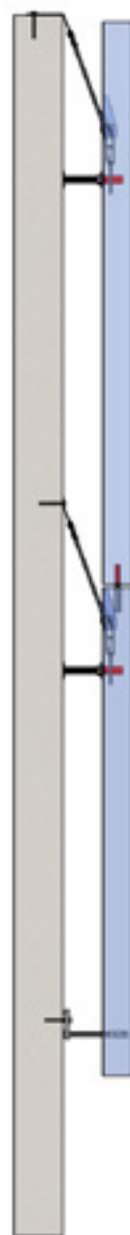
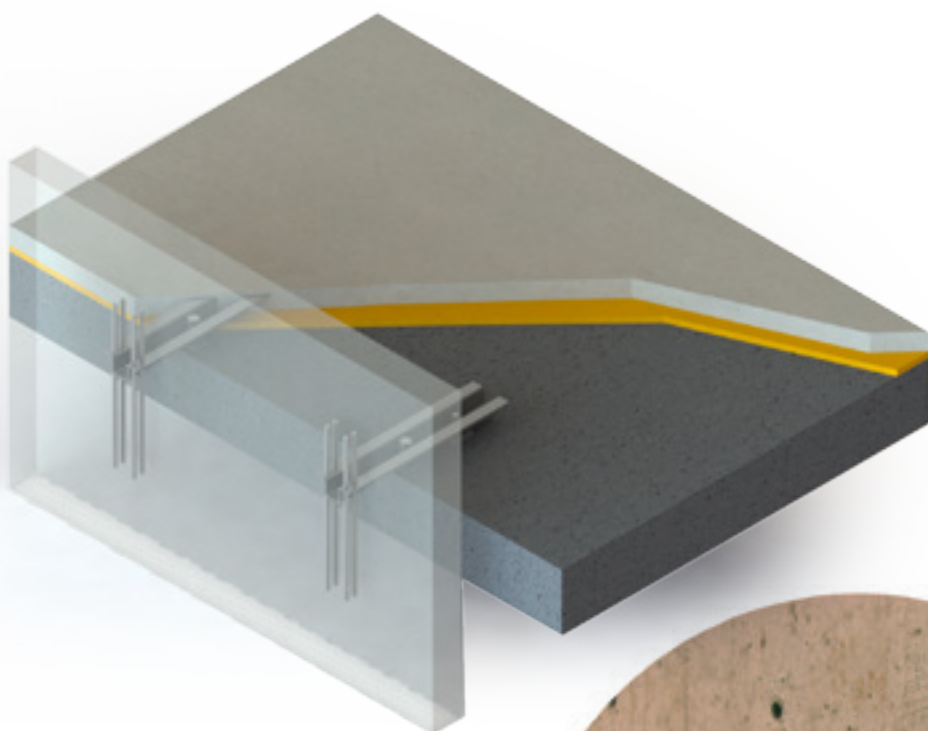


# ARCHITECTURAL PRECAST CONCRETE ANCHORS



## ARCHITECTURAL PRECAST CONCRETE (APC)

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### QUALITY FEATURES ARE :

- Simple and quick on site installation
- Dry fixing (cast in plate in the concrete structure not necessary)
- Adjustable in all directions
- EOTA approved
- All load bearing parts are manufactured in Stainless steel grade 316 (0 corrosion risk )
- Cost factor improves with larger cavity thanks to less metal involved
- Heavy load bearing custom sized angles and concrete corbels are spared
- Reduced thermal bridging (thermal conductivity of stainless steel is 1/3 of normal steel conductivity+ 4 or 6 punctual fixings only for more than 15 square meters.

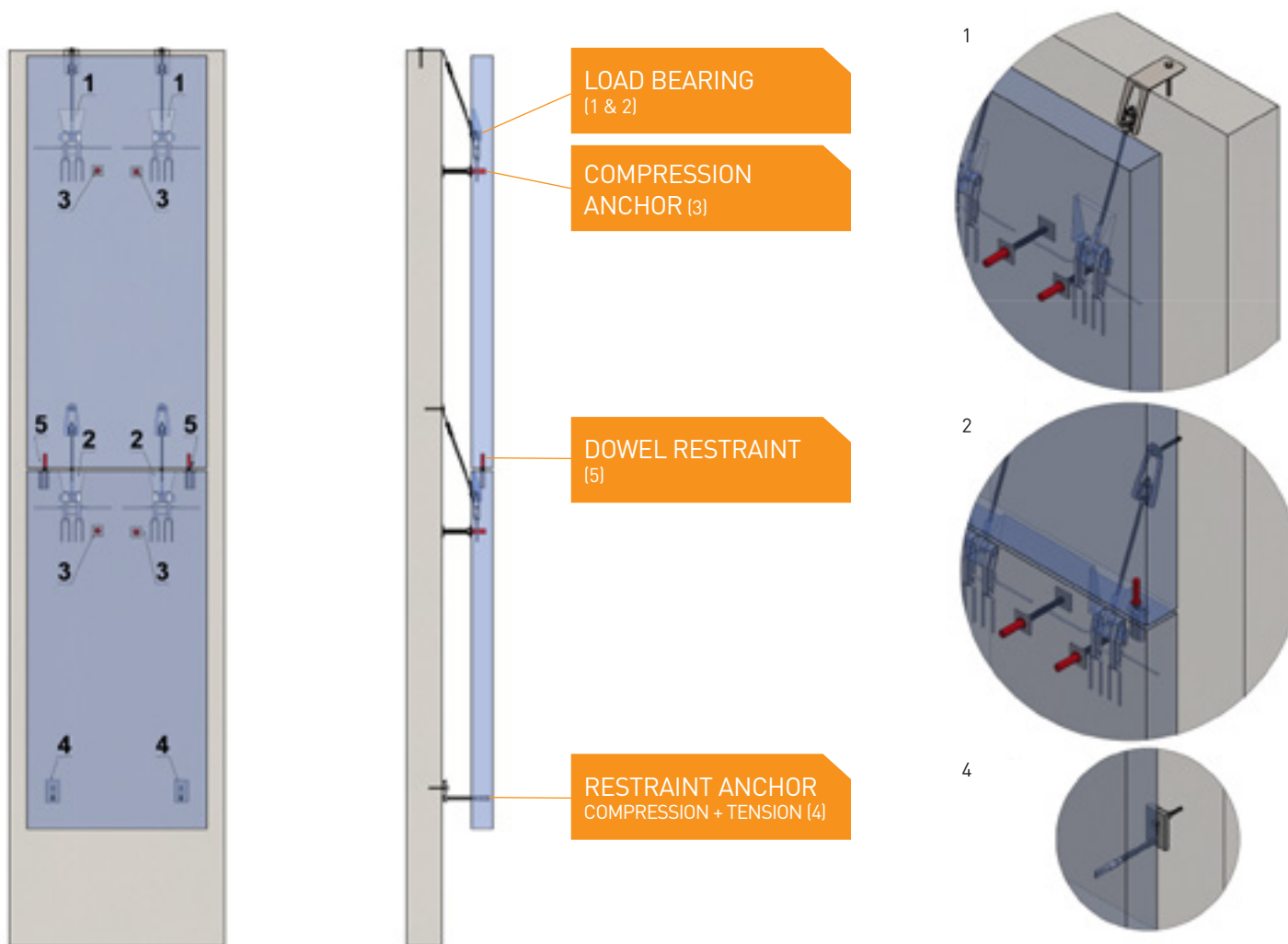
“BEWARE : OUR SOLUTIONS  
ARE CUSTOM MADE”

