Leviat
A CRH COMPANY

Anchoring & Fixing for High Rise Structures

Applications – Products - Solutions

19th November 2021- CONSTRUCCIÓN ACTIVA

Imagine. Model. Make.

Bienvenidos !

Agenda

Leviat
A CRH COMPANY

1. **Introduction**
2. **Curtain Wall**
3. **Concrete Façade & GRC**
4. **Elevators**
5. **Architectural & Structural**
6. **Q & A**

We are **Leviat**

Leviat
A CRH COMPANY

- **3,000 people**
- **60 locations**
- Manufacturing on **4 continents**
- Sales in **30+ countries**

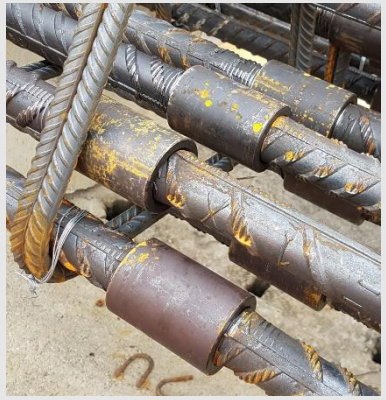
Our **Product Brands**

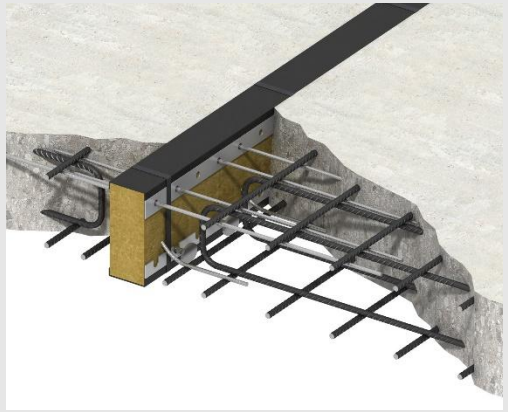
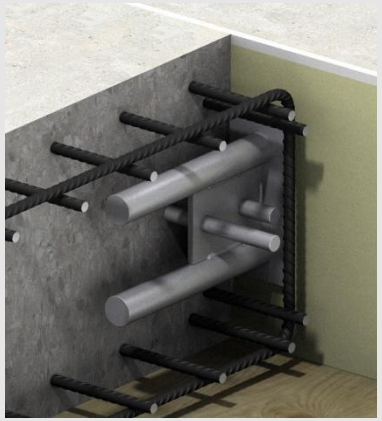
Leviat
A CRH COMPANY

