Universal high perfomance nylon plug, for use in concrete and masonry

T-NUX

Assessment ETA acording ETAG 020.

PRODUCT INFORMATION

DESCRIPTION
Universal high performance nylon plug, for use in concrete and masonry.

OFFICIAL DOCUMENTATION
- CE-1219-CPR-0088.
- ETA 14/0467 according to ETAG 020 for multiple use in concrete and masonry for non-structural applications.
- Declaration of performance DoP TNUX-n.

SIZES
Ø8x80 to Ø10x230.

DESIGN LOAD RANGE
From 1,4 to 1,9 kN (C12/15).
From 1,9 to 2,8 kN (≥C16/20).

BASE MATERIAL
Conrete class C12/15 and contrete ≥C16/20.

ASSESSMENTS
- Multiple use.
- Fire Resistance R30-90.

14
Técnicas Expansivas S.L.
Segador 13. Logroño. Spain
ETA 14/0467
1219
Fixings in concrete, masonry, aerated concrete

FIRE RESISTANCE

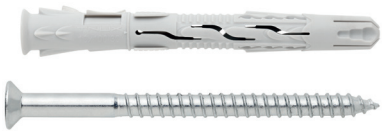
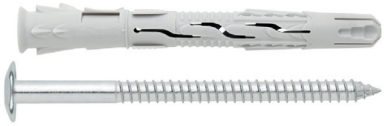
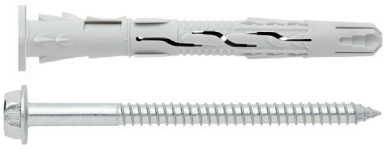
CHARACTERISTICS AND BENEFITS
- Easy installation.
- Suitable for a variety base of materials: concrete, stone, solid masonry, hollow masonry, hollow concrete, etc.
- Use for medium loads.
- Installation through the clearence hole in the fixture.
- Variety o plug versions: standard plug or wide collar plug.
- Variety of screws, countersunk, hexagonal and truss head. Zincplated coating or stainless steel made.
- Variety of lengths and diameters: flexibility in assembly.
- Recommended when reduced edge distance and spacing are required.
- When the plug performs the expansion it makes a knot, which makes it specially suitable for hollow materials or when the base material where the fixation is made is unknown.
- For static and quasi-static loads.
- Direct installation; no need of dinamometric wrench.
- Available at INDEXcal.

MATERIALS
Screw: Carbon steel with zinc-plated coating or stainless steel made.

Plug: Polyamide 6 grey color.

APPLICATIONS
- Window and door frames fixings.
- Garages doors.
- Handrails.
- Façade rehabilitation.
- Double-skin facades.
- Indoor and outdoor uses.
- Fixing of stone cladding for facades.

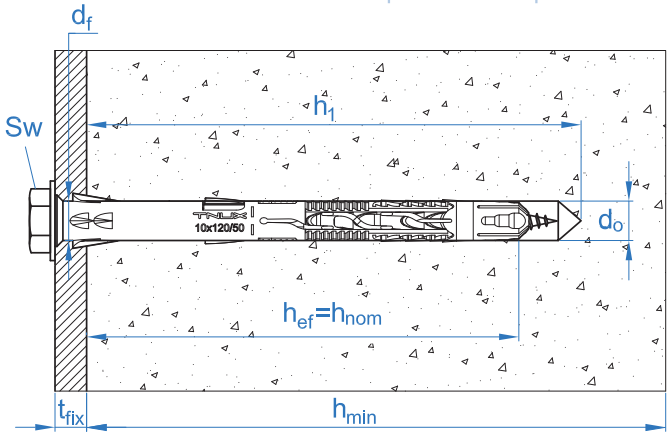
HIGH PERFORMANCE NYLON PLUG RANGE

ITEM	CODE	PHOTO	COMPONENT	MATERIAL
1	TNUXA		Nylon plug	Polyamide 6
			Countersunk head screw	Zinc-plated steel
2	TNUXE		Nylon plug	Polyamide 6
			Hexagonal head screw	Zinc-plated steel
3	TNUXT		Nylon plug	Polyamide 6
			Truss head screw	Zinc-plated steel
4	TFUXE		Wide collar nylon plug	Polyamide 6
			Hexagonal head screw	Zinc-plated steel
5	TNXA4		Nylon plug	Polyamide 6
			Countersunk head screw	Stainless steel A4, AISI 316
6	TNXEA4		Nylon plug	Polyamide 6
			Hexagonal head screw	Stainless steel A4, AISI 316

