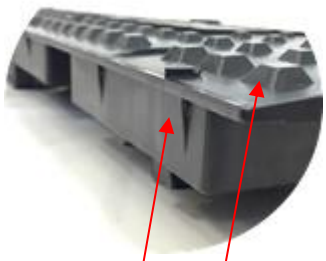
The strong bottom structure and the partial double walls ensure the stability of the duct and resistance to lateral ground loads.	The special honeycomb structure makes the lid resistant to heavy loads (for example, lawnmowers and light diggers).	A click connection in the dovetail prevents the ducts from separating (for example, due to subsidence).
		
The lid and the duct have two triangular markings to indicate the correct position of the closed lid.	One of the crosscut edges of the duct has thin position ribs to absorb expansion and shrinkage.	The lid has markings for additional nails or screws in case these are required (for example, at railway crossings). The cable duct includes markings to saw bends on site.
		
All sides of the duct that do not have double walls, have markings to indicate where to drill holes for cables (max. Ø125 mm).	The length of the duct has two strong raised edges to prevent contamination of the interior of the duct from the sides. The lid is placed between the two raised edges. The lid overlaps the walls to prevent contamination from above.	The lid has a few vertical narrow guiding ribs to simplify the mounting of the lid. The lid has an anti-skid pyramid structure. This limits the risk of slipping when the lid is wet or icy.

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 The lid includes a narrow edge (overlap) which falls over the adjacent duct. It prevents dirt and vermin from entering the duct, it absorbs the expansion and shrinkage of the duct and it ventilates the duct.	 The bottom of the cable duct has drainage and/or fixation openings for anchor pens. The cables can be fastened to the bottom of the cable duct using a metal cable tie-wrap (to prevent theft). (refer to Ch.3.8.)	 The upper edge of the cable duct has small openings to alleviate potential upward pressure of groundwater. The side of the cable duct has horizontal stabilising ribs to withstand ground pressure from above.
 The two position ridges on the underside of the lid have an additional (securing) click system (*see also Ch.2.7)	 The bottom of the cable duct has two recesses for the lid's position ridges (*also see Ch.2.7)	 The strong lid hooks ensure the duct is resistant to vandalism when closed.

2.7 Differences between MAX-2N and MAX-3N

Besides the difference in size between the MAX-2N and MAX-3N, further development has been carried out on the MAX-3N. Because the MAX-2N is more narrow, adjustments on the MAX-2N are not necessary and have not been carried out.
The main new features in MAX-3N (T2) are:

- The anti-skid profile (with lid marking) has been improved and meets the EN standard (see illustration 2)
- An extra (5th) lid hook has been added to the underside of the lid to replace 1 position ridge. The recess in the duct has been adapted accordingly. The closure of the lid on the duct is even better safeguarded in extreme situations (see illustration 1)
- The lid overlap is adjusted on both lid ends, allowing for shrinkage and expansion in extreme situations to be handled even better.
- -Some ribs on the underside of the lid are thickened in favor of a higher load strength.

Illustration 1: 5th lid hook at MAX-3N

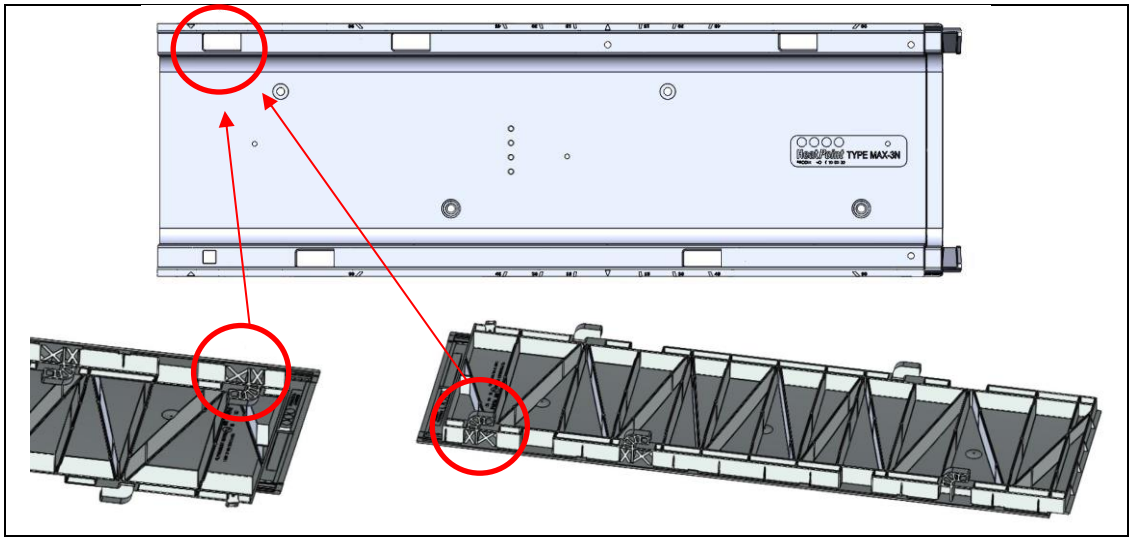
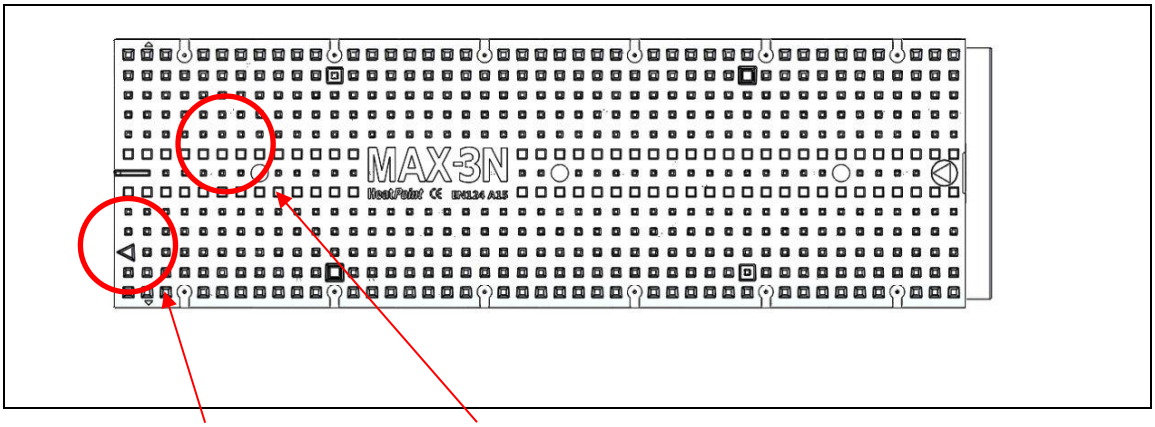


Illustration 2: raised lid profile and lid marking for lid lifter position



Lid marking for lid lifter *Raised anti skid profile*

Note:
Due to the changes in the MAX-3N duct and lid, the lid no longer fits on the earlier duct type.