### INFORMATION REQUESTED FOR QUOTATION

- Drawing of façade front view
- Number and size or precast panel
- Support specification (thickness of in situ concrete wall and floor or dimensions of metal beam)
- Cavity dimensions

## ARCHITECTURAL PRECAST CONCRETE (APC)

# 1. GENERAL DESCRIPTION OF THE FIXI 3D SYSTEM



### LOAD BEARING SUPPORTS

- 1 • Attika Hanger FIXI 3D for floor fixing
- 2 • Standard Hanger FIXI 3D for a vertical fixing on in situ concrete wall or beam
- 3 • Spacing threaded rod permits adjustment in horizontal directions
- 4 • Wind load tieback resist horizontal forces on the panel from wind and/or earthquakes

## ARCHITECTURAL PRECAST CONCRETE (APC)

### 2. HANGER FIXI 3D (LOAD BEARING)

LOAD CAPACITY (kN)	COLOR INDEX
5,0	Black
8,0	Red
11,5	Green
16,0	
22,0	Yellow
27,0	Blue
34,0	Orange
56,0	Magenta

The hangers FIXI3D are the load bearing adjustable fixings. They are proposed on complete set or as spare items. Spare items as follows: a) upper section made of 316 sheets (1 to 5), b) assembly adjustable component (6), c) cast in insert (7). Each item of the hanger is painted of a special color in accordance with load capacity (see chart).

For each load capacity 5 shapes of upper section are available. While the dimensions of the assembly component and of the insert are unique per load capacity.



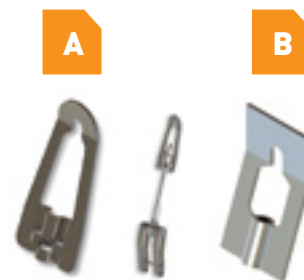
#### 1 TO 5 ARE UPPER UNIT

- 1 • Single facing Hanger
- 1b.is • Single facing hanger 56 KN
- 2 • Single Attika (Floor) Hanger
- 2b.is • Single roof hanger 56 KN
- 3 • Dual forked facing Hanger
- 4 • Dual straight facing Hanger
- 5 • Dual Attika (Floor) Hanger
- 6 • Assembly component
- 7 • Cast in insert (Lower unit)

## ARCHITECTURAL PRECAST CONCRETE (APC)

### FIXI 3D SINGLE UPPER PART ARTICLES 04IM001 AND 04M010

HANGER COMPLETE		HANGER ALONE OR UPPER UNIT	LOAD CAPACITY (kN)	CAVITY (mm)	MINIMUM CONCRETE PANEL THICKNESS (mm)	MINIMUM CONCRETE SUPPORT THICKNESS (mm)
04IM001-5,0	<b>A</b>	04M010-5,0	5,0	50	80	100
04IM001-8,0		04M010-8,0	8,0	55	80	100
04IM001-11,5		04M010-11,5	11,5	60	80	120
04IM001-16,0		04M010-16,0	16,0	70	90	140
04IM001-22,0		04M010-22,0	22,0	80	90	140
04IM001-27,0		04M010-27,0	27,0	80	100	160
04IM001-34,0		04M010-34,0	34,0	80	100	200
04IM001-56,0	<b>B</b>	04M010-56,0	56,0	80	100	330



### FIXI 3D SINGLE UPPER PART ARTICLES 04IM002 AND 04M015

04IM002-5,0	<b>A</b>	04M015-5,0	5,0	50	80	80
04IM002-8,0		04M015-8,0	8,0	55	80	100
04IM002-11,5		04M015-11,5	11,5	60	80	120
04IM002-16,0		04M015-16,0	16,0	70	90	150
04IM002-22,0		04M015-22,0	22,0	80	90	200
04IM002-27,0		04M015-27,0	27,0	80	100	220
04IM002-34,0		04M015-34,0	34,0	80	100	250
04IM002-56,0	<b>B</b>	04M015-56,0	56,0	80	100	370



## ARCHITECTURAL PRECAST CONCRETE (APC)

TYPE SIZE AND NUMBER OF ANCHORING BOLTS ARE DESIGNED ACCORDING TO CONCRETE STRENGTH AND THICKNESS

### FIXI 3D DUAL UPPER UNIT (TWISTED) ARTICLES 04IM003 AND 04M020



HANGER COMPLETE	HANGER ALONE OR UPPER UNIT	LOAD CAPACITY (kN)	MINIMUM CAVITY (mm)	MINIMUM PANEL THICKNESS (mm)	MINIMUM CONCRETE SUPPORT THICKNESS (mm)
04IM003-22,0	04M020-22,0	22,0	105	90	120
04IM003-27,0	04M020-27,0	27,0	105	100	140
04IM003-34,0	04M020-34,0	34,0	110	100	140

### FIXI 3D SINGLE UPPER PART (STRAIGHT) ARTICLES 04IM005 AND 04M026



04IM005-22,0	04M026-22,0	22,0	80	90	120
04IM005-27,0	04M026-27,0	27,0	80	100	140
04IM005-34,0	04M026-34,0	34,0	80	100	140
04IM005-56,0	04M026-56,0	56,0	90	100	160

### FIXI 3D DUAL UPPER UNIT ROOF TYPE (STRAIGHT) ARTICLES 04IM006 AND 04M027



04IM006-22,0	04M027-22,0	22,0	80	90	120
04IM006-27,0	04M027-27,0	27,0	80	100	140
04IM006-34,0	04M027-34,0	34,0	80	100	160
04IM006-56,0	04M027-56,0	56,0	90	100	260

### ARCHITECTURAL PRECAST CONCRETE (APC)

#### ASSEMBLY COMPONENT

- The assembly component is articulated and includes :  
1 threaded rod ,1 pin,1 nut and 1 square washer
- For length see layout chart (page 13)