FIXING IN CONCRETE

MECHANICAL PROPERTIES				
Screw diameter			Ø8	Ø10
A_s	Threaded area section of screw	(mm^2)	28,2	38,4
Steel type			Zinc-plated	Stainless steel
$f_{u,s}$	Characteristic resistance of the screw	(N/mm^2)	600	700
$f_{y,s}$	Yield strength	(N/mm^2)	440	450

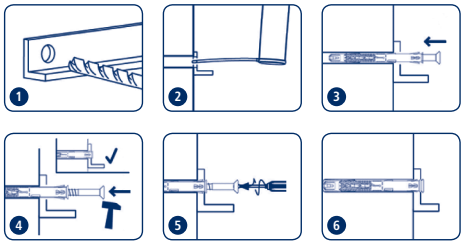
INSTALLATION DATA						
DIAMETER			Ø8		Ø10	
Code			TNUX / TFUX		TNUX / TFUX	
d_0	Nominal diameter of drill bit	[mm]	8		10	
d_f	Diameter of clearance hole in the fixture	[mm]	8,5		11	
$L_{mín}$	Minimum length of anchor	[mm]	80		80	
$L_{máx}$	Maximum length of anchor	[mm]	250		300	
h_1	Minimum drill hole depth	[mm]	90		90	
h_{nom}	Installation depth	[mm]	70		70	
h_{ef}	Effective emdment depth	[mm]	70		70	
T_{fix}	Maximum thickness of fixture	[mm]	L - 70		L - 70	
d_s	Screw diameter	[mm]	6		7	
L_s	Screw length	[mm]	L + 6		L + 6	
L_t	Screw thread length	[mm]	80		80	
T	Hexalobular Tx recess		T30		T40	
SW	Installation wrench (only for hexagonal head)		10		13	
T°	Installation temperature	[°C]	from 0 to +40			
	Service temperature	[°C]	from -40 to +80			
	Maximum long term temperature	[°C]	+50			
	Maximum short term temperature	[°C]	+80			
	Concrete class		C12/15	≥ C16/20	C12/15	≥ C16/20
h_{min}	Minimum base material thickness		100		100	
$c_{cr,N}$	Critical edge distance		140	100	140	100
s_{min}	Minimum spacing		85	60	100	70
c_{min}	Minimum edge distance		85	60	100	70



T-NUX

Code	INSTALLATION PRODUCTS
	Hammer drill
BHDSXXXXX	Concrete drill bits
MOBOMBA	Blow pump
MORCEPKIT	Cleaning brush
	Installation wrench
	Hexagonal socket
	Installation bits

INSTALLATION



Resistance in concrete C12/15 y ≥C16/20 for an isolated anchor, without effects of edge distance or spacing and for the specified temperatures and materials

Characteristic Resistance N_{Rk} y V_{Rk}

TENSION						SHEAR					
Diameter			Ø8		Ø10		Diameter		Ø8		Ø10	
Temperature range			24/40°C	50/80°C	24/40°C	50/80°C	Coating / material		Zinc-plated	Stainless steel	Zinc-plated	Stainless steel
N_{Rk}	Concrete C12/15	[kN]	2,5	2,5	3,5	3,0	V_{Rk}	[kN]	6,5	7,6	9,0	10,5
N_{Rk}	Concrete ≥ C16/20	[kN]	3,5	3,5	5,0	4,5						

Design Resistance N_{Rd} y V_{Rd}

TENSION						SHEAR					
Diameter			Ø8		Ø10		Diameter		Ø8		Ø10	
Temperature range			24/40°C	50/80°C	24/40°C	50/80°C	Coating / material		Zinc-plated	Stainless steel	Zinc-plated	Stainless steel
N_{Rd}	Concrete C12/15	[kN]	1,4	1,4	1,9	1,7	V_{Rd}	[kN]	4,8	4,9	6,6	6,8
N_{Rd}	Concrete ≥ C16/20	[kN]	1,9	1,9	2,8	2,5						