2.8 Life Cycle costs (LCC)

The Life Cycle Costs are reduced to a minimum as a result of a long design life time, use of a very appropriate material and very limited maintenance. The costs reduction is achieved by:

- use of strong, tough and high quality plastic material with minimal risk of breakage (also at a low temperature)
- a design taking into account an optimal strength to weight ratio allowing competitive product costs
- long lifecycle due to UV resistance of the prime material and use of a (very limited) percentage of UV-reducing carbon black.
- easy and fast installation of the ducts and lids without additional fixation parts
- low transportation costs through efficient packaging.

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2.9 RAMSHE

Reliability, Availibility, Maintenance and Safety are key issues for the design and installation of MAX-N cable duct and lid. The cable duct and lid are very stable and strong preventing cable damages.
The lid has a special locking system which is not affected by sand or contamination and can be opened many times without damaging the duct or lid.
Polypropylene is fire retardant / self extinguishing.

2.10 Environment / sustainability

In relation to Environmental issues the used Polypropylene for the duct and lid is without toxic and polluting additives (only a very small percentage non-toxic UV stabilizer is added).

Note: The toxic and/or environmentally polluting additives are mostly used in other plastic compounds in order to make the product fire retardant and self-extinguishing.

After use or at the end of the lifecycle, the raw materials van be easily classified for recycling purposes, without polluting additives. There is no uncertainty about (future) recycling, processing and (future) regulations and costs.

The used Polypropylene is not classified as a polluting material and not mentioned on international lists of polluting materials such as :
-OSPAR (EU chemical list of priority action or chemical list of possible concern)
-BASTA (Scandinavian list of chemicals with hazardous properties)
-RIVM (Dutch report for classification methods for dangerous cable waste materials)

In relation to the 'Greenhouse Gas Protocol' and the use of the MAX-N cable ducts the CO2 emissions have been identified and quantified in the value chain during the entire life cycle.
The following processes are elaborated :
Compound processing, compound transport, production cable duct and lid, transportation site location, installation and destruction/recycling.
The result is a significantly low CO2 emission.

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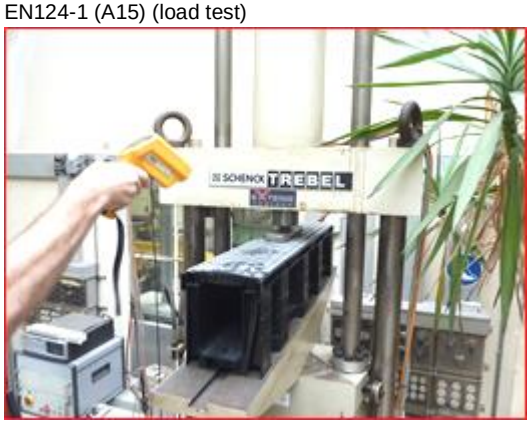
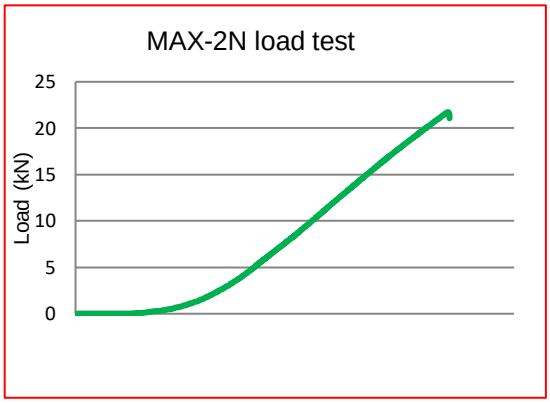
2.11 Testing cable ducts

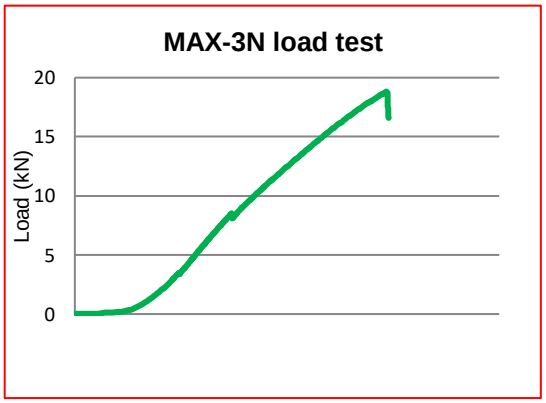
The cable ducts have been tested by Dekra Rail Netherlands, an independent Notified Body with accreditations according to the relevant EU standards.

EN124-1 (A15) (load test)





EN124-1 (A15) (load test)



3. Laying of the plastic cable duct

3.1 General

The plastic MAX-N cable duct can be installed in, on, above or below the ground.
The basic principle is that the duct is always well supported, so that subsidence, rise or buckling in sand, earth, ballast, etc. cannot occur.

3.2 Safety measures

Observe the workplace safety rules. Furthermore, for all other safety aspects, reference is made to the client's available safety documentation.

3.3 Preparations

Depending on the application and method of installation of the duct, the duct route must be well prepared. The type of duct, the correct numbers of specials such as corner elements and other accessories must be determined in advance. Naturally, the installation instructions must be read carefully so that the correct working method is applied.

3.4 Required tools

- Mini-digger or shovel (depending on the intended use)
- Broom and plastic hammer.
- Lid closer/opener (T-wrench) with lid lifter.