M THREAD



THREADED ROD REF	LOAD BEARING GRADE (kN)	M THREAD	PIN DIAMETER (mm)
04M035-5,0	5,0	M8	20
04M035-8,0	8,0	M10	20
04M035-11,5	11,5	M12	24
04M035-16,0	16,0	M14	26
04M035-22,0	22,0	M16	30
04M035-27,0	27,0	M18	32
04M035-34,0	34,0	M20	36
04M035-56,0	56,0	M20	36 duplex

#### INSERT

- The insert is the lower unit and is cast in the precast.  
The lower unit offers lateral adjustment .  
It includes one stainless steel bracket and a polystyrene former.  
The insert is sent to the precast panel fabricator.
- Length on request



INSERT (LOWER UNIT) REF	LOAD BEARING GRADE (kN)	PANEL THICKNESS (mm)
04i030-5,0	5,0	80
04i030-8,0	8,0	80
04i030-11,5	11,5	80
04i030-16,0	16,0	90
04i030-22,0	22,0	100
04i030-27,0	27,0	100
04i030-34,0	34,0	100
04i030-56,0	56,0	100

### ARCHITECTURAL PRECAST CONCRETE (APC)

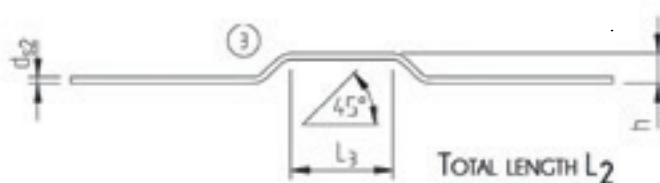
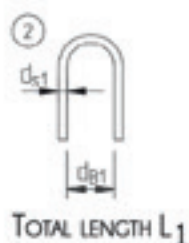
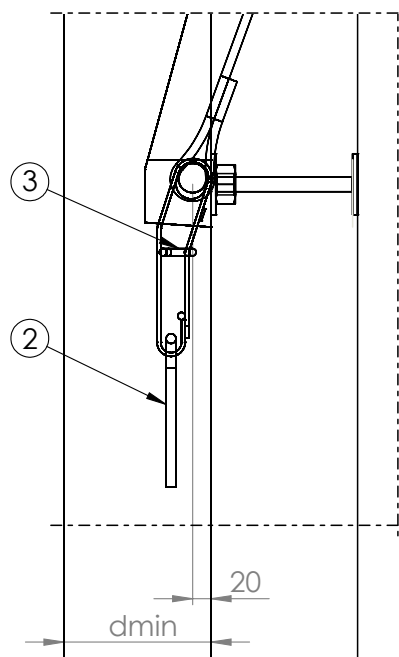
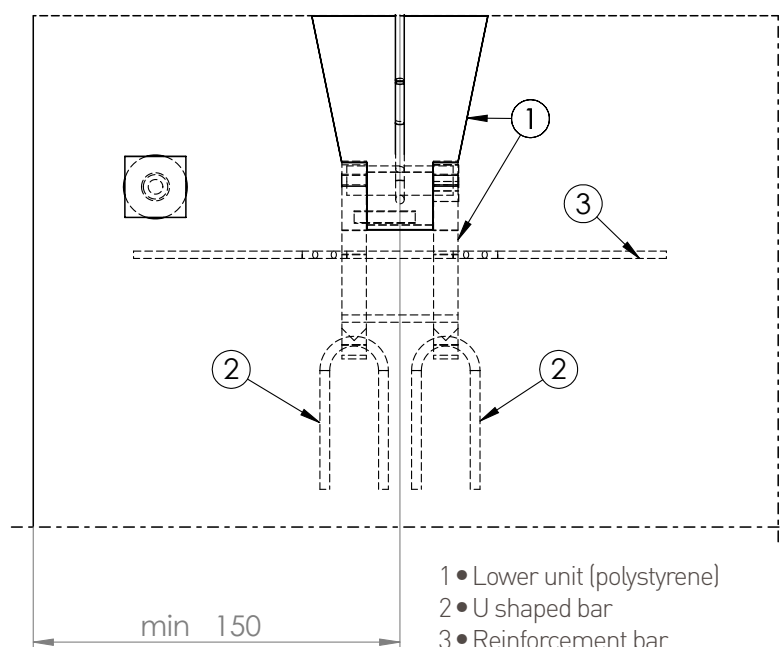
#### REINFORCEMENT BARS

The reinforcement loops and bars are in mild steel and are introduced by the precast fabricator through the insert.

They avoid concrete cracking

LOAD BEARING GRADE (kN)	U SHAPED REINFORCEMENT BAR			REINFORCEMENT BAR			
	TOTAL LENGTH $L_1$ (mm)	db1 (mm)	ds1 (mm)	TOTAL LENGTH $L_2$ (mm)	ds2 (mm)	$L_3$ (mm)	h (mm)
5,0	200	30	Ø 6	300	Ø 6	88	30
8,0	250	30	Ø 6	345	Ø 6	89	30
11,5	280	40	Ø 8	450	Ø 6	97	30
16,0	360	50	Ø 10	450	2 Ø 6	95	40
22,0	400	50	Ø 10	570	2 Ø 6	105	40
27,0	460	50	Ø 10	520	2 Ø 8	112	50
34,0	470	60	Ø 12	630	2 Ø 8	124	50
56,0	800	60	Ø 12	1000	2 Ø 8	124	80

#### REQUIRED REINFORCEMENT



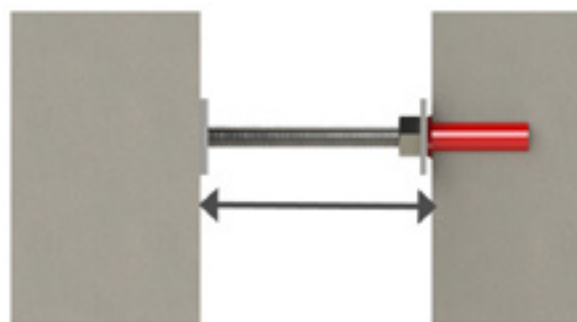


## ARCHITECTURAL PRECAST CONCRETE (APC)

### 3. HORIZONTAL LOAD CONNECTIONS AND CAVITY ADJUSTMENT

#### SPACER BOLT

• The spacer bolt pushes the precast panel away from the support. It includes a threaded rod welded to a square stainless steel sheet. They consist of a threaded rod and a welded square plate. The plate distributes the stresses on the concrete. The threaded rod is inserted into the precast panel in a plastic sleeve (Art N° 04i031-xy). The nut allows easy adjustment of the depth of the cavity. The plastic sleeve is placed into the precast panel during manufacture, however it can be placed also in the in situ concrete wall.



