



**Technical and Test Institute
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European Technical Assessment

**ETA 16/0598
of 15/07/2016**

Technical Assessment Body issuing the ETA: Technical and Test Institute
for Construction Prague

Trade name of the construction product

G&B Fissaggi MA Multi Anchor
G&B Fissaggi MA Multi Anchor Nordic

**Product family to which the construction
product belongs**

Product area code: 33
Bonded injection type anchor for use
in non-cracked concrete

Manufacturer

G&B Fissaggi S.R.L.
C.so Savona 22
10029 Villastellone (TO)
Italy

Manufacturing plant

G&B Fissaggi s.r.l
Plant 4

**This European Technical Assessment
contains**

14 pages including 10 Annexes which form
an integral part of this assessment

**This European Technical Assessment is
issued in accordance with regulation
(EU) No 305/2011, on the basis of**

ETAG 001-Part 1 and Part 5, edition 2013,
used as European Assessment Document
(EAD)

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1. Technical description of the product

The G&B Fissaggi MA Multi Anchor and G&B Fissaggi MA Multi Anchor Nordic for non-cracked concrete is bonded anchor consisting of cartridge with injection mortar and a steel element. The steel elements are the commercial threaded rods with hexagon nut and washer. The steel elements are made of galvanized steel or stainless steel.

The steel element is placed into a drilled hole filled with injection mortar and is anchored via the bond between metal part, injection mortar and concrete.

The illustration and the description of the product are given in Annex A.

2. Specification of the intended use in accordance with the applicable EAD

The performances given in Section 3 are only valid if the anchor is used in compliance with the specifications and conditions given in Annex B.

The provisions made in this European Technical Assessment are based on an assumed working life of the anchor of 50 years. The indications given on the working life cannot be interpreted as a guarantee given by the producer, but are to be regarded only as a means for choosing the products in relation to the expected economically reasonable working life of the works.

3. Performance of the product and references to the methods used for its assessment

3.1 Mechanical resistance and stability (BWR 1)

Essential characteristic	Performance
Characteristic resistance for tension loads	See Annex C 1
Characteristic resistance for shear loads	See Annex C 2
Displacement	See Annex C 3

3.2 Safety in case of fire (BWR 2)

Essential characteristic	Performance
Reaction to fire	Anchorage satisfy requirements for Class A1
Resistance to fire	No performance assessed

3.3 Hygiene, health and environment (BWR 3)

Regarding dangerous substances contained in this European Technical Assessment, there may be requirements applicable to the products falling within its scope (e.g. transposed European legislation and national laws, regulations and administrative provisions). In order to meet the provisions of the Regulation (EU) No 305/2011, these requirements need also to be complied with, when and where they apply.

3.4 Safety in use (BWR 4)

For basic requirement safety in use the same criteria are valid as for Basic Requirement Mechanical resistance and stability.

3.5 Sustainable use of natural resources (BWR 7)

For the sustainable use of natural resources no performance was determined for this product.

3.6 General aspects relating to fitness for use

Durability and serviceability are only ensured if the specifications of intended use according to Annex B 1 are kept.

4. Assessment and verification of constancy of performance (AVCP) system applied with reference to its legal base

According to the Decision 96/582/EC of the European Commission¹ the system of assessment verification of constancy of performance (see Annex V to Regulation (EU) No 305/2011) given in the following table apply.

Product	Intended use	Level or class	System
Metal anchors for use in concrete	For fixing and/or supporting to concrete, structural elements (which contributes to the stability of the works) or heavy units	-	1

5. Technical details necessary for the implementation of the AVCP system, as provided in the applicable EAD

5.1 Tasks of the manufacturer

The manufacturer shall exercise permanent internal control of production. All the elements, requirements and provisions adopted by the manufacturer shall be documented in a systematic manner in the form of written policies and procedures, including records of results performed. This production control system shall insure that the product is in conformity with this European Technical Assessment.

The manufacturer may only use raw materials stated in the technical documentation of this European Technical Assessment.

The factory production control shall be in accordance with the control plan which is a part of the technical documentation of this European Technical Assessment. The control plan is laid down in the context of the factory production control system operated by the manufacturer and deposited at Technický a zkušební ústav stavební Praha, s.p.² The results of factory production control shall be recorded and evaluated in accordance with the provisions of the control plan.