3.5 Processing temperature

The plastic cable duct may be installed as long as the ambient temperature is higher than 0°C because frozen ground does not properly enclose the sides of the cable duct.

3.6 Guidelines

The following aspects are to be considered as guidelines during and after installing the cable ducts and lids:

- The cable duct alignment may not be used as a route for cars.
- The duct can be placed in the ground with the lid at ground level but on or above the ground is also possible.
- The ducts should be correctly slid and clicked into each other
- The lids should be closed correctly (the position ridge(s) have to be clicked into the duct recesses)
- Prevent striking or dropping of cable ducts and lids on the ground to prevent any damage.

(*) dependening on the application (refer to section 2.2)

3.7 Corner elements

Corner elements should be used when the specific angular displacement in the alignment cannot be laid using the standard cable ducts. The following corner elements are available:

- Horizontal corner element for corner 15°,30°,45° and 90°
- Horizontal corner element (T-piece) with 90° branche
- Horizontal corner element (T-piece) with radius for 90° branche. This concerns corners and branches for cables with a large corner radius that can't be installed using standard elements.
- Vertical corner element for corner 15° and 30°

There are **left-angled and right-angled horizontal corner elements**. Left and right are always defined in the laying direction. Take this into account when taking stock of the available material on site. The **vertical corner elements are universal**.

Each lid section for the corner element is secured using special fastening bolts because lid hooks can not be used. The lid can be opened and closed multiple times without requiring the substitution of either the lid or the duct.

3.8 Procedure

The procedure to install the cable ducts is included in annex A.

Brief overview of (potential) work methods (if the lid is installed at ground level (*))

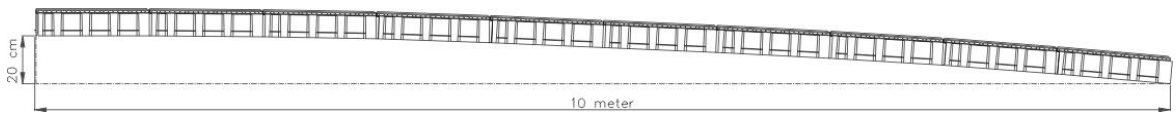
1	Dig the trench as accurately as possible. The trench dimensions are approx. 10 cm wider and 3 cm higher than the actual duct dimensions (see also Section 2.3.1). Remove all (larger) stones.
2	Loosen approx. 2-3 cm of the soil using a shovel or similar tool (or add sand) to ensure the cable duct can be pressed down sufficiently (for stability purposes).
3	Place a span wire (or use a laser) to ensure the trench is straight.
4	Place the 1st cable duct in the trench, taking the laying direction into account. The 2nd cable duct must slide into the preceding cable duct from above. Ensure that the cable duct is slid into the preceding cable duct far enough to click together (use a rubber hammer, not a heavy metal hammer or something similar). Ensure the cable duct is pressed down sufficiently in the loose soil.
5	Use the minidigger or shovel to add enough sand or soil under the (stabilising) ribs. The cable ducts are now firmly laid in the ground and cannot subside.
6	Add sand or soil up to the upper part of the cable duct and compact it (tamp down).
7	Clean the cable duct using a broom and lay the required cables.
8	Place the lid in the laying direction on top of the cable duct, making sure that the hooks are in the cable duct recesses. Slide the lid in the laying direction (using the T-wrench) to ensure that the lid hooks into the cable duct (pressing the standard slightly domed lid ánd the lid at the position of the 5th hook at MAX-3N gently downwards). The lid is placed correctly when the positioning ridges (2 ridges for MAX-2N and 1 ridge for MAX-3N) **click into the recesses and the 2 triangle marks on lid and duct are at the same position pointing to each other**.

(*) Refer to section 2.2 for other applications. The work method has to be adapted to the local situation.

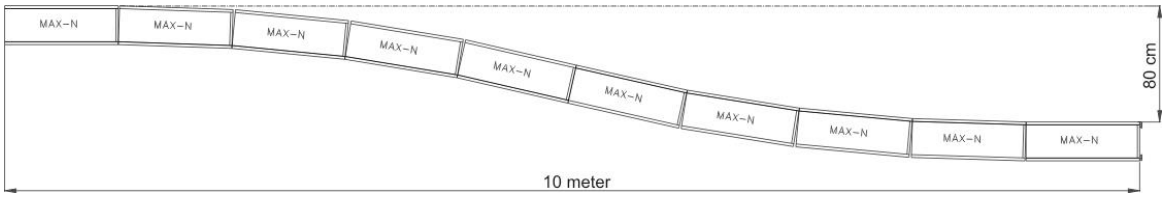
Tip: in case of ballast foundation, a tile can be placed under the transition between 2 cable ducts to simplify the alignment of the duct route.

General remarks:

a	Only place the lids after the cables have been laid.
b	The standard cable duct route, without using corner elements, may be laid as follows (using the available tolerance in the dovetail connection): à The (vertical) deviation may not be greater than 20 cm over a distance of 10 metres (from ground level upwards or downwards) (see drawing). à The (horizontal) deviation may not be greater than approx. 80cm over a distance of 10 metres (from the continuous duct alignment to the left or right) (see drawing).



Example: Vertical displacement without corner elements



Example: Horizontal displacement without corner elements

3.9 Fitting and removing the lid

A lid can easily be fitted and removed

Short overview of the procedure for fitting the lid (see also annex B)

1. Place the lid on top of the duct in the proper laying direction (with the hooks in the duct recesses).
2. Stand with both feet on the lid (at MAX-2N in the middle of the lid and with MAX-3N more forward due to the 5th hook) with your back to the laying direction and place the T-wrench in the space between the two lids.
3. Turn the T-wrench to move the lid on which you are standing backwards in the laying direction. The lid hooks into the duct and the positioning ridge(s)
4. into the duct recesses (2 ridges at MAX-2N and 1 ridge at MAX-3N). Press the position ridge(s) applying little force into the duct (click connection). Do not apply any unnecessary force.