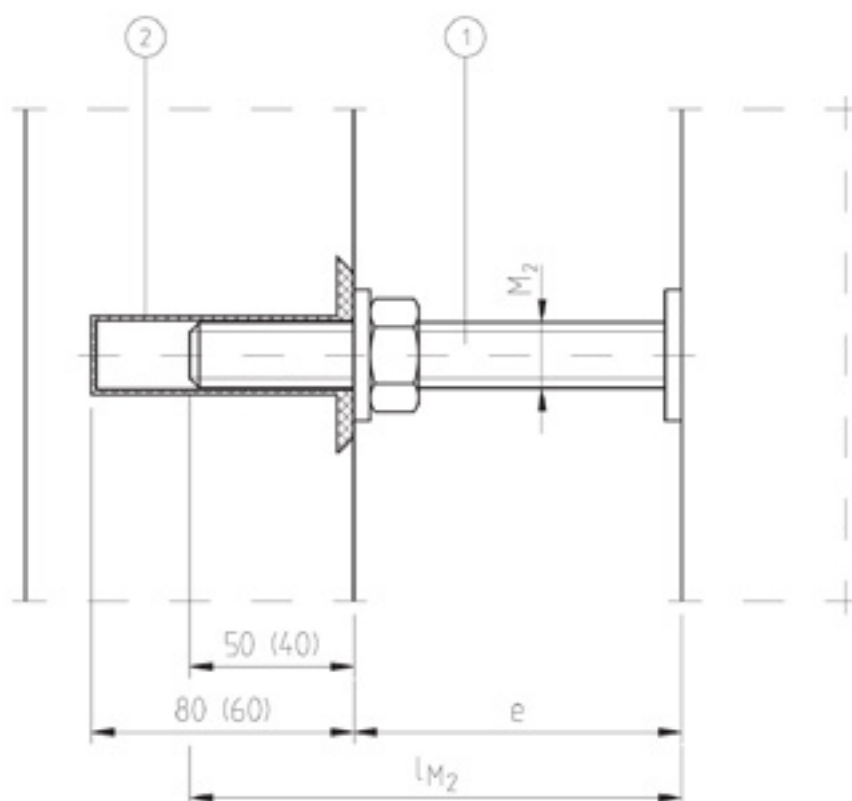
#### OTHER LENGTH ON REQUEST

- 1 • Spacer bolt - Part no. 04M031 - M.. - L
- 2 • Plastic sleeve - Part no. 04i031-M..- 80

• The spacer bolt transfers compressive loads as a result of selfweight and wind forces.

Tensile forces can not be taken.

The use of the plastic sleeve is possible in the precast unit as well as in the in-situ concrete wall.



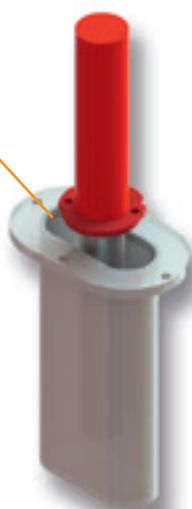
### ARCHITECTURAL PRECAST CONCRETE (APC)

Spacer selection is linked to the supported pressure and to the cavity. The supported pressure is linked to the load capacity according chart below with minimal thickness  $E_p$ .

HANGER LOAD GRADE (kN)	5,0	8,0	11,5	16,0	22,0	27,0	34,0	56,0
Standard compressive load in the spacer bolt (kN)	6,53	10,45	15,02	19,41	26,69	30,73	38,70	63,74

56,0								M30	
34,0								M24	
27,0									
22,0						M20			
16,0				M16					
11,5		M12							
8,0	M10								
5,0									
$E_p$ (mm)	40	60	80	100	120	140	160	180	200

NON  
SHRINKING  
GROUT



#### DOWEL RESTRAINT

Vertical pinning secures two superposed panels by means of the sealed pin in the edge of the two plates. They usually consist of:

- A hollow cylindrical sleeve made of polyethylene inbeded at the lower edge of the upper plate inner diameter 12, 16, 20;
- An oval cross section polyethylene sleeve in the upper edge of the lower plate.  
For dia 12 and 16 pins inner cross section is 22x47 mm;  
For dia 20 inner cross section is 35x60 mm;
- A stainless steel pin with a diameter equal to the inner diameter of the cylindrical sleeve (single pinning);
- The sealing of the pin in performed with mortar in the oval sleeve.

## ARCHITECTURAL PRECAST CONCRETE (APC)

### 3.2 WIND LOAD RESTRAINT ANCHOR

The choice of a category of wind load restraint anchor which is generally located at the bottom of a plate is directly related to the in situ erection conditions.

#### FLAT WIND LOAD RESTRAINT ANCHOR

The flat wind load restraint anchor comprises a plate having an oval button hole, a cylindric hole and a round bar welded on the rear (in situ wall side). It is fixed to the in situ wall by means of an expansion bolt through the oval hole. A hex head screw passes through the cylindric hole and is fixed to the facing precast panel by means of a socket. The diameter of the round welded bar is equal to the height of the screw head.



ARTICLE REF	M THREAD	WIND LOAD (kN)
04IM070	M10	1,8
04IM070	M12	3,0
04IM070	M16	4,2

#### TOOTHED C CHANNELS WIND LOAD RESTRAINT ANCHOR

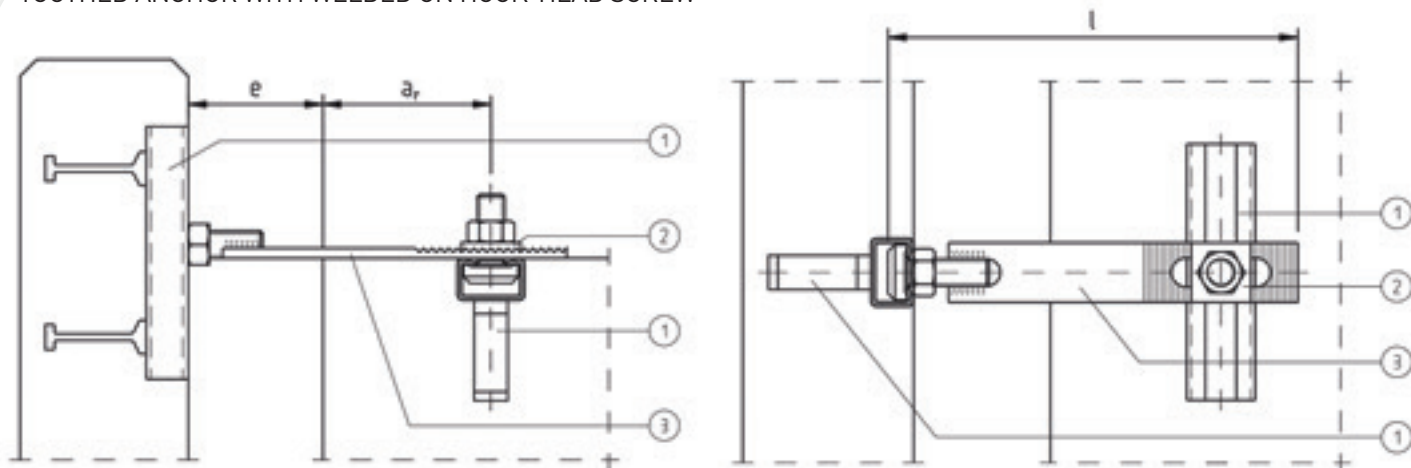
The principle of anchoring "wind" by C channels is to connect 2 channels with a hook Bracket welded seals on the respective sides of the structure and the with a toothed anchor plate inside the ventilated space, the two channels being mutually orthogonal. The adjustable connection, in position and length, can be done in different ways, all parts being always stainless steel.