The manufacturer shall, on the basis of a contract, involve a body which is notified for the tasks referred to in section 4 in the field of anchors in order to undertake the actions laid down in section 5.2. For this purpose, the control plan referred to in this section and section 5.2 shall be handed over by the manufacturer to the notified body involved.

The manufacturer shall make a declaration of performance, stating that the construction product is in conformity with the provisions of this European Technical Assessment.

¹ Official Journal of the European Communities L 254 of 08.10.1996

² The control plan is a confidential part of the documentation of the European Technical Assessment, but not published together with the ETA and only handed over to the approved body involved in the procedure of AVCP.

5.2 Tasks of the notified bodies

The notified body shall retain the essential points of its actions referred to above and state the results obtained and conclusions drawn in a written report.

The notified certification body involved by the manufacturer shall issue a certificate of constancy of performance of the product stating the conformity with the provisions of this European Technical Assessment.

In cases where the provisions of the European Technical Assessment and its control plan are no longer fulfilled the notified body shall withdraw the certificate of constancy of performance and inform Technický a zkušební ústav stavební Praha, s.p without delay.

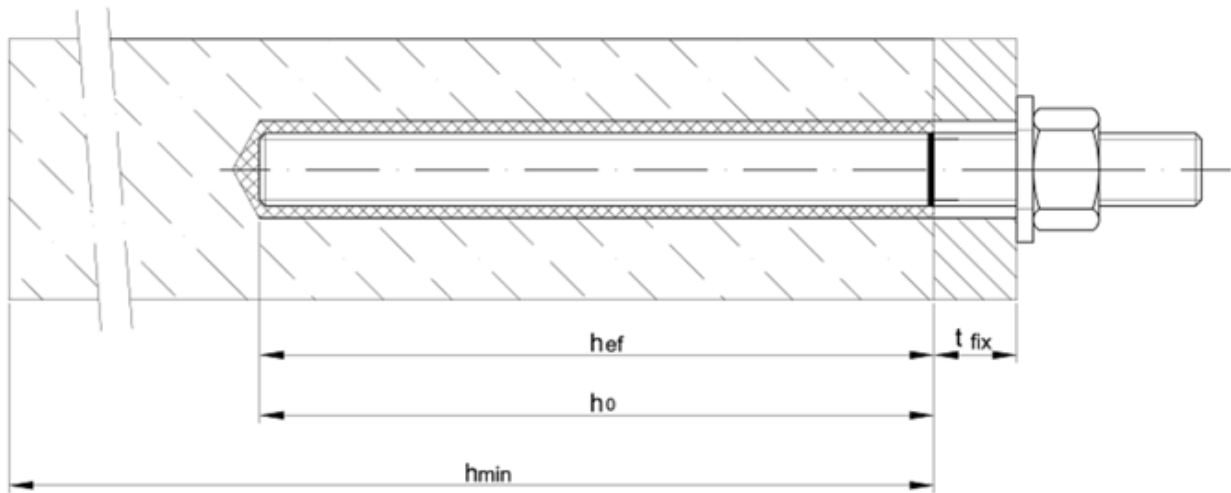
Issued in Prague on 15.07.2016

By

Ing. Mária Schaan

Head of the Technical Assessment Body

Installation in concrete



h_{ef} = effective setting depth

h_0 = bore hole depth

t_{fix} = thickness of fixture

t_{min} = thickness of member

G&B Fissaggi MA Multi Anchor, MA Multi Anchor Nordic

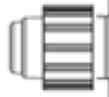
Product description
Installed conditions

Annex A 1

Cartridge: G&B Fissaggi MA Multi Anchor, MA Multi Anchor Nordic

150 ml, 280 ml, 300 ml, 330 ml, 380 ml, 410 ml and 420 ml cartridge (Type: coaxial)

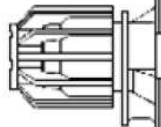
Sealing/Screw cap



Imprint: G&B Fissaggi MA Multi Anchor
processing notes, charge-code, shelf life, hazard-
code, curing- and processing time (depending on
the temperature), with as well
as without travel scale

235 ml, 345 ml and 825 ml cartridge (Type: "side-by-side")