Maximum Loads recommended N_{rec} y V_{rec}

TENSION						SHEAR					
Diameter			Ø8		Ø10		Diameter		Ø8		Ø10	
Temperature range			24/40°C	50/80°C	24/40°C	50/80°C	Coating / material		Zinc-plated	Stainless steel	Zinc-plated	Stainless steel
N_{rec}	Concrete C12/15	[kN]	1,0	1,0	1,4	1,2	V_{rec}	[kN]	3,4	3,5	4,7	4,8
N_{rec}	Concrete ≥ C16/20	[kN]	1,4	1,4	2,0	1,8						

Simplified calculation method

European Technical Assessment ETA 14/0467

Simplified version of the calculation method according to ETAG 020. Resistance is calculated according to data shown in assessment ETA 14/0467.

- Influence of concrete strength.
- Influence of edge distance.
- Influencia base material thickness.

This calculation method is bases on the following simplification: **Different load do not act on individual anchors, without eccentricity.**

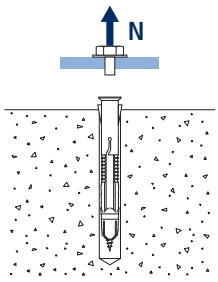
INDEXcal

For a more accurate calculation and to take more constructive previsions into account, INDEX Fixing Systems is developing a calculation software for multiple use in non structual applications in conrete and masonry.

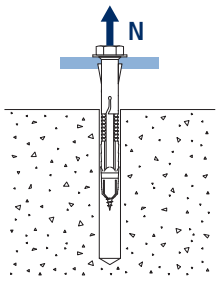
T-NUX

TENSION LOADS

- Steel design resistance: $N_{Rd,s}$
- Pull-out design resistance: $N_{Rd,p}$
- Concrete cone design resistance: $N_{Rd,c} = N^{o}_{Rd,p} \cdot \Psi_{c,N}$; $C/C_{cr,N} \leq 1$

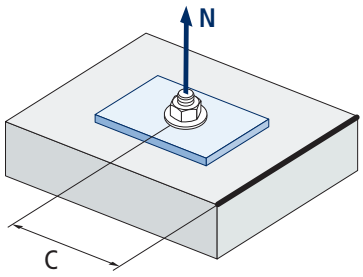


Steel design resistance of the screw $N_{Rd,s}$					
Diameter			Ø8		Ø10	
Coating / material			Zinc-plated	Stainless steel	Zinc-plated	Stainless steel
$N_{Rd,s}$		[kN]	6,9	7,1	9,3	9,6



Pull-out design resistance $N_{Rd,p}$						
Diameter			Ø8		Ø10	
			24/40°C	50/80°C	24/40°C	50/80°C
$N_{Rd,p}$	Concrete C12/15	[kN]	1,4	1,4	1,9	1,7
$N_{Rd,p}$	Concrete ≥ C16/20	[kN]	1,9	1,9	2,8	2,5

Influence of concrete edge distance (concrete cone) $\Psi_{c,N}$				
c [mm]	Ø8		Ø10	
	C12/15	≥ C16/20	C12/15	≥ C16/20
50	**Invalid value**			
55				
60		0,60		
65		0,65		
70		0,70		0,70
75		0,75		0,75
80		0,80		0,80
85	0,61	0,85		0,85
90	0,64	0,90		0,90
95	0,68	0,95		0,95
100	0,71	1,00	0,71	1,00
105	0,75		0,75	
110	0,79		0,79	
115	0,82		0,82	
120	0,86		0,86	
125	0,89		0,89	
130	0,93		0,93	
135	0,96		0,96	
140	1,00		1,00	
145	**Value without reduction = 1**			
150				

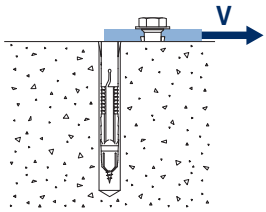


$$\Psi_{c,N} = \frac{c}{C_{cr,N}}$$

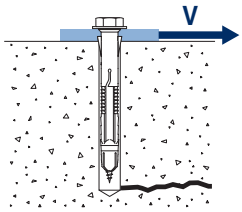
T-NUX

SHEAR LOADS

- Steel design resistance without lever arm: $V_{Rd,s}$
- Pry-out design resistance: $V_{Rd,c} = V^{o}_{Rd,c} \cdot \Psi_b \cdot \Psi_c$