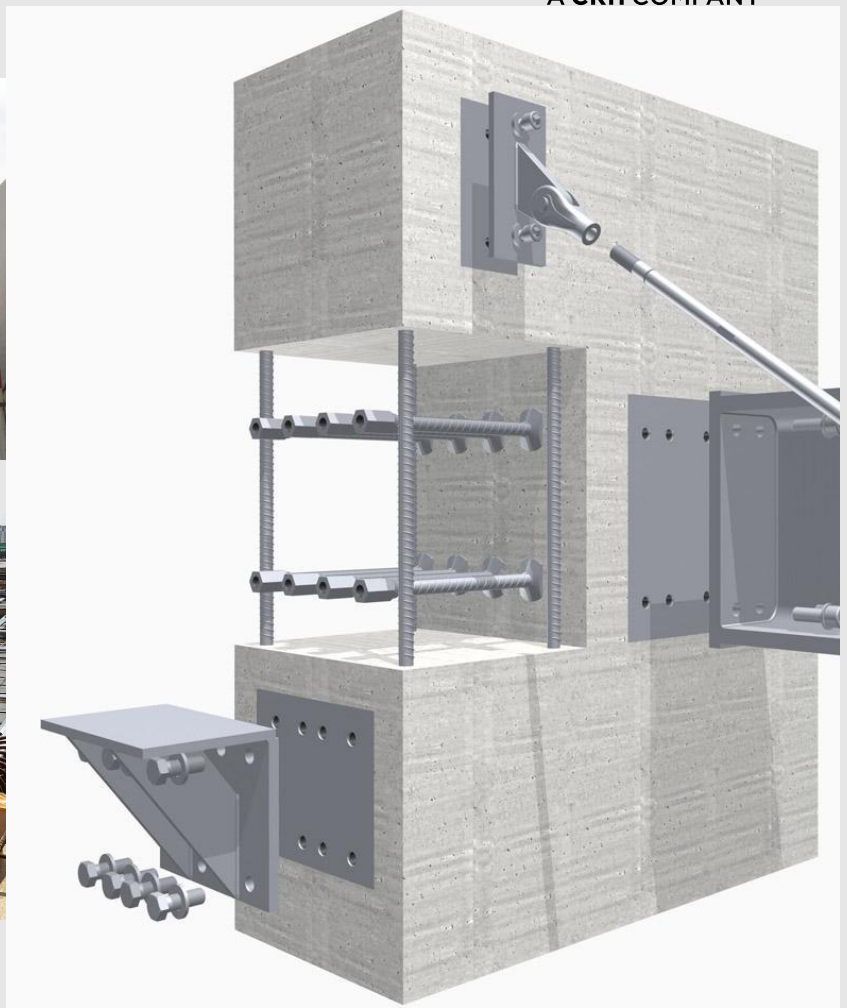
MeadowBurke®

Connecting, Fixing, Anchoring & Lifting Technology

Leviat
A CRH COMPANY

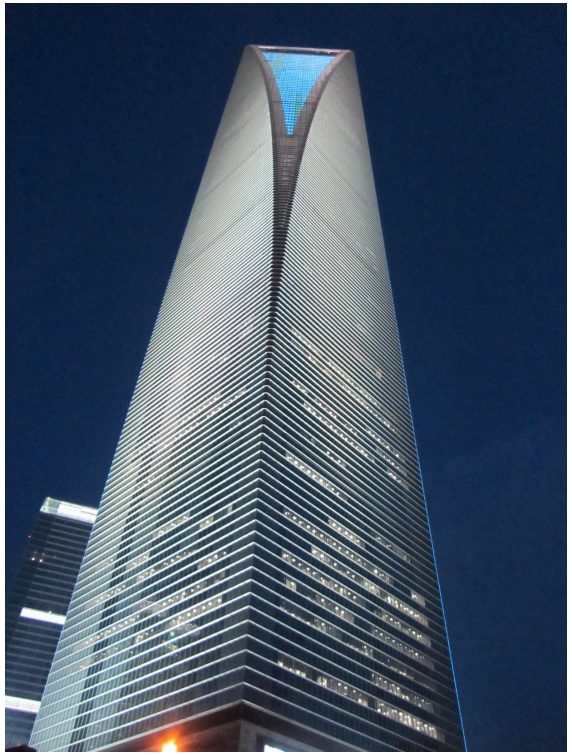
We help you build **better**, **safer**, **stronger** & **faster**