And the connection setting is carried out by means of two plates held in the rack rails by notches or hammer screw fixed to the plate by welding.

## ARCHITECTURAL PRECAST CONCRETE (APC)

### TOOTHED ANCHOR AS TENSILE- AND COMPRESSIVE-SECURE CONNECTION

#### TOOTHED ANCHOR WITH WELDED ON HOOK-HEAD SCREW



POS	LOAD RATING 8,0 kN (TENSILE/COMPRESSIVE FORCE)	LOAD RATING 12,0 kN (TENSILE/COMPRESSIVE FORCE)
1	C-channel, type 40/25/150 Part no. 07FTA-40-150	C-channel, type 38/17/150 Part no. 07FTA-38-150
2	Hook-head bolt M16x40, type 40/22, Part no. 07FTB-40-16-40 with toothed plate 30x30x4mm	Hook-head bolt M16x50, type 50/30, Part no. 07FTB-49-16-50 with toothed plate 30x30x4mm
3	Toothed anchor 35x6mm (max. $e = 90\text{mm}$ )* or 35x8mm with welded on hook-head screw, Parti no. 03HKFP-800-L $L = e + 160 \text{ (mm)}$	Toothed anchor 35x8mm (max. $e = 90\text{mm}$ )* or 35x10mm with welded on hook-head screw, Part no. 03HKFP-1200-L $L = e + 210 \text{ (mm)}$
	max. $e = 220 \text{ mm}^*$	
$a_r$	100 mm	150 mm

\* for bigger  $e$ -values the permitted pressure values must be reduced if necessary - only on request !

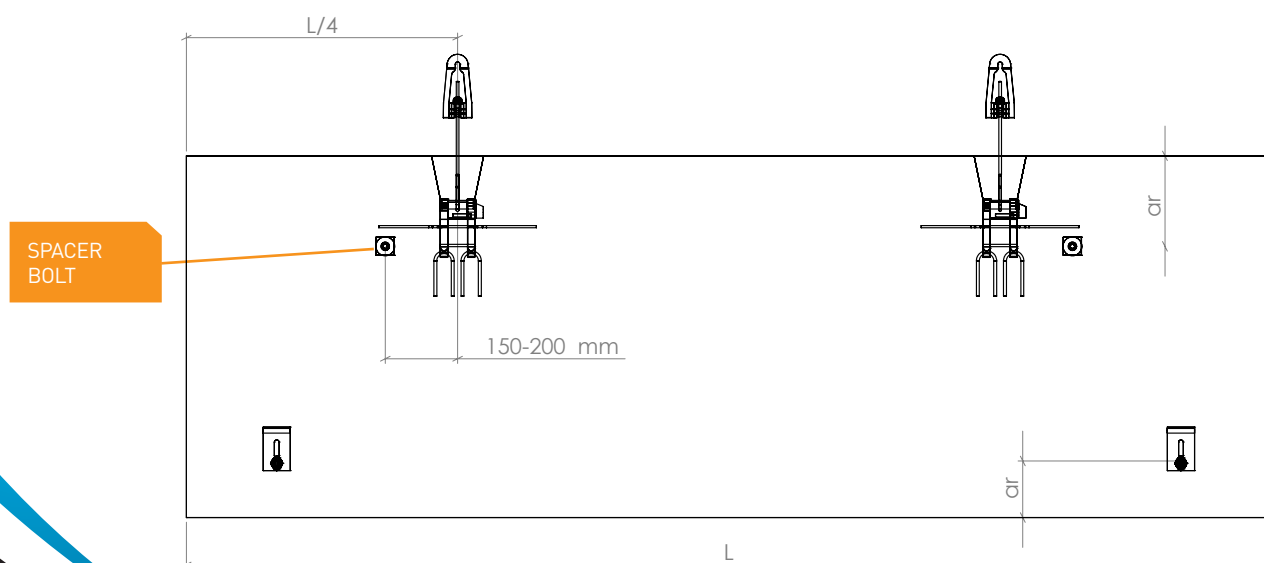
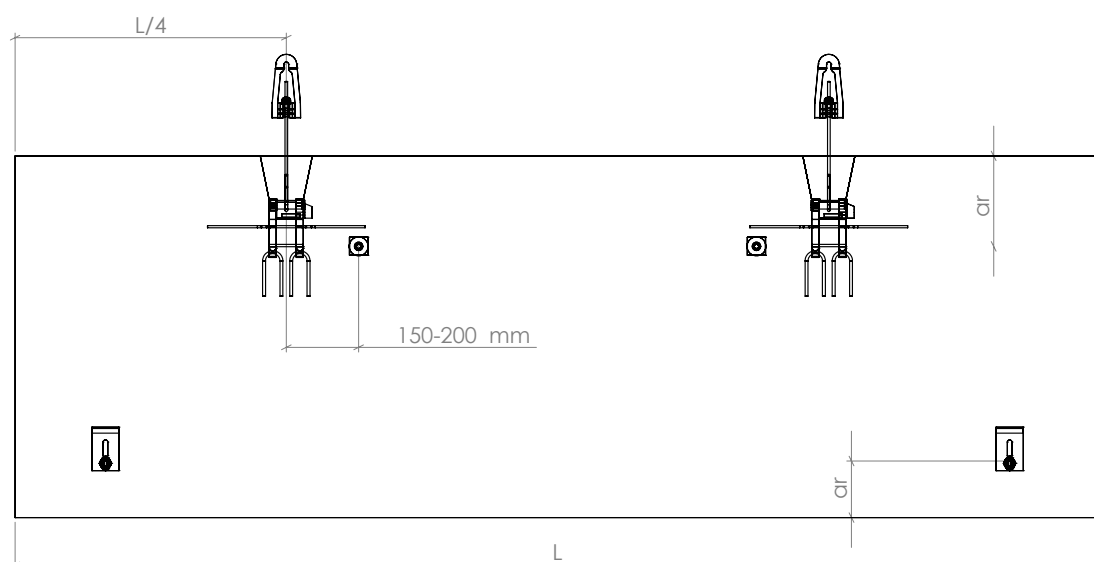
## ARCHITECTURAL PRECAST CONCRETE (APC)

### 4. LAYOUT AND IMPLEMENTING DIMENSIONS

#### LAYOUT OF SPACER BOLT + WIND LOAD RESTRAINT ANCHOR

Spacer bolt M diameter is related to load grade of panel hanger. Ep is the precast panel thickness.