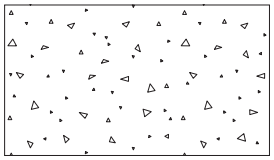


Steel design resistance without lever arm					
$V_{Rd,s}$					
Diameter		Ø8		Ø10	
Coating / material		Zinc-plated	Stainless steel	Zinc-plated	Stainless steel
$V_{Rd,s}$	[kN]	4,8	4,9	6,6	6,8



Pry-out design resistance				
$V_{Rd,c}$				
Diameter			Ø8	Ø10
$V_{Rd,c}$	Concrete C12/15	[kN]	4,2	4,5
	Concrete C16/20		4,9	5,2
	Concrete C20/25		5,5	5,8
	Concrete C30/37		6,6	7,1
	Concrete C40/50		7,7	8,2
	Concrete C50/60		8,5	9,0

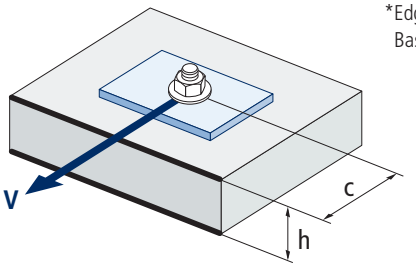
Coefficients of influence



$$\Psi_b = \sqrt{\frac{f_{ck,cube}}{25}} \geq 1$$

Influence of concrete strength Ψ_b									
Concrete class	C12/15	C16/20	C20/25	C25/30	C30/37	C35/45	C40/50	C45/55	C50/60
Ψ_b	0,77	0,89	1,00	1,10	1,22	1,34	1,41	1,48	1,55

Influence of edge distance for different concrete thickness Ψ_c*												
	c [mm] / h [mm]	50	60	70	80	90	100	120	140	160	180	200
Ψ_c	100	0,35	0,46	0,57	0,65	0,73	0,82	0,98	1,14	1,31	1,47	1,63
	125	0,35	0,46	0,59	0,72	0,82	0,91	1,10	1,28	1,46	1,64	1,83
	150	0,35	0,46	0,59	0,72	0,85	1,00	1,20	1,40	1,60	1,80	2,00
	175	0,35	0,46	0,59	0,72	0,85	1,00	1,30	1,51	1,73	1,94	2,16
	200	0,35	0,46	0,59	0,72	0,85	1,00	1,31	1,62	1,85	2,08	2,31



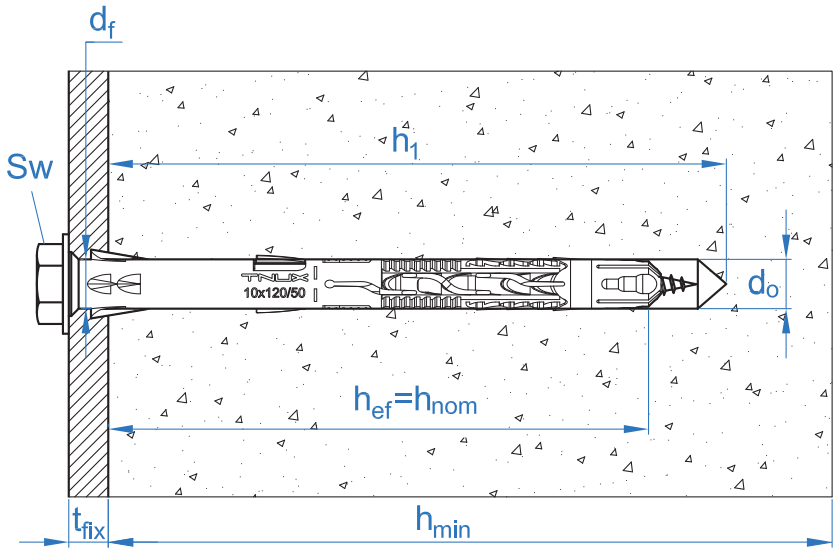
*Edge distance shouldn't be less than minimum edge distance c_{min}
Base material thickness shouldn't be less than minimum base material thickness h_{min}

$$\Psi_c = \frac{c_1^{1,5}}{1000} \sqrt{\frac{h}{1,5c_1}} ; \sqrt{\frac{h}{1,5c_1}} \leq 1$$