Agenda

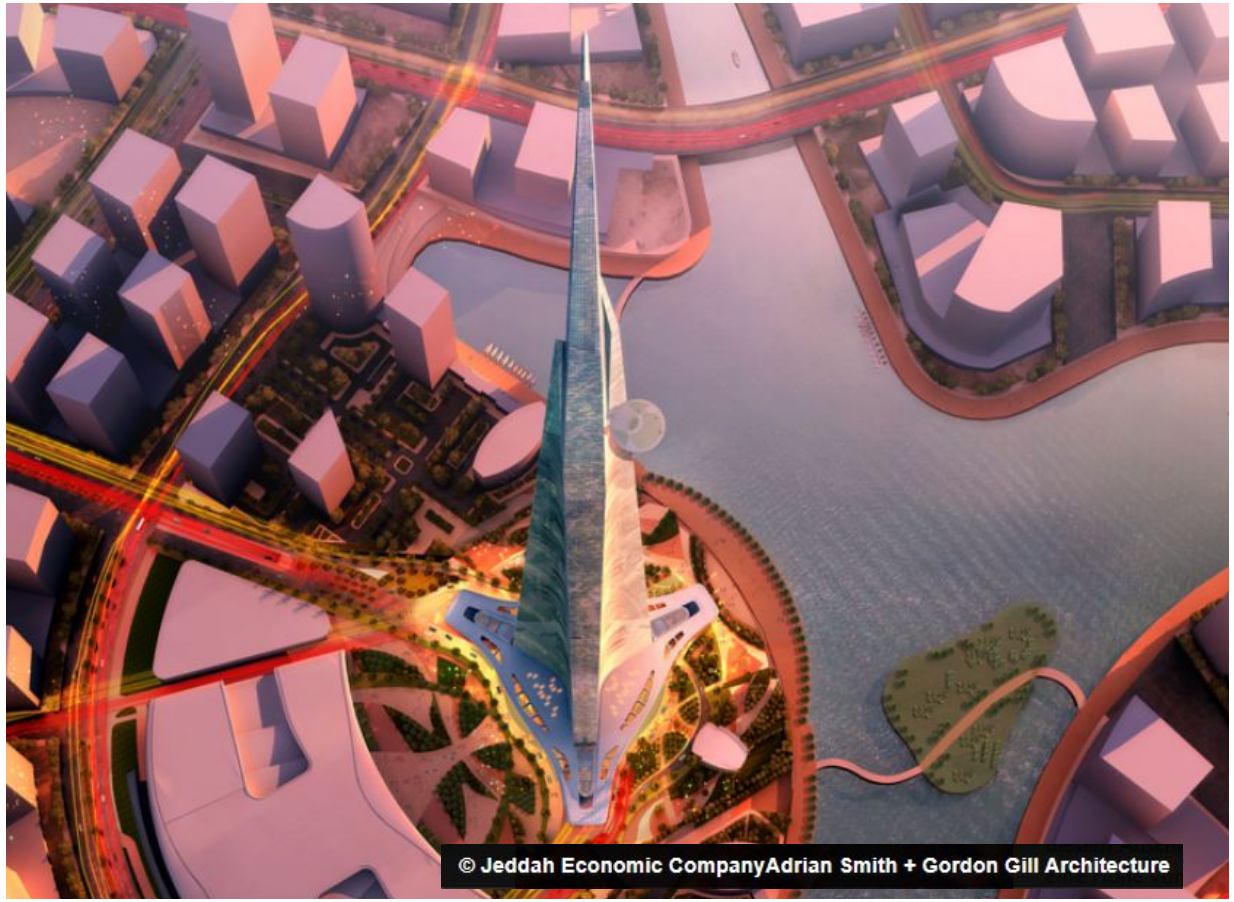
Leviat
A CRH COMPANY

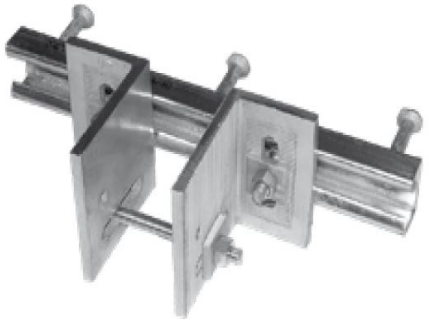
1. Introduction
2. Curtain Wall
3. Concrete Façade & GRC
4. Elevators
5. Architectural & Structural
6. Q & A