Short overview of the procedure for removing the 1st lid (see also annex B)

1. Place a lid lifter between the end of the duct and the lid (in the ventilation slot) to ensure that the lid is raised sufficiently from the click connections.
   ATTENTION: with the MAX-3N with only 1 click ridge, place the lifter only at the triangle symbol Δ.
2. Place the T-wrench between the other end of the lid and the adjacent lid.
3. Turn the T-wrench to press the lid hooks out of the duct and remove the lid manually.

3.10 Special details when installing the cable duct

The following special conditions may be applicable when laying a cable alignment:

1	When the cable duct has to be shorter than the standard length of 1 meter, the cable duct can be shortened using a manual saw. Remove the central section of the cable duct. Both ends are required and cannot be removed (see also annex C).
2	Take the possible expansion or contraction of the cables and tubes to be laid due to internal and/or external temperature influences (heat generated by the cables and/or solar radiation) into account. The following aspects are important: • The temperature during the laying of the cables and tubes. • Expansion coefficient for the cables and tubes. • Length of the cables and tubes. • Remaining available space in the cable ducts after the cables and tubes have been laid.
3	In a connection between a plastic cable duct and an inspection chamber (manhole), the duct should be connected to the inspection chamber with secure and sufficient support.
4	Cable feed-through holes can be added at the side or bottom of the duct. A plastic tube (max. Ø125mm) may be fitted and secured to the duct.
5	The ends of the MAX-N duct can be sealed by applying end plates which prevent entry of dirt.
6	In case of a transition from a MAX-2N to a MAX-3N (or vice versa) special transition (connection) elements may be used.
7	The ducts and the lids are made of plastic that becomes stronger and tougher during the first few months after it is installed. It is important to be careful during installation.
8	Track crossings are possible using metal brackets or by connecting to a hollow sleeper.

4 Ordering method

The plastic MAX-N duct materials can be ordered from:
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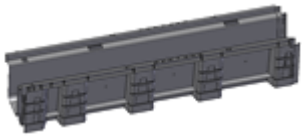
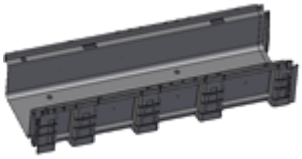
4.1 Order list of standard materials for the cable duct (MAX-N)

See overview corner elements annex D

Pos.	Description of duct item	Illustration
1	Plastic duct type MAX-2N	
2	Plastic lid type MAX-2N	
3	Plastic duct type MAX-3N	
4	Plastic lid type MAX-3N	

4.2 Shipment (road)

The cable ducts are supplied in the following quantities per pallet (105 x 120 cm):

	1 pallet
MAX-2N	77 pieces (as a set of duct and lid)
MAX-3N	42 pieces (as a set of duct and lid)

The ducts and lids are each packaged on their own pallet and combined onto a single block pallet.

The pallets include sufficient plastic wrapping to prevent the material from shifting or falling.

pallet ducts
pallet lids

Option:

	1 pallet	1 pallet
MAX-2N	99 pieces ducts	420 pieces lids
MAX-3N (T2)	54 pieces ducts	240 pieces lids

A full truck can transport 24 (sometimes 26) pallets, depending on the available truck.
Each pallet has a project / information label.

4.3 Storage and packing

The ducts and lids can be stored at an outdoor location.
Wooden one-way pallets and packing materials become the property of the customer upon delivery and should be discarded by the contractor in an environmentally friendly manner.

4.4 Inspection and completion

Prior to completion, special attention should be paid to the following aspects during the inspection:

- Damage and/or breakage of the duct and/or lid
- Secure fit of the lid on to the duct
- Use of the appropriate fasteners in corner elements
- Proper application of the filling sand at the sides of the duct.

4.5 Guarantee

The standard guarantee period is 12 months starting from the date of delivery.

The guarantee is void if the ducts and lids are not installed according to the instructions or have in any way been handled improperly.
The guarantee is also void when possible expansion or shrinkage of the installed cables has not been sufficiently taken into account.

Heatpoint is not liable for any labour and safety costs (direct and indirect) if materials are to be replaced under guarantee.

4.6 Return

Due to the variety of various materials we do not take back remaining products after deliveries. We therefore recommend to perform a good pre-inspection. We can possibly advise on this.

5 Disposal instructions

The duct, lid and other parts do not contain any environmentally hazardous substances and can, therefore, be disposed of by a recycling facility without special instructions being required.