FISING IN MASONRY

MECHANICAL PROPERTIES				
Screw diameter			Ø8	Ø10
A_s	Threaded area section of screw	(mm^2)	28,2	38,4
Steel type			Zinc-plated	Stainless steel
$f_{u,s}$	Characteristic resistance of the screw	(N/mm^2)	600	700
$f_{y,s}$	Yield strength	(N/mm^2)	440	450

INSTALLATION DATA				
Diameter			Ø8	Ø10
Code			TNUX / TFUX	TNUX / TFUX
d_0	Nominal diameter of drill bit	[mm]	8	10
d_f	Diameter of clearance hole in the fixture	[mm]	8,5	11
$L_{mín}$	Minimum length of anchor	[mm]	80	80
$L_{máx}$	Maximum length of anchor	[mm]	250	300
h_1	Minimum drill hole depth	[mm]	90	90
h_{nom}	Installation depth	[mm]	70	70
h_{ef}	Effective emdment depth	[mm]	70	70
T_{fix}	Maximum thickness of fixture	[mm]	L - 70	L - 70
d_s	Screw diameter	[mm]	6	7
L_s	Screw length	[mm]	L + 6	L + 6
L_t	Screw thread length	[mm]	80	80
T	Hexalobular Tx recess		T30	T40
SW	Installation wrench (only for hexagonal head)		10	13
T°	Installation temperature	[°C]	from 0 to +40	
	Service temperature	[°C]	from -40 to +80	
	Maximum long term temperature	[°C]	+50	
	Maximum short term temperature	[°C]	+80	



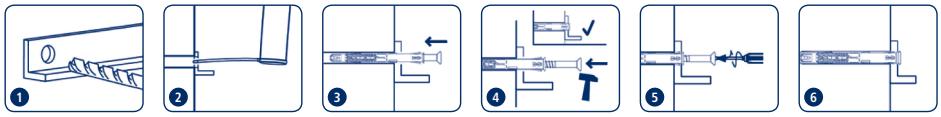
T-NUX

Code	INSTALLATION PRODUCTS
	Hammer drill
BHDSXXXXX	Concrete drill bits
MOBOMBA	Blow pump
MORCEPKIT	Cleaning brush

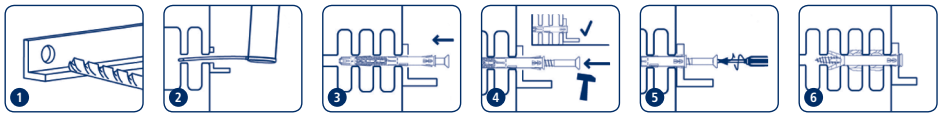
Code	INSTALLATION PRODUCTS
	Installation wrench
	Hexagonal socket
	Installation bits