Curtain Wall



Curtain Wall



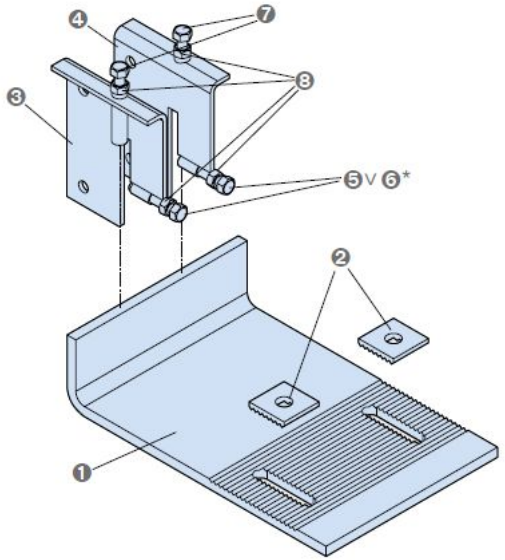


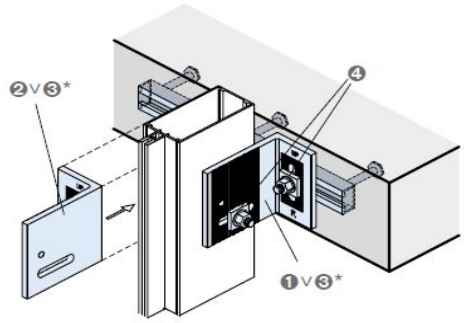
Curtain Wall

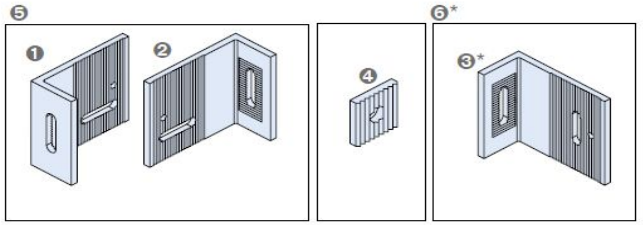
Curtain Wall

HALFEN

Curtain Wall





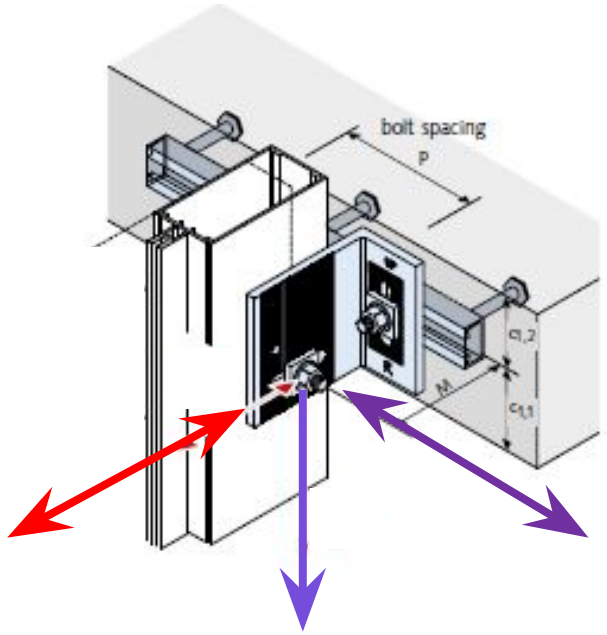


Curtain Wall - Cast-in channels

Channel selection

Acting External Loads

- Dead Load F_{DL}
- Wind Load ± F_{WL}
  - Straight on Facade Panel
  - Eccentric loads (Corners etc.)
  - On architectural elements (‘fins‘)
- Seismic Loads ± F_{EQ}
- Blast Loads ± F_{Blast}



Channel selection

HALFEN

Selection of Fixings

- Load capacity
- Geometric constraints (i.e. slab thickness)
- Special requirements
- Approvals and other documentation

- **Modified bracket geometry can often lead to optimized channel selection options**