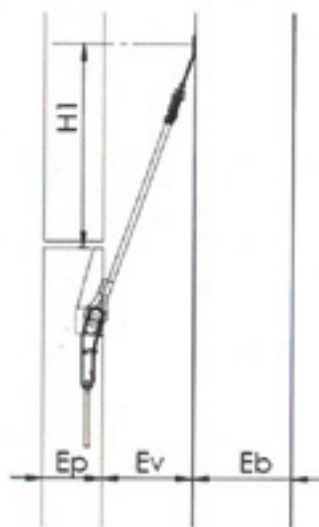
	M12			M16			M20			M24		
EP (mm)	70	90	100	80	90	120	90	100	140	130	150	-
AR (mm)	70	70	110	100	120	170	135	150	200	180	250	-



### ARCHITECTURAL PRECAST CONCRETE (APC)

#### EYEBOLT (ASSEMBLY COMPONENT)

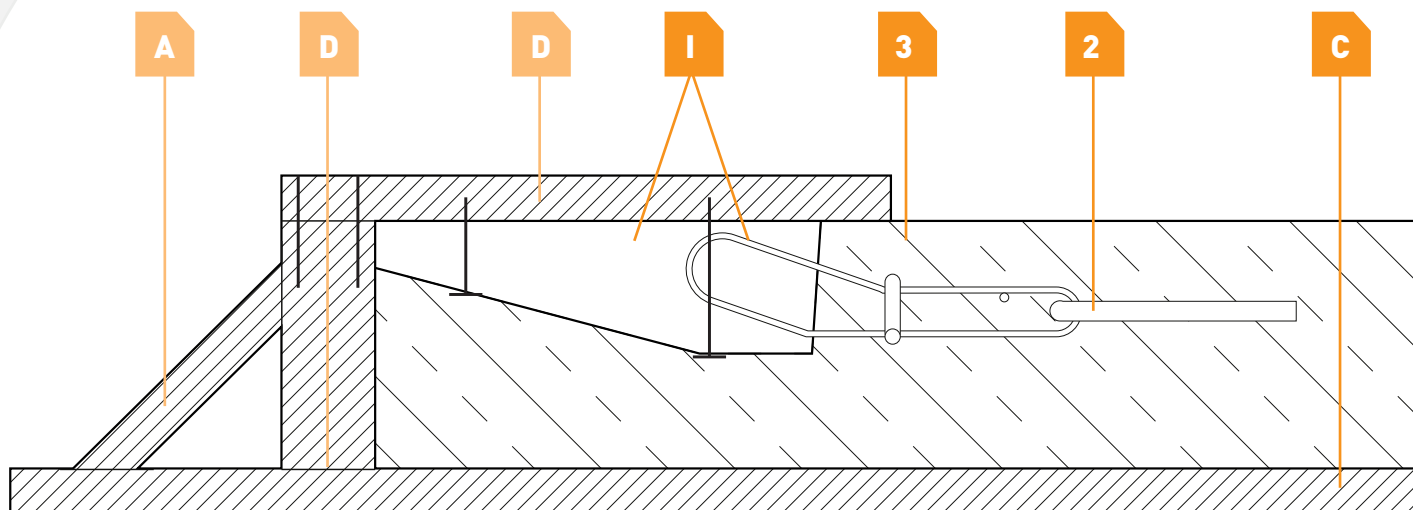
The thickness of the concrete panel (Ep) and the minimum thickness of the cavity (Ev) must be combined with the type of selected upper unit. The minimum values of these dimensions are given with the description of the unit page 7, 8 and 9. H1 dimension and the minimum length (L) of the assembly components (eye pin) are given in the table in the chart.



CAVITY EV (mm)																
Capacity		60	70	80	90	100	110	120	130	140	150	160	170	180	190	200
0,5 single	L	216	245	274	303	333	362	391	420	450	479	508	537	567	596	625
	H1	99	126	153	181	208	236	263	291	318	346	373	401	428	456	483
0,8 single	L	218	248	277	306	335	364	394	423	452	481	511	540	569	598	628
	H1	99	126	153	181	208	236	263	291	318	346	373	401	428	456	483
11,5 single	L	213	242	271	301	330	359	388	417	447	476	505	534	564	593	622
	H1	97	124	151	179	206	234	261	289	316	344	371	399	426	454	481
16,0 single	L			271	300	329	359	388	427	446	476	505	534	563	593	622
	H1			153	181	208	236	263	291	318	346	373	401	428	455	483
22,0 single	L			265	294	323	353	382	411	440	470	499	528	557	586	616
	H1			153	181	208	236	263	291	318	346	373	401	428	455	483
22,0 double straight	L			288	317	346	376	405	434	463	493	522	551	580	609	639
	H1			177	204	232	259	287	314	342	369	397	424	451	479	506
22,0 double twisted	L						315	344	374	403	432	461	491	520	549	578
	H1						257	285	312	340	367	395	422	449	477	504
27,0 simple	L			272	301	331	360	389	418	448	477	506	535	565	594	623
	H1			153	180	208	235	263	290	318	345	373	400	427	455	482
27,0 double straight	L			291	320	350	379	408	437	467	496	525	554	584	613	642
	H1			177	204	232	259	287	314	342	369	397	424	451	479	506
27,0 double twisted	L						318	348	377	406	435	465	494	520	552	582
	H1						257	285	312	340	367	395	422	449	477	504
34,0 simple	L			296	325	355	384	413	442	472	501	530	559	589	618	647
	H1			163	190	218	245	273	300	328	355	383	410	438	465	493
34,0 double straight	L			311	340	370	399	428	457	487	516	545	574	604	633	662
	H1			190	218	245	273	300	328	355	383	410	438	465	493	520
34,0 double twisted	L						338	368	397	426	455	485	514	543	572	602
	H1						271	298	326	353	381	408	436	463	491	518
56,0 simple	L				336	365	394	424	453	482	511	541	570	599	628	658
	H1				207	234	262	289	317	344	372	399	427	454	482	509
56,0 double straight	L				335	365	394	423	452	482	511	540	569	599	628	657
	H1				218	245	273	300	328	355	383	410	438	465	493	520