INSTALLATION

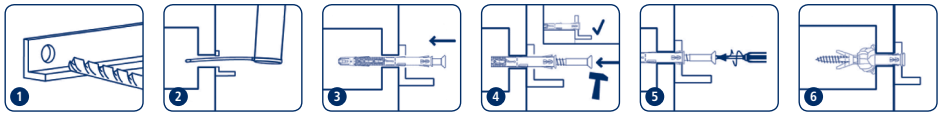
Solid brick



Hollow brick



Hollow concrete



BRICK TYPES

Material	Size	Figure	Bulk density [kg/m³]	Minimum compressive resistance [N/mm²]	T-NUX / T-FUX Ø8			T-NUX / T-FUX Ø10		
					h_{min}	s_{min}	c_{min}	h_{min}	s_{min}	c_{min}
Solid brick	Adoquín 200 x 100 x 50		2060	30	100	250	100	100	250	100
Hollow brick nº1	Termoarcilla 237 x 305 x 191		855	12,5	237	250	100	237	250	100
Hollow brick nº2	Cerámica 237 x 110 x 100		1025	20	110	250	100	110	250	100
Hollow brick nº3	Caravista 240 x 115 x 50		1065	20	115	250	100	115	250	100
Hollow brick nº4	Mediterráneo 240 x 115 x 90		1310	40	115	250	100	115	250	100
Hollow brick nº5	Bloque gero 240 x 120 x 100		1180	10	120	250	100	120	250	100
Hollow brick nº6	Bloque 390 x 190 x 190		870	5	190	250	100	190	250	100
Hollow brick nº7	Airblock 491 x 241 x 190		935	4	241	250	100	241	250	100
Aerated concrete AAC2	625 x 240 x 250		360	2	100	250	100	100	250	100
Aerated concrete AAC6	625 x 240 x 250		710	6	100	250	100	100	250	100

T-NUX

Characteristic resistance in all load directions F_{Rk}						
Material			T-NUX / T-FUX Ø8		T-NUX / T-FUX Ø10	
			24/40°C	50/80°C	24/40°C	50/80°C
Solid brick	F_{Rk}	[kN]	1,50		2,00	
Hollow brick n°1	F_{Rk}	[kN]	0,75		0,50	
Hollow brick n°2	F_{Rk}	[kN]	0,30		0,50	
Hollow brick n°3	F_{Rk}	[kN]	0,50		0,90	
Hollow brick n°4	F_{Rk}	[kN]	0,75		1,50	
Hollow brick n°5	F_{Rk}	[kN]	0,75		1,50	
Hollow brick n°6	F_{Rk}	[kN]	1,50		1,50	
Hollow brick n°7	F_{Rk}	[kN]	2,00		1,50	
Aerated concrete AAC2	F_{Rk}	[kN]	0,40	0,30	0,30	0,30
Aerated concrete AAC6	F_{Rk}	[kN]	0,90	0,90	1,50	1,20

Design resistance in all load directions F_{Rd}						
Material			T-NUX / T-FUX Ø8		T-NUX / T-FUX Ø10	
			24/40°C	50/80°C	24/40°C	50/80°C
Solid brick	F_{Rd}	[kN]	0,60		0,80	
Hollow brick n°1	F_{Rd}	[kN]	0,30		0,20	
Hollow brick n°2	F_{Rd}	[kN]	0,12		0,20	
Hollow brick n°3	F_{Rd}	[kN]	0,20		0,36	
Hollow brick n°4	F_{Rd}	[kN]	0,30		0,60	
Hollow brick n°5	F_{Rd}	[kN]	0,30		0,60	
Hollow brick n°6	F_{Rd}	[kN]	0,60		0,60	
Hollow brick n°7	F_{Rd}	[kN]	0,80		0,60	
Aerated concrete AAC2	F_{Rd}	[kN]	0,16	0,12	0,12	0,12
Aerated concrete AAC6	F_{Rd}	[kN]	0,36	0,36	0,60	0,48

Maximum loads recommended in all load directions F_{rec}						
Material			T-NUX / T-FUX Ø8		T-NUX / T-FUX Ø10	
			24/40°C	50/80°C	24/40°C	50/80°C
Solid brick	F_{rec}	[kN]	0,43		0,57	
Hollow brick n°1	F_{rec}	[kN]	0,21		0,14	
Hollow brick n°2	F_{rec}	[kN]	0,09		0,14	
Hollow brick n°3	F_{rec}	[kN]	0,14		0,26	
Hollow brick n°4	F_{rec}	[kN]	0,21		0,43	
Hollow brick n°5	F_{rec}	[kN]	0,21		0,43	
Hollow brick n°6	F_{rec}	[kN]	0,43		0,43	
Hollow brick n°7	F_{rec}	[kN]	0,57		0,43	
Aerated concrete AAC2	F_{rec}	[kN]	0,11	0,09	0,09	0,09
Aerated concrete AAC6	F_{rec}	[kN]	0,26	0,26	0,43	0,34

T-NUX RANGE

T-NUX

Code	Size		
TNUX08060	8 x 60 Ø8	50	800
TNUX08080	8 x 80 Ø8	50	600
TNUX08100	8 x 100 Ø8	50	600
TNUX08120	8 x 120 Ø8	50	600
TNUX10060	10 x 60 Ø10	50	600
TNUX10080	10 x 80 Ø10	50	600
TNUX10100	10 x 100 Ø10	50	600
TNUX10120	10 x 120 Ø10	50	600
TNUX10140	10 x 140 Ø10	50	300