List of annexes

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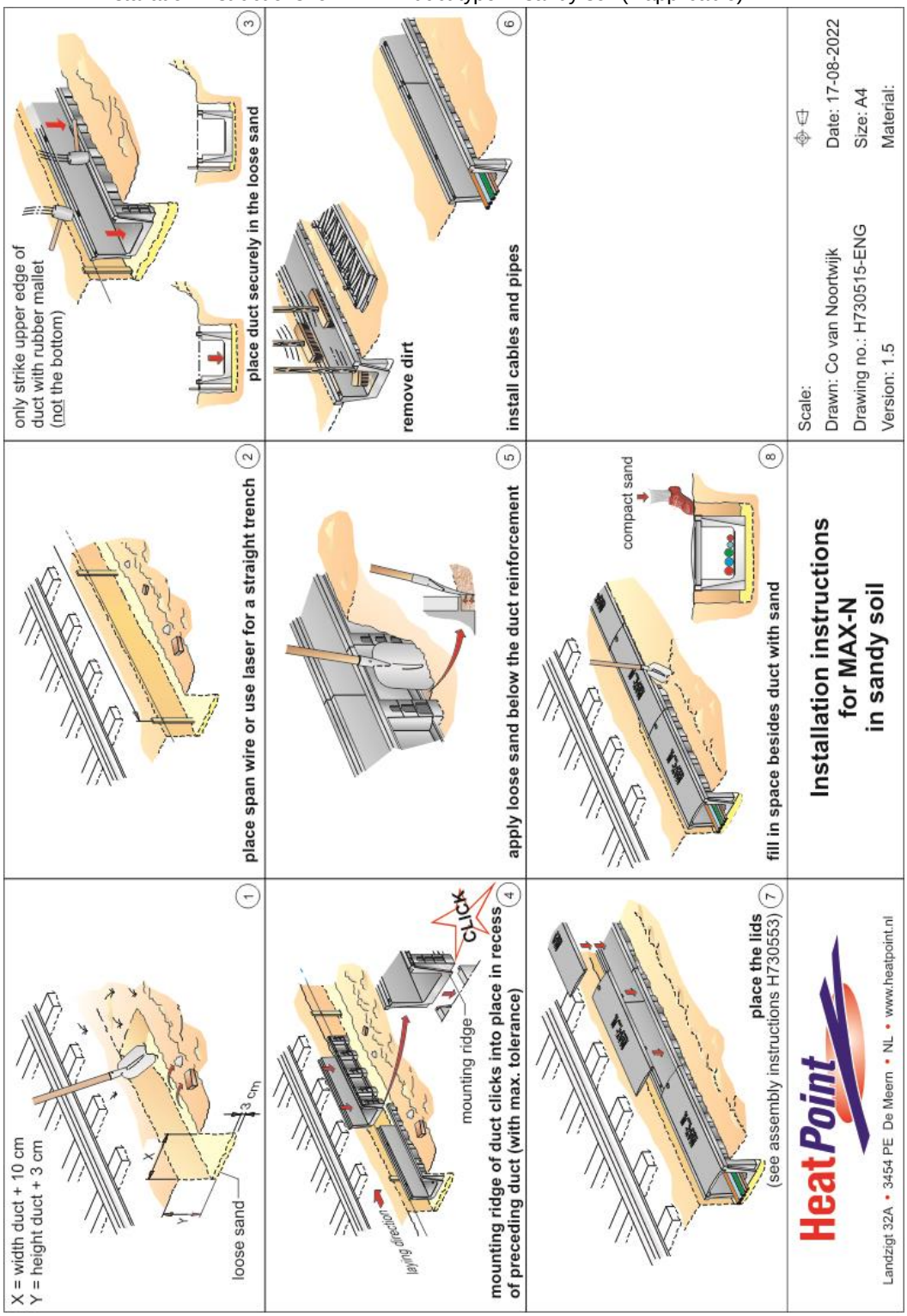
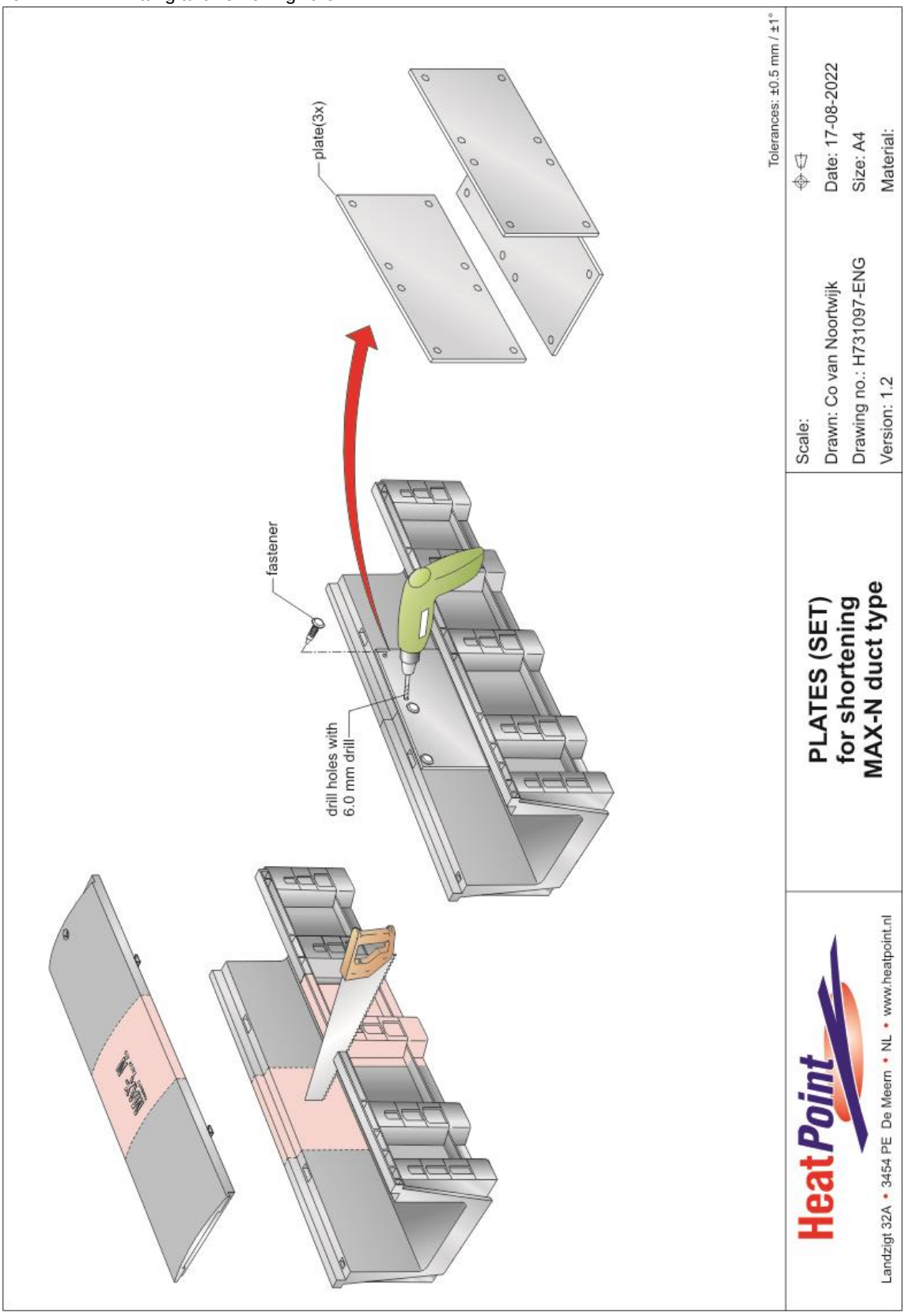
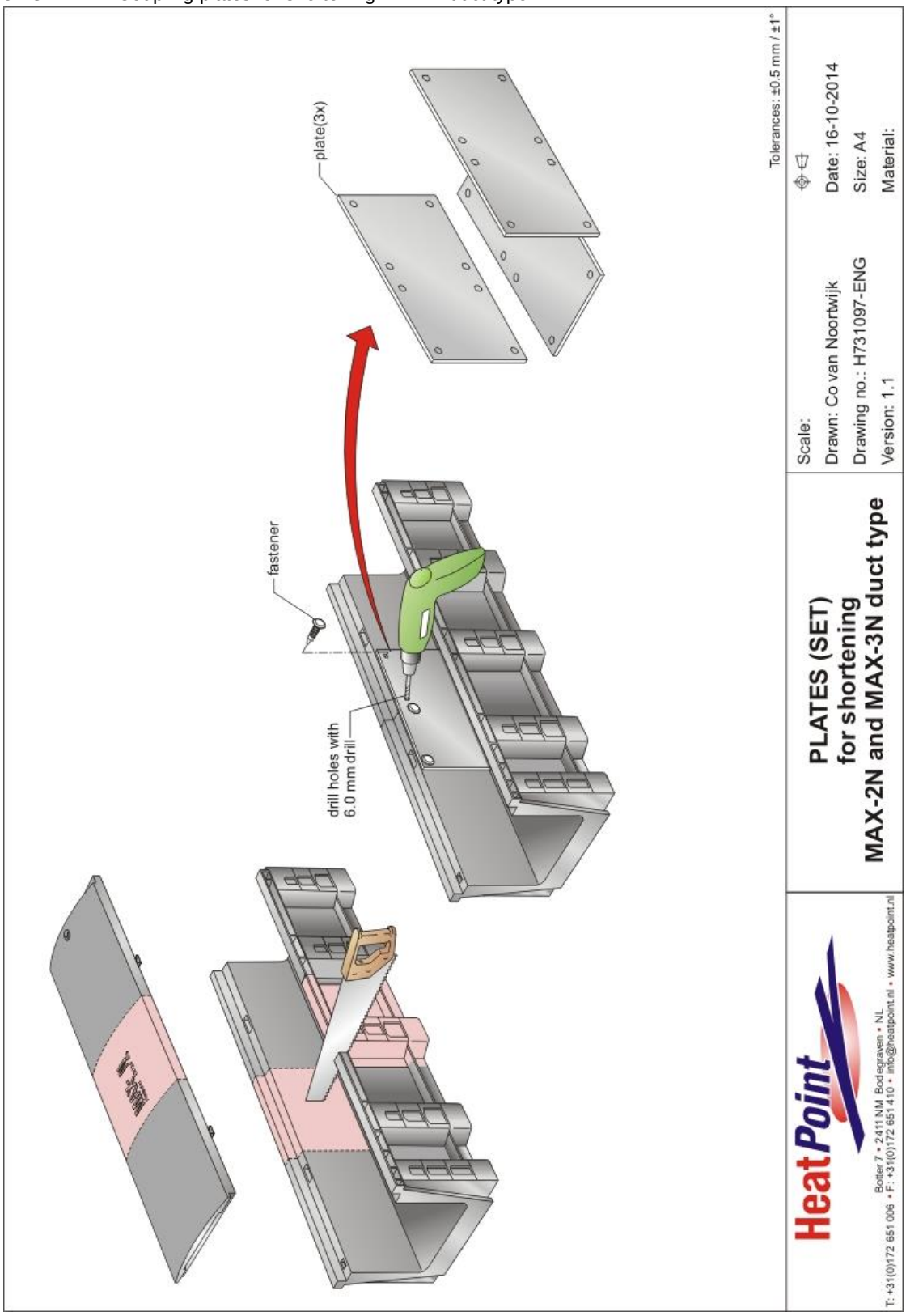
Annex A Installation instructions for MAX-N duct type in sandy soil (if applicable)