## ARCHITECTURAL PRECAST CONCRETE (APC)

### FORM AIDS, PROPOSAL FOR FACING PANEL ANCHOR

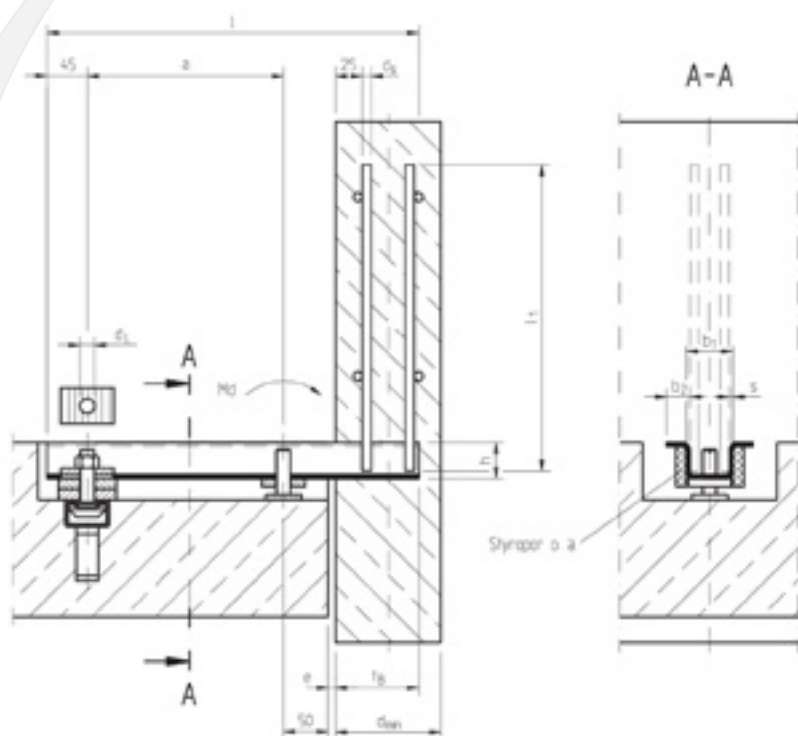


- A • Side form on gable-end of facing panel unit
- 3 • Reinforcement bar (see page 8)
- C • Form base
- D • Wooden cover
- I • Insert
- 2 • U shaped reinforcement bar (2 pieces) (see page 8)

- Nail or screw recess styropor plugs securely to the wooden cover (C). The wooden cover must be at least as wide as the recess plug. The lower unit is similarly to be protected against soiling.
- Secure wooden cover to the side form (A)
- In the case of the roof panel the wooden cover is replaced by a stable section running continuously between the side forms comprising a wooden or steel cross-section.

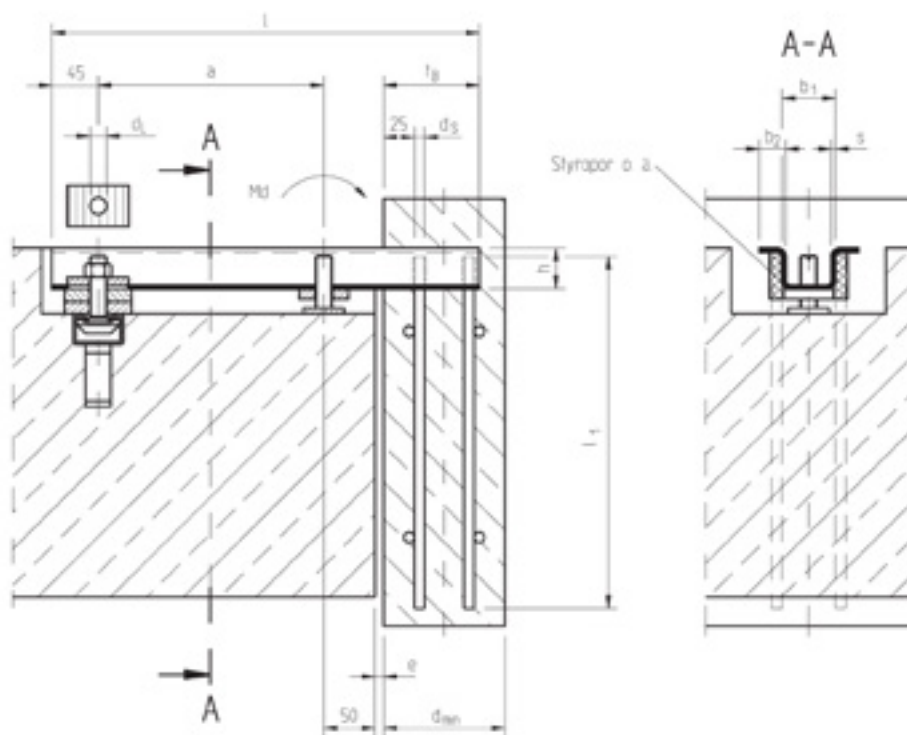
## ARCHITECTURAL PRECAST CONCRETE (APC)

### 5. PARAPET ANCHORS



Parapet anchor,  
with adjustment screw,  
standard unit,  
Part no. 04BA203- Md -L

Parapet anchor,  
with adjustment screw,  
roof unit,  
Part no. 04BA205- Md -L





## ARCHITECTURAL PRECAST CONCRETE (APC)

Parapet anchors allow fixing of concrete facades in parapet and roof areas. They absorb moments resulting from self-weight as well as wind pressure and suction. Parapet anchors are adjustable into 3 dimensions further anchorage and fixing gear, e.g.; additional tensile or compression anchors are not necessary.

At least two parapet anchors are to be arranged per facing unit. Statically determined dimensions are preferred. To absorb the length changes of the completed unit resulting from temperature influences, a damper strip (5 mm polystyrene) is laid next to the parapet anchor. This damper strip is useless when the anchor is not in bedded in the concrete of the floor.

PART NO.		BA203-100-L BA205-100-L	BA203-180-L BA205-180-L	BA203-300-L BA205-300-L	BA203-375-L BA205-375-L	BA203-500-L BA205-500-L	BA203-750-L BA205-750-L
adm. MD	kNcm	135	243	405	506,25	675	1012,5
l	mm	340-430	380-470	480-570	560-650	530-620	605-695
h	mm	35	40	49	54	60	68
b1	mm	42	40	49	54	60	68
b2	mm	26	38	36,5	36	51	54
S	mm	3	4	4	5	6	8
d <sub>min</sub>	mm	90	100	110	120	120	140
REINFORCEMENT BARS							
ds	mm	8	10	12	14	14	16
l1	mm	400	500	580	680	680	780
OTHER MEASUREMENTS							
a <sub>min</sub>	mm	245	285	385	645	435	510
t <sub>b</sub>	mm	75	85	95	105	105	125
e	mm	0-120	0-120	0-120	0-120	0-120	0-120
d <sub>L</sub>	mm	13	13	17	17	17	17

Other load ratings available on request.