Cast-in channels - Differentiation

- Manufacturing process: Hot rolling vs. cold forming
- Material: Mild steel & stainless steel
- Channel lip type: Smooth vs. serrated
- Approvals: International / National / None
- Design methods: International / National / None

Manufacturing

HALFEN

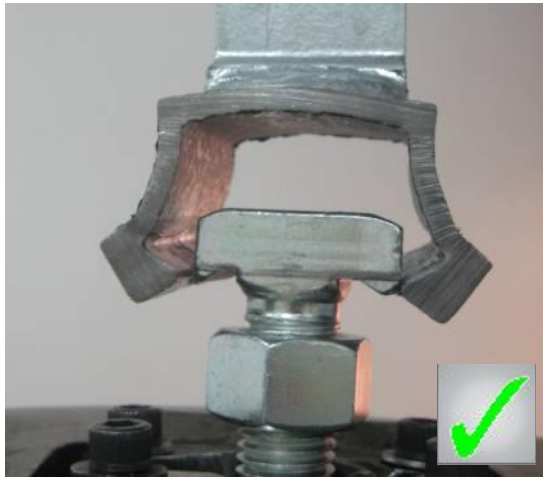
Cold-forming

- Metal is shaped **below** recrystallization temperature

Hot-rolling

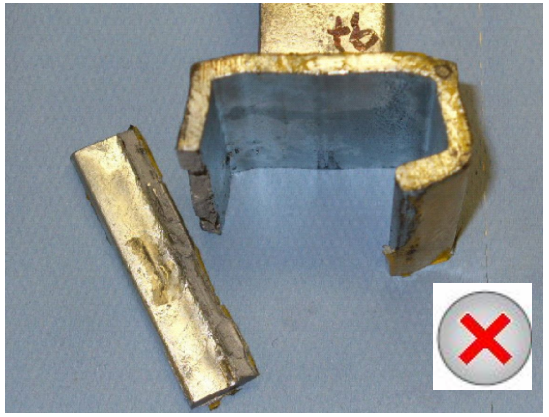
- Metal is shaped **above** recrystallization temperature

Manufacturing & Quality



High quality hot-rolled HALFEN cast-in channel:

- Consistent performance
- Ductile failure
- Full documentation



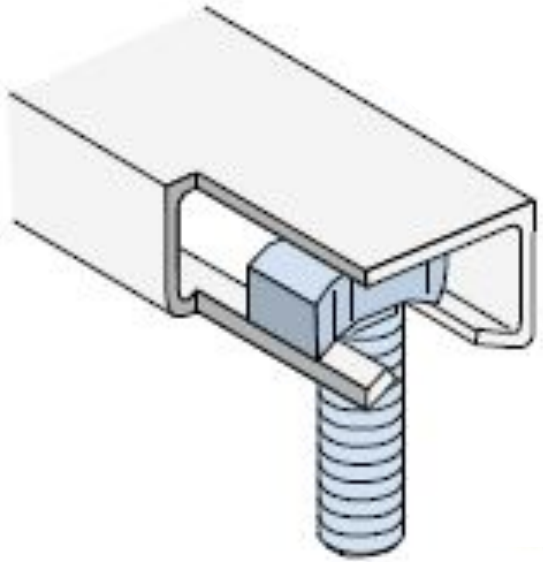
Low quality cold-formed cast-in channel of unknown origin:

- Unknown material properties
- Risk of brittle failure
- No documentation

Channel lip types

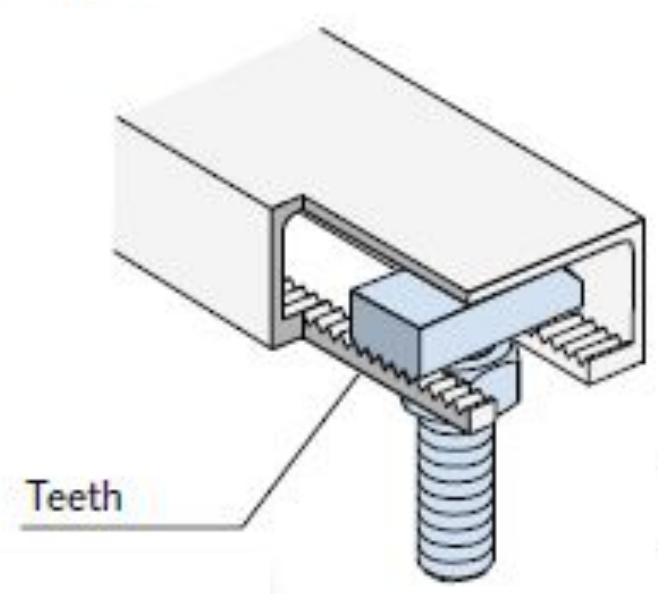
Smooth

- **HTA-CE**



Serrated

- **HZA**



Global Approvals

HALFEN HTA (-CE) cast-in channels

ETA-09/0339

ESR-1008

CABR-YMC-1A

HALFEN HZA serrated cast-in channels

ESR-4016

ETA-17/0728
(HZA-PS 53/34)

ETA-20/1081
(HZA)

Design Rules

EN 1992-4 (Eurocode 2) - for tension & perpendicular shear

EOTA-TR 047 (or CEN/TR 17080) - for longitudinal loads

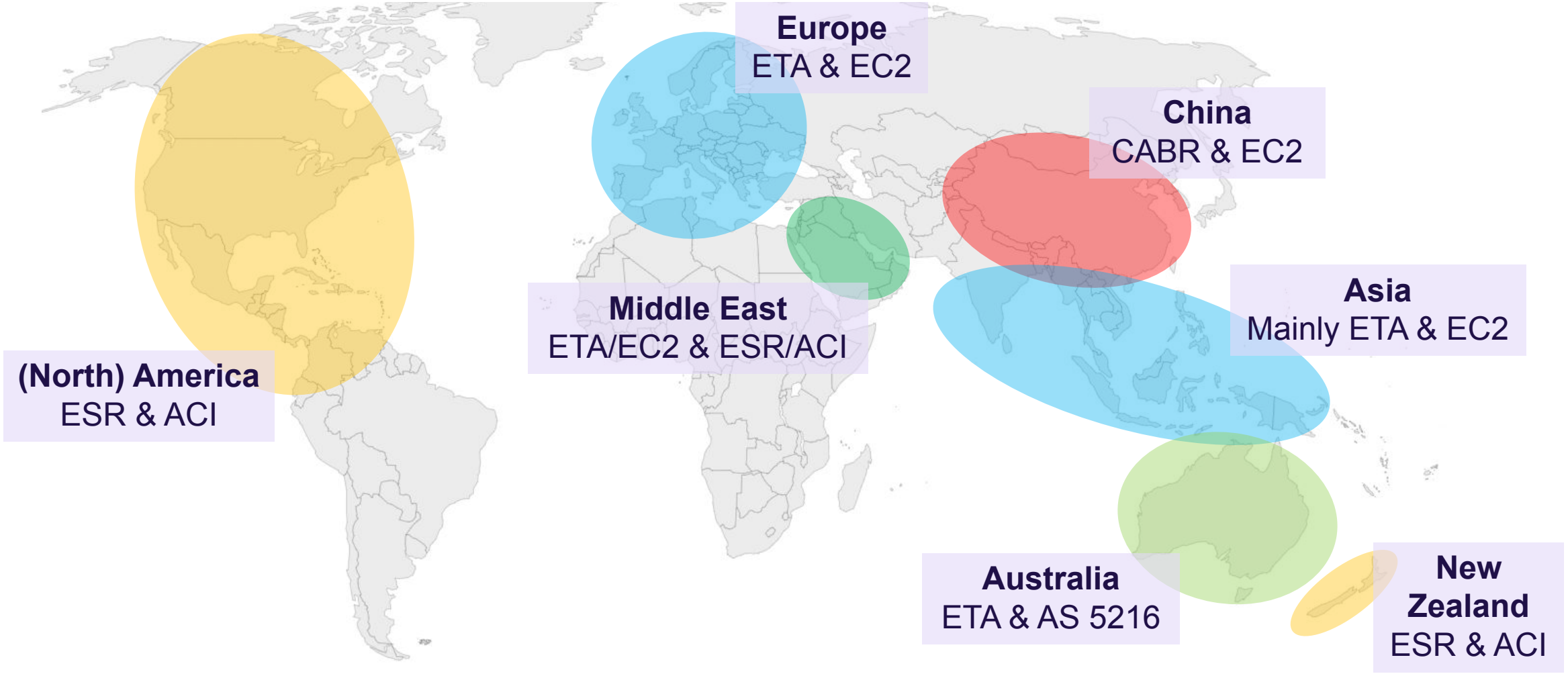
ACI 318-14 & AC 232 - covers all load directions