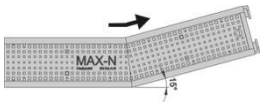
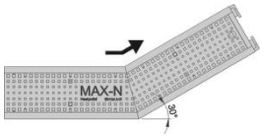
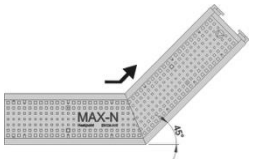
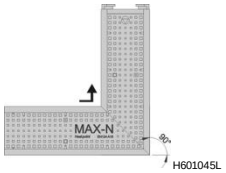
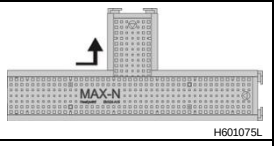
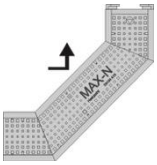
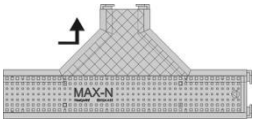
Annex B Fitting and removing lid of MAX-N

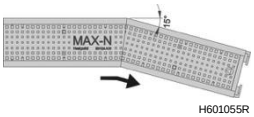
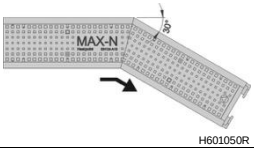
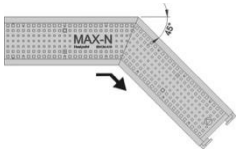


Annex C Coupling plates for shortening MAX-N duct type



Annex D Corner elements MAX-2N & MAX-3N

Pos.	Description of MAX-2N & MAX-3N duct – *LEFT*	Illustration (indicative)
1	Horizontal corner element with lid 15° LEFT in laying direction incl. screws	
2	Horizontal corner element with lid 30° LEFT in laying direction incl. screws	
3	Horizontal corner element with lid 45° LEFT in laying direction incl. screws	
4	Horizontal corner element with lid 90° LEFT in laying direction incl. screws	
5	T-piece with branch and lid 90° LEFT in laying direction, incl. screws	
6	Horizontal corner element with radius 90° LEFT in laying direction incl. screws (also refer to Annex E and F)	
7	T-piece with branch and radius 90° LEFT in laying direction incl. screws (also refer to Annex E and F)	

Pos.	Description of MAX-2N & MAX-3N duct – *RIGHT*	Illustration
1	Horizontal corner element with lid 15° RIGHT in laying direction incl. screws	
2	Horizontal corner element with lid 30° RIGHT in laying direction incl. screws	
3	Horizontal corner element with lid 45° RIGHT in laying direction incl. screws	