T-NUX A

Code	Size		Maximum thickness of fixture		
• TNUXA08060	8 x 60 Ø8	T30	-	50	600
TNUXA08080	8 x 80 Ø8	T30	10	50	600
TNUXA08100	8 x 100 Ø8	T30	30	50	600
TNUXA08120	8 x 120 Ø8	T30	50	50	300
• TNUXA10060	10 x 60 Ø10	T40	-	50	300
TNUXA10080	10 x 80 Ø10	T40	10	50	300
TNUXA10100	10 x 100 Ø10	T40	30	50	300
TNUXA10120	10 x 120 Ø10	T40	50	50	300
TNUXA10140	10 x 140 Ø10	T40	70	50	300
TNUXA10160	10 x 160 Ø10	T40	90	50	200
TNUXA10180	10 x 180 Ø10	T40	-	50	150
TNUXA10200	10 x 200 Ø10	T40	130	50	150
TNUXA10230	10 x 230 Ø10	T40	160	50	100

T-NUX E

Code	Size			Maximum thickness of fixture		
• TNUXE08060	8 x 60 Ø8	T30	10	-	50	600
TNUXE08080	8 x 80 Ø8	T30	10	10	50	600
TNUXE08100	8 x 100 Ø8	T30	10	30	50	300
TNUXE08120	8 x 120 Ø8	T30	10	50	50	300
• TNUXE10060	10 x 60 Ø10	T40	13	-	50	300
TNUXE10080	10 x 80 Ø10	T40	13	10	50	300
TNUXE10100	10 x 100 Ø10	T40	13	30	50	300
TNUXE10120	10 x 120 Ø10	T40	13	50	50	300
TNUXE10140	10 x 140 Ø10	T40	13	70	50	200
TNUXE10160	10 x 160 Ø10	T40	13	90	50	150
TNUXE10180	10 x 180 Ø10	T40	13	-	50	150
TNUXE10200	10 x 200 Ø10	T40	13	130	50	150
TNUXE10230	10 x 230 Ø10	T40	13	160	50	100

T-NUX T

Code	Size		Maximum thickness of fixture		
TNUXT10080	10 x 80 Ø10	T40*	10	50	300
TNUXT10100	10 x 100 Ø10	T40*	30	50	300
TNUXT10120	10 x 120 Ø10	T40*	50	50	300
TNUXT10140	10 x 140 Ø10	T40*	70	50	300
TNUXT10160	10 x 160 Ø10	T40*	90	50	200

T-FUX E

Code	Size			Maximum thickness of fixture		
TFUXE10080	10 x 80 Ø10	T40	13	10	50	300
TFUXE10100	10 x 100 Ø10	T40	13	30	50	300
TFUXE10120	10 x 120 Ø10	T40	13	50	50	300

*Includes tamper-proof TX screw

• Non-assessed sizes. Resistance values and installation data are not applicable to hese references. For further information, please contact Technical Department.

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Code	Size		Maximum thickness of fixture		
TNXA408080	8 x 80 Ø8	T30	10	50	600
TNXA408100	8 x 100 Ø8	T30	30	50	600
TNXA408120	8 x 120 Ø8	T30	50	50	300
TNXA410080	10 x 80 Ø10	T40	10	50	300
TNXA410100	10 x 100 Ø10	T40	30	50	300
TNXA410120	10 x 120 Ø10	T40	50	50	300
TNXA410140	10 x 140 Ø10	T40	70	50	300

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Code	Size			Maximum thickness of fixture		
TNXE408080	8 x 80 Ø8	T30	10	10	50	600
TNXE408100	8 x 100 Ø8	T30	10	30	50	600
TNXE410080	10 x 80 Ø10	T40	13	10	50	300
TNXE410100	10 x 100 Ø10	T40	13	30	50	300
TNXE410120	10 x 120 Ø10	T40	13	50	50	300
TNXE410140	10 x 140 Ø10	T40	13	70	50	200

Notes