## ARCHITECTURAL PRECAST CONCRETE (APC)

### 6. PARAPET ANCHORS FIX BA

#### DESIGN BASIC RULES

OMEGA BA Parapet Anchors are dimensioned according to present standards and rules.

##### Basic rules:

- Eurocode 0 (EN 1990)
- Eurocode 3 (EN 1993)

##### Partial safety factor:

$G = 1.35$  (dead load)

$Q = 1.50$  (live load)

The required OMEGA BA is chosen by calculating the bending moment,  $M_d$  and the shear load,  $V$  at bearing point, A.

#### ADDITIONNAL CHECK

##### Check for serviceability

At cases, additional verifications have to be taken into account:

- Deformation (incl. Bending)
- Vibration risks
- Instability risks for seismic situations.

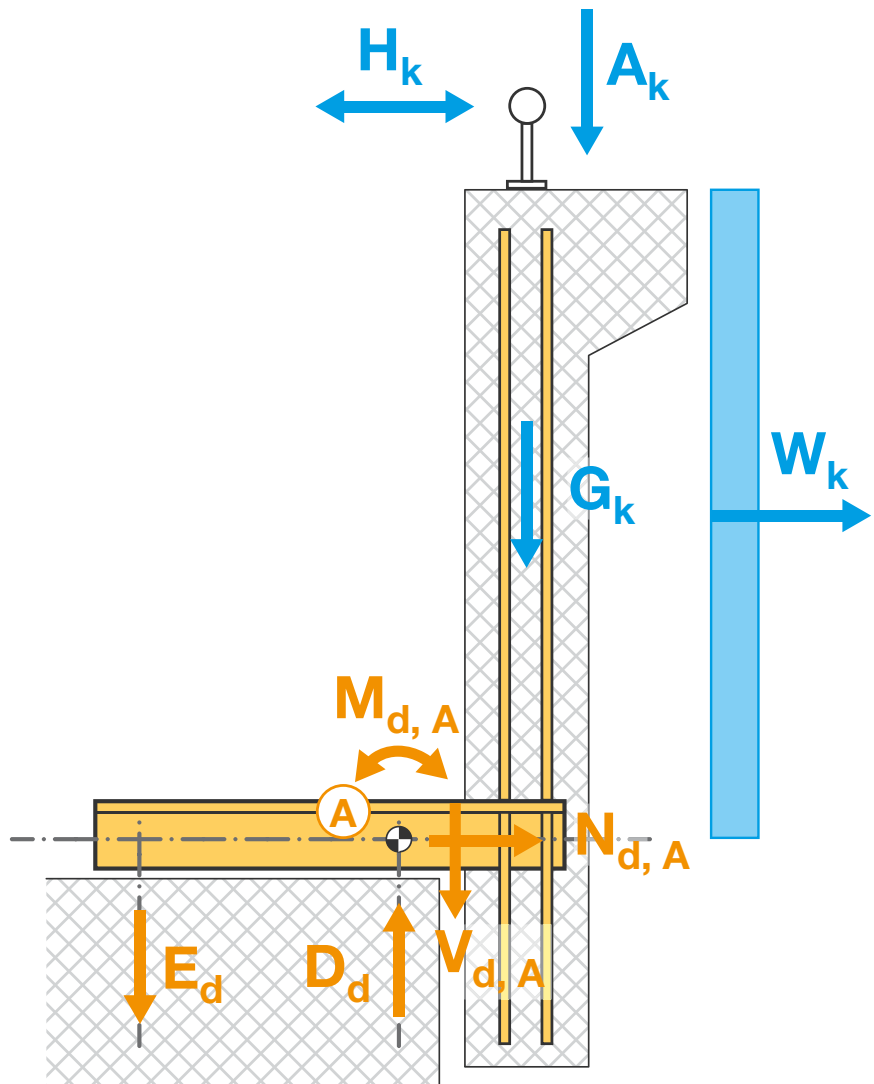
#### CALCULATION OF LOADS

##### Applied Loads

$A_k$	(kN.m <sup>-1</sup> )	Overload
$G_k$	(kN.m <sup>-1</sup> )	Weight of the parapet panel
$H_k$	(kN.m <sup>-1</sup> )	Point Load
$W_k$	(kN.m <sup>-2</sup> )	Wind load on the parapet panel

##### Resultant Load and support reaction

$M_d$	(kNm)	Calculation value for bending moment
$V_d$	(kN)	Calculation value for shear load
$N_d$	(kN)	Calculation value for normal load
$E_d$	(kN)	Calculation value for traction support reaction
$D_d$	(kN)	Calculation value for compression support reaction



**ARCHITECTURAL PRECAST CONCRETE (APC)**

## 6.2 PARAPET ANCHORS FIX BA

**CALCULATION NOTE****Shear Load**

$$V_d = \gamma_G \cdot G_k + \gamma_Q \cdot A_k$$

**Normal Load**

$$N_d = \gamma_Q \cdot H_k + \gamma_Q \cdot W_k$$

**Lever arms:**

$$w = e + 0,5f + 50\text{mm}$$

$e$  = distance between parapet and the edge of the slab

$f$  = thickness of parapet panel

$h_w$  = centre of the parapet panel – top of the slab

$h_H$  = point load position (Note: point load may be applied at the upper edge of parapet) – top of the slab

**Bending moment**

The largest bending moment on the parapet corbel occurs on the front support point:

$$M_d = \gamma_G \cdot (A_k + G_k) \cdot w + \gamma_Q \cdot H_k \cdot h_H + \gamma_Q \cdot W_k \cdot h_w$$

$$M_{d,adm} = M_d / n$$

With  $n$  = numbers of parapet anchors per panel,  $n \geq 2$

**SETTING UP PRESCRIPTIONS****OMEGA BA Repartition**

OMEGA BA have to be set depending on the element gravity center so that it guarantee an equal stress for both OMEGA. OMEGA gathering may be possible under conditions.

**Horizontal Stress**

If the horizontal stress cannot be undertaken by the friction between the profile and the bearing area, the installation of toothed plates can solve this issue.

**OMEGAFIX Installation and adjustment**

Adjustment at the bearing area is made by use of appropriate wedges. Wide between OMEGA BA and the slab must be filled with a shrinkage compensated bearing mortar.

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