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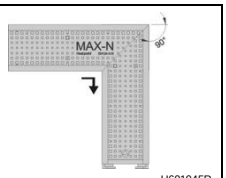
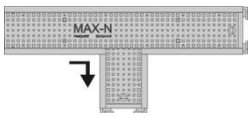
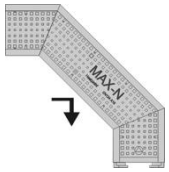
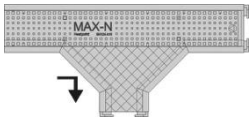
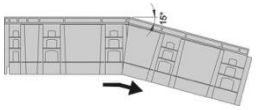
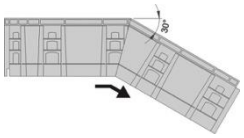
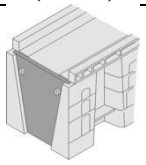
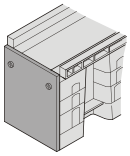
4	Horizontal corner element with lid 90° RIGHT in laying direction incl. screws	 H601045R
5	T-piece with branch and lid 90° RIGHT in laying direction, incl. screws	 H601075R
6	Horizontal corner element with radius 90° RIGHT in laying direction incl. screws (also refer to Annex E and F)	 H601085R
7	T-piece with branch and radius 90° RIGHT in laying direction incl. screws (also refer to Annex E and F)	 H601080R

Pos.	Description of MAX-2N & MAX-3N duct	Illustration (indicative)
1	Vertical corner element with lid 15° universal incl. screws	 H601060
2	Vertical corner element with lid 30° universal incl. screws	 H601065

Pos.	Description of MAX-2N & MAX-3N duct accessories	Illustration (indicative)
1	End plate for duct (trapezoid including 2 screws)	 H601001
2	End plate for duct (rectangular including 2 screws)	 H601002
3	Coupling plate set to shorten MAX-2N duct incl. fasteners	 H331200

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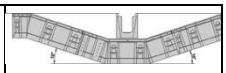
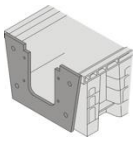
4	Crossing with exsisting duct incl. screws (also refer to Annex E and F)	 H601090
5	Transition element from MAX-2N à MAX-3N incl. screws	 H601004
6	Torx screws (per 100 units) to secure lid (optional)	 H101550
7	Fastener (per 100 units) to fix coupling plate (optional) (also refer to Annex C)	 H321016
8	T-wrench incl. lifting tool for fitting and removing lid.	 H330554