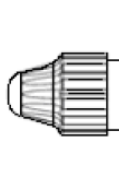
Sealing/
Screw cap



Imprint: G&B Fissaggi MA Multi Anchor
processing notes, charge-code, shelf life, hazard-
code, curing- and processing time (depending on
the temperature), with as well
as without travel scale

165 ml and 300 ml cartridge (Type: "foil tube")

Sealing/
Screw cap



Imprint: G&B Fissaggi MA Multi Anchor
processing notes, charge-code, shelf life, hazard-
code, curing- and processing time (depending on
the temperature), with as well
as without travel scale

Static mixer

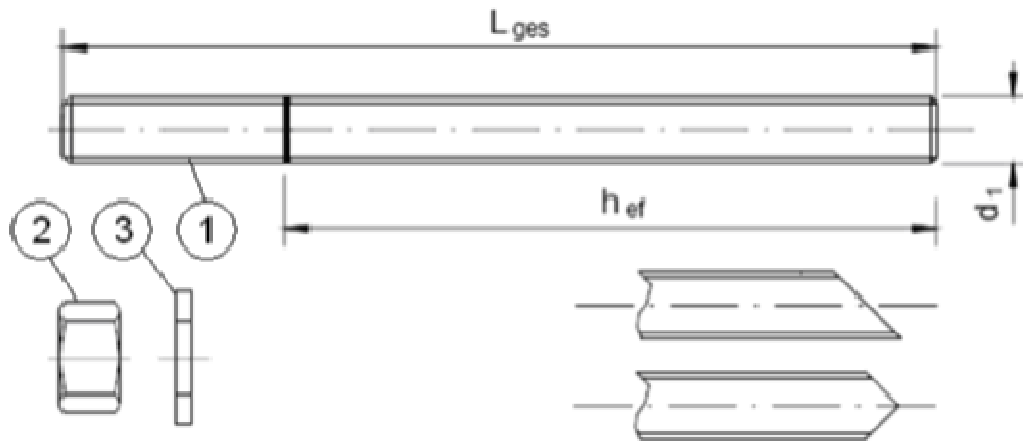


G&B Fissaggi MA Multi Anchor, MA Multi Anchor Nordic

Product description
Injection system

Annex A 2

Threaded rod M8, M10, M12, M16, M20, M24



Standard commercial threaded rod with marked embedment depth

Part	Designation	Material
Steel, zinc plated $\geq 5 \mu\text{m}$ acc. to EN ISO 4042 or Steel, Hot-dip galvanized $\geq 40 \mu\text{m}$ acc. to EN ISO 1461 and EN ISO 10684		
1	Anchor rod	Steel, EN 10087 or EN 10263 Property class 5.8, 8.8 EN ISO 898-1:1999
2	Hexagon nut EN ISO 4032	EN 20898-2
3	Washer, EN ISO 887, EN ISO 7089, EN ISO 7093 or EN ISO 7094	Steel, zinc plated or hot-dip galvanised
Stainless steel		
1	Anchor rod	Material: A4-70, A4-80, EN ISO 3506
2	Hexagon nut EN ISO 4032	Material: A4-70, A4-80, EN ISO 3506
3	Washer EN ISO 887, EN ISO 7089, EN ISO 7093 or EN ISO 7094	Material: A4-70, A4-80, EN ISO 3506

G&B Fissaggi MA Multi Anchor, MA Multi Anchor Nordic

Product description
Threaded rod and materials

Annex A 3

Specifications of intended use

Anchorage subject to:

- Static and quasi-static load.

Base materials

- Non-cracked concrete.
- Reinforced or unreinforced normal weight concrete of strength class C20/25 at minimum and C50/60 at maximum according EN 206-1:2000-12.

Temperature range:

- -40°C to +40°C (max. short. term temperature +40°C and max. long term temperature +24°C)

Use conditions (Environmental conditions)

- Structures subject to dry internal conditions (zinc coated steel, stainless steel).
- Structures subject to external atmospheric exposure including industrial and marine environment, if no particular aggressive conditions exist (stainless steel).
- Structures subject to permanently damp internal condition, if no particular aggressive conditions exist (stainless steel).

Note: Particular aggressive conditions are e.g. permanent, alternating immersion in seawater or the splash zone of seawater, chloride atmosphere of indoor swimming pools or atmosphere with extreme chemical pollution (e.g. in desulphurization plants or road tunnels where de-icing materials are used).

Use categories:

- Category 2 – installation in dry or wet concrete or in flooded holes.

Design:

- The anchorages are designed in accordance with the EOTA Technical Report TR 029 “Design of bonded anchors” under the responsibility of an engineer experienced in anchorages and concrete work.
- Verifiable calculation notes and drawings are prepared taking account of the loads to be anchored. The position of the anchor is indicated on the design drawings.

Installation:

- Dry or wet concrete or in flooded holes.
- Hole drilling by hammer or compressed air drill mode.
- Anchor installation carried out by appropriately qualified personnel and under the supervision of the person responsible for technical matters of the site.

G&B Fissaggi MA Multi Anchor, MA Multi Anchor Nordic

Intended use
Specifications

Annex B 1

Table B1: Cleaning

Size		M8	M10	M12	M16	M20	M24
Nominal drill hole diameter	$\varnothing d_0$ [mm]	10	12	14	18	22	28
Diameter of brush	d_b [mm]	12	14	16.3	20.0	26.0	30.0
Minimum brush diameter	$d_{b,min}$ [mm]	10.5	12.5	14.5	18.5	24.5	28.5
Brush length	L [mm]	170	170	170	200	250	300
Cleaning		4 x blow out 4 x brush out 4 x blow out					

Table B2: Installation parameters

Size		M8	M10	M12	M16	M20	M24
Nominal drill hole diameter	$\varnothing d_0$ [mm]	10	12	14	18	22	28
Depth of drill hole	h_0 [mm]	80	90	110	125	170	210
Edge distance	$c_{cr,N}$ [mm]	80	90	110	125	170	210
Minimum edge distance	c_{min} [mm]	40	50	60	80	100	120
Spacing	$s_{cr,N}$ [mm]	160	180	220	250	340	420
Minimum spacing	s_{min} [mm]	40	50	60	80	100	120
Minimum thickness of member	h_{min} [mm]	110	120	140	160	215	260
Torque moment	T_{inst} [Nm]	10	20	40	80	150	200
Embedment depth	h_{ef} [mm]	80	90	110	125	170	210

Steel brush



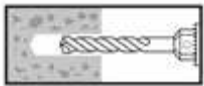
Hand pump (volume 750 ml) Drill bit diameter (d_0): 10 mm to 20 mm	Compressed air Drill bit diameter (d_0): 10 mm to 28 mm

Table B3: Minimum curing time

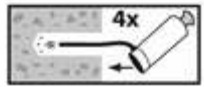
G&B Fissaggi MA Multi Anchor			G&B Fissaggi MA Multi Anchor Nordic		
Temperature of Base Material [°C]	Gelling and Working Time [mins]	Full Curing Time [mins]	Temperature of Base Material [°C]	Gelling and Working Time [mins]	Full Curing Time [mins]
min +5	15	120	-5 to +5	12	200
+5 to +10	10		+5 to +10	6	85
+10 to +20	5	80	+10 to +20	4	55
+20 to +30	3	45	+20 to +25	3	30
+30 to +35	1.5	25	+25 to +30	1.5	20
+35	1.5	20	+30	1.5	15

G&B Fissaggi MA Multi Anchor, MA Multi Anchor Nordic	Annex B 2
Intended use Cleaning Installation parameters Curing time	

Assembly instructions



1. Drill with hammer drill a hole into the base material to the size and embedment depth required by the selected anchor (Table B2).



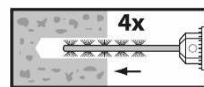
Attention! Standing water in the bore hole must be removed before cleaning.

- 2a. Starting from the bottom or back of the bore hole, blow the hole clean with compressed air or a hand pump (Annex B 2) a minimum of four times. If the bore hole ground is not reached an extension shall be used.

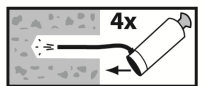
or



The hand pump can be used for anchor sizes up to bore hole diameter 20 mm. For bore holes larger than 20 mm or deeper 240 mm, compressed air (min. 6 bar) **must** be used.

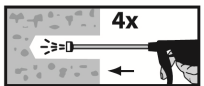


- 2b. Check brush diameter (Table B1) and attach the brush to a drilling machine or a battery screwdriver. Brush the hole with an appropriate sized wire brush $> d_{b,min}$ (Table B1) a minimum of four times. If the bore hole ground is not reached with the brush, a brush extension shall be used (Table B1).