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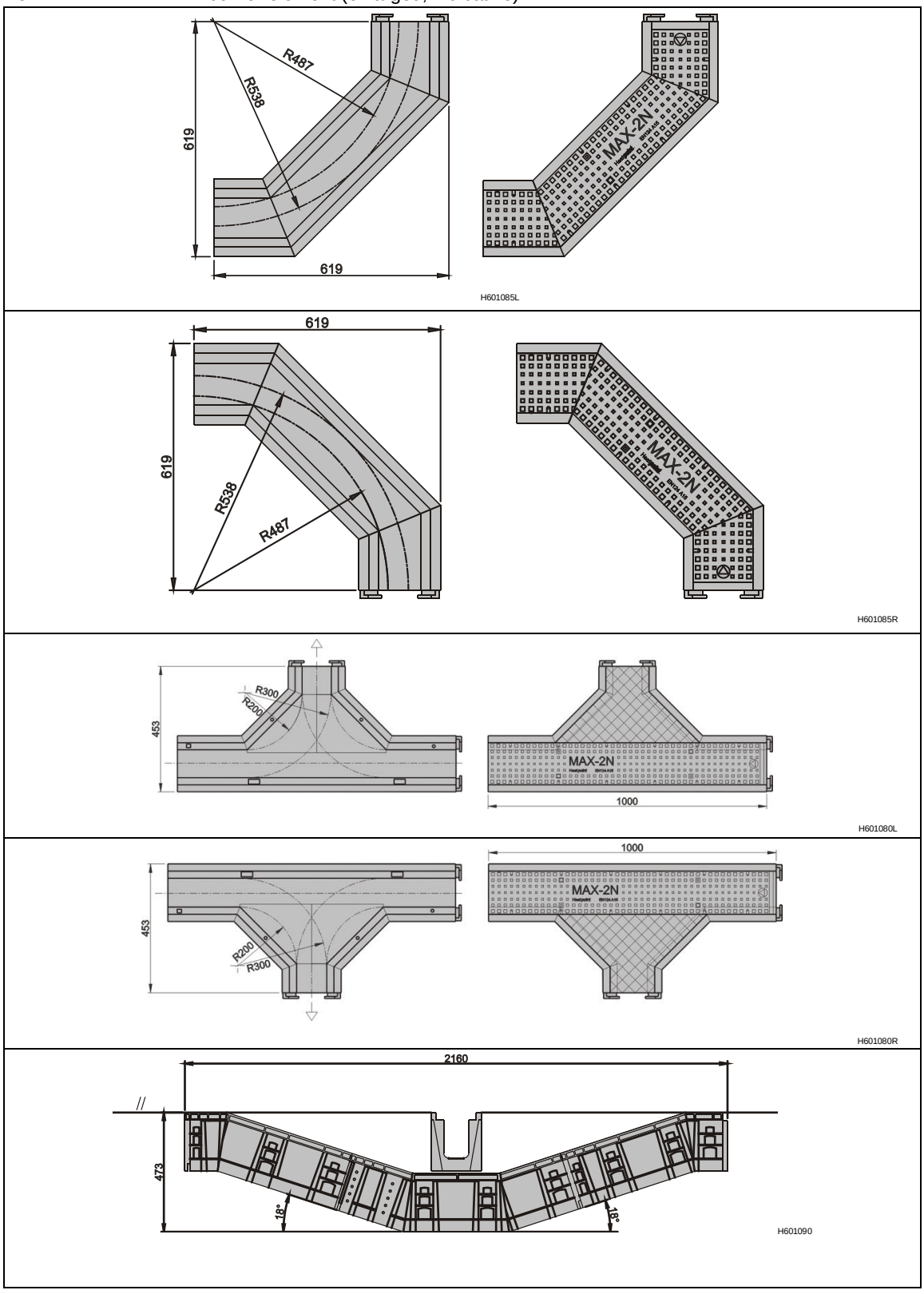
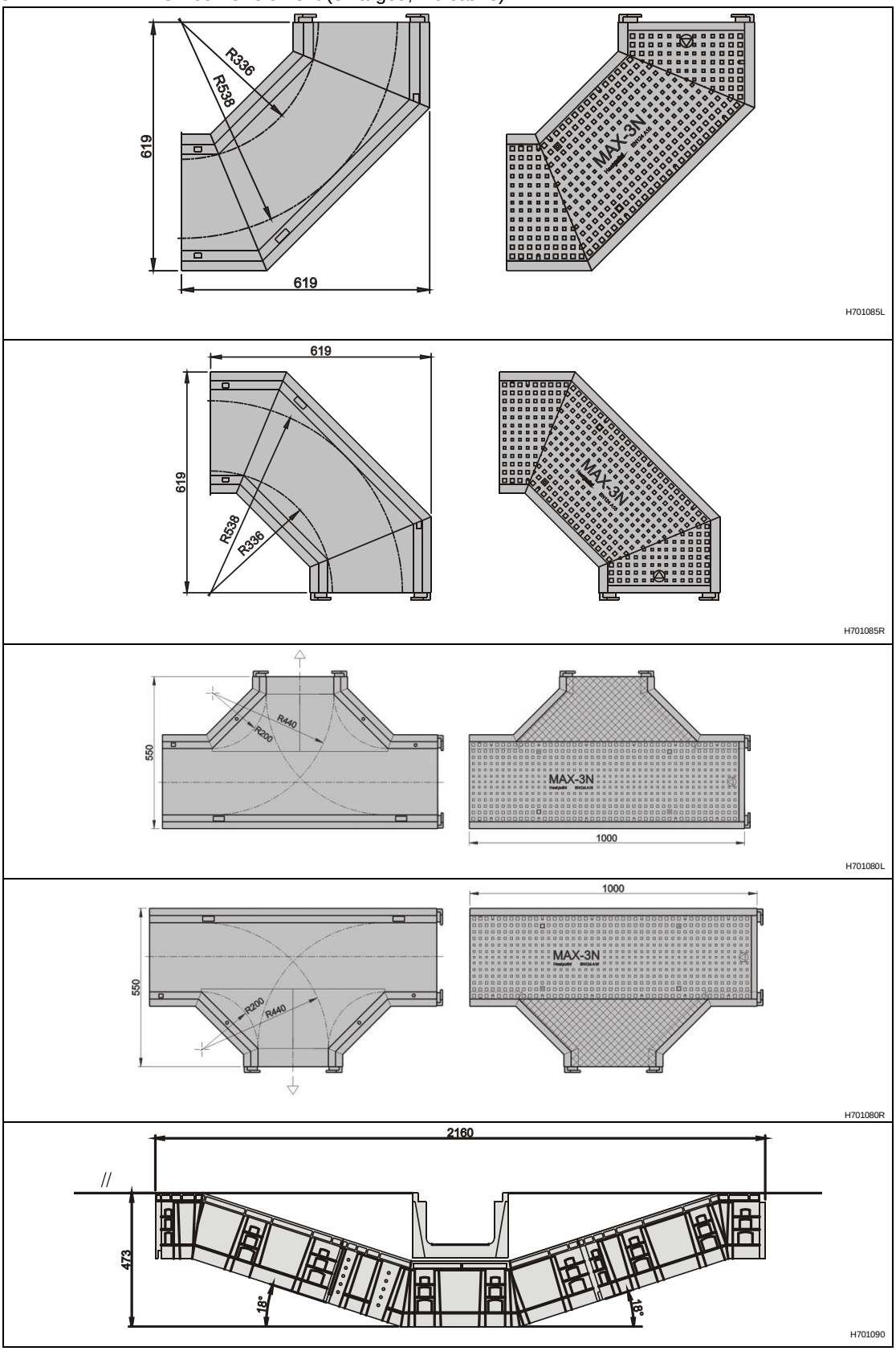
Annex E MAX-2N corner element (enlarged, indicative)



Annex F MAX-3N corner element (enlarged, indicative)



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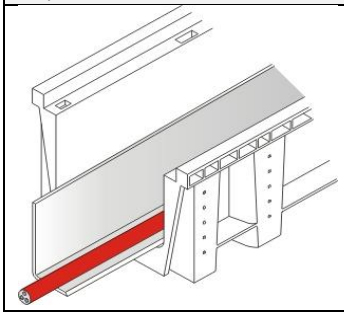
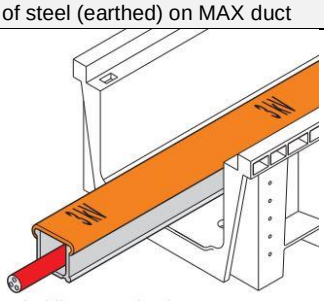
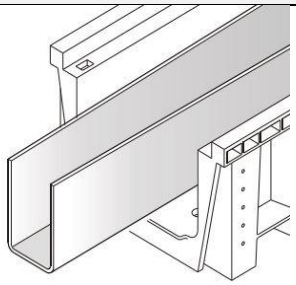
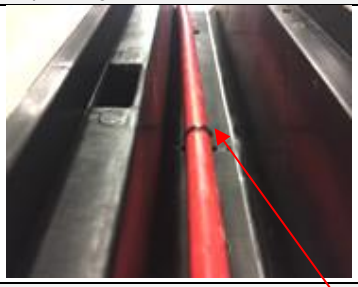
Annex G Special work methods

The following special conditions may be applicable:

		
Inspection chamber MAX-S	Lid of steel (earthed) on MAX duct	Concrete lid on duct
		
Separating profile L-3000	Separating duct S-5000	Separating duct U-5000
		
Rail crossing	Steel (plastified) cable binder	Cable ducts placed side by side
		
Cable ducts on bridge construction		

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