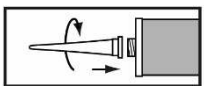
- 2c. Finally blow the hole clean again with compressed air or a hand pump (Annex B 2) a minimum of four times. If the bore hole ground is not reached an extension shall be used.

or

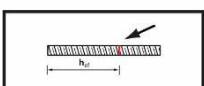


The hand pump can be used for anchor sizes up to bore hole diameter 20 mm. For bore holes larger than 20 mm or deeper 240 mm, compressed air (min. 6 bar) **must** be used.

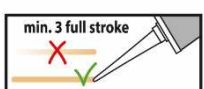
After cleaning, the bore hole has to be protected against re-contamination in an appropriate way, until dispensing the mortar in the bore hole. If necessary, the cleaning repeated has to be directly before dispensing the mortar. In-flowing water must not contaminate the bore hole again



3. Attach a supplied static-mixing nozzle to the cartridge and load the cartridge into the correct dispensing tool. For foil tube cartridges, cut off the foil tube clip before use. For every working interruption longer than the recommended working time (Table B3) as well as for new cartridges, a new static-mixer shall be used.



4. Prior to inserting the anchor rod into the filled bore hole, the position of the embedment depth shall be marked on the anchor rods



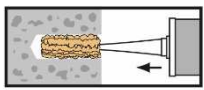
5. Prior to dispensing into the anchor hole, squeeze out separately a minimum of three full strokes and discard non-uniformly mixed adhesive components until the mortar shows a consistent grey colour.

G&B Fissaggi MA Multi Anchor, MA Multi Anchor Nordic

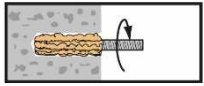
Intended use
Assembly instructions I

Annex B 3

Assembly instructions (continuation)

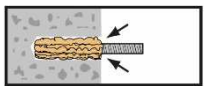


6. Starting from the bottom or back of the cleaned anchor hole fill the hole up to approximately two-thirds with adhesive. Slowly withdraw the static mixing nozzle as the hole fills to avoid creating air pockets. For embedment larger than 190 mm an extension nozzle shall be used. Observe the gel-/ working times given in Table B3.



7. Push the threaded rod into the anchor hole while turning slightly to ensure positive distribution of the adhesive until the embedment depth is reached.

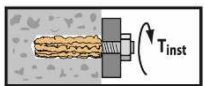
The anchor should be free of dirt, grease, oil or other foreign material.



8. Be sure that the anchor is fully seated at the bottom of the hole and that excess mortar is visible at the top of the hole. If these requirements are not maintained, the application has to be renewed.



9. Allow the adhesive to cure to the specified time prior to applying any load or torque. Do not move or load the anchor until it is fully cured (attend Table B3).



10. After full curing, the add-on part can be installed with the max. torque (Table B2) by using a calibrated torque wrench.

G&B Fissaggi MA Multi Anchor, MA Multi Anchor Nordic

Intended use
Assembly instructions II

Annex B 4

Table C1: Design method TR 029
Characteristic values of resistance to tension load

Steel failure – Characteristic resistance								
Size			M8	M10	M12	M16	M20	M24
Steel grade 5.8	$N_{Rk,s}$	[kN]	18	29	42	79	123	177
Partial safety factor	$\gamma_{Ms}^{1)}$	[-]	1,5					
Steel grade 8.8	$N_{Rk,s}$	[kN]	29	46	67	126	196	282
Partial safety factor	$\gamma_{Ms}^{1)}$	[-]	1,5					
Stainless steel grade A4-70	$N_{Rk,s}$	[kN]	26	41	59	110	172	247
Partial safety factor	$\gamma_{Ms}^{1)}$	[-]	1,9					
Stainless steel grade A4-80	$N_{Rk,s}$	[kN]	29	46	67	126	196	282
Partial safety factor	$\gamma_{Ms}^{1)}$	[-]	1,6					

Combined pullout and concrete cone failure in non-cracked concrete C20/25								
Size			M8	M10	M12	M16	M20	M24
Characteristic resistance in non-cracked concrete in dry or wet concrete or in flooded holes	$N_{Rk,p}$	[kN]	20	30	35	60	75	115
	Partial safety factor	$\gamma_{Mc}^{1)}$	1,8 ²⁾					
Factor for concrete	C30/37	ψ_c	[-]	1,12				
	C40/45			1,19				
	C50/60			1,30				

Splitting failure								
Size			M8	M10	M12	M16	M20	M24
Edge distance	$c_{cr,sp}$	[mm]	2,0 h_{ef}			1,5 h_{ef}		
Spacing	$s_{cr,sp}$	[mm]	4,0 h_{ef}			3,0 h_{ef}		
Partial safety factor	$\gamma_{Msp}^{1)}$	[-]	1,8					

¹⁾ In absence of national regulations

²⁾ The partial safety factor $\gamma_2=1,0$ is included

³⁾ The partial safety factor $\gamma_2=1,2$ is included

G&B Fissaggi MA Multi Anchor, MA Multi Anchor Nordic

Performances
Characteristic resistance for tension loads

Annex C 1

Table C2: Design method TR 029
Characteristic values of resistance to shear load

Steel failure without lever arm									
Size			M8	M10	M12	M16	M20	M24	
Steel grade 5.8	$V_{Rk,s}$	[kN]	9	15	21	39	61	88	
Partial safety factor	$\gamma_{Ms}^{1)}$	[-]	1,25						
Steel grade 8.8	$V_{Rk,s}$	[kN]	15	23	34	63	98	141	
Partial safety factor	$\gamma_{Ms}^{1)}$	[-]	1,25						
Stainless steel grade A4-70	$V_{Rk,s}$	[kN]	13	20	30	55	86	124	
Partial safety factor	$\gamma_{Ms}^{1)}$	[-]	1,56						
Stainless steel grade A4-80	$V_{Rk,s}$	[kN]	15	23	34	63	98	141	
Partial safety factor	$\gamma_{Ms}^{1)}$	[-]	1,33						

Steel failure with lever arm									
Size			M8	M10	M12	M16	M20	M24	
Steel grade 5.8	$M_{Rk,s}^o$	[N.m]	19	37	66	166	325	561	
Partial safety factor	$\gamma_{Ms}^{1)}$	[-]	1,25						
Steel grade 8.8	$M_{Rk,s}^o$	[N.m]	30	60	105	266	519	898	
Partial safety factor	$\gamma_{Ms}^{1)}$	[-]	1,25						
Stainless steel grade A4-70	$M_{Rk,s}^o$	[N.m]	26	52	92	233	454	786	
Partial safety factor	$\gamma_{Ms}^{1)}$	[-]	1,56						
Stainless steel grade A4-80	$M_{Rk,s}^o$	[N.m]	30	60	105	266	519	898	
Partial safety factor	$\gamma_{Ms}^{1)}$	[-]	1,33						

Concrete pryout failure									
Factor <i>k</i> from TR 029 Design of bonded anchors, Part 5.2.3.3			2						
Partial safety factor	$\gamma_{Mp}^{1)}$	[-]	1,5						

Concrete edge failure									
Size			M8	M10	M12	M16	M20	M24	
See section 5.2.3.4 of Technical Report TR 029 for the Design of Bonded Anchors									
Partial safety factor	$\gamma_{Mc}^{1)}$	[-]	1,5						

¹⁾ In absence of national regulations

G&B Fissaggi MA Multi Anchor, MA Multi Anchor Nordic

Performances
Characteristic resistance for shear loads

Annex C 2

Table C3: Displacement under tension and shear load

Anchor size			M8	M10	M12	M16	M20	M24
Tension load	F	[kN]	6,3	9.9	13.9	23.8	29,8	37,7
Displacement	δ_{N0}	[mm]	0,1	0,2	0,3	0,5	0,7	0,9
	$\delta_{N\infty}$	[mm]	0,5	0,5	0,5	0,5	0,5	0,5
Shear load	F	[kN]	3.1	5.0	7.2	13.5	21.0	30.3
Displacement	δ_{V0}	[mm]	1,5	1,5	1,5	1,5	2,0	2,5
	$\delta_{V\infty}$	[mm]	2,3	2,3	2,3	2,3	3,0	3,8

G&B Fissaggi MA Multi Anchor, MA Multi Anchor Nordic**Performances**
Displacement**Annex C 3**