No country-specific design codes

European methods are widely accepted

AS 5216:2021 – 3D – now includes longitudinal loads

Global Approvals & Design Rules



Cold-formed channels HTA-CE

Applications

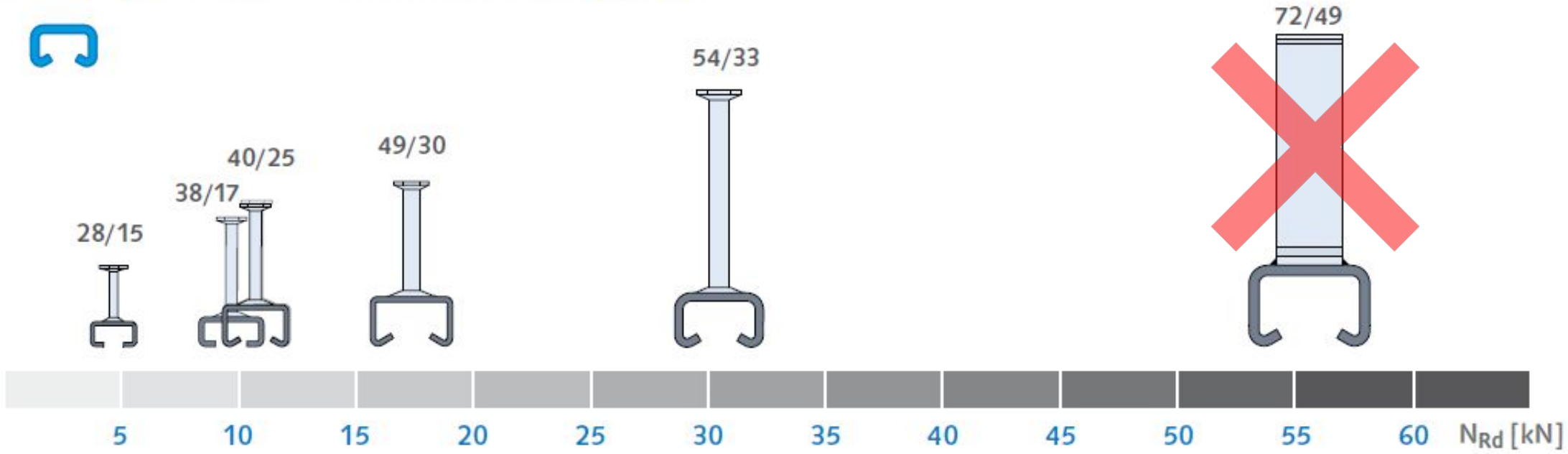
- Predominantly static loads
- Tension & perpendicular shear
- Very low nominal load bearing capacity in longitudinal direction of channel

Approvals

- European Technical Assessment ETA-09/0339
- Chinese approval CABR-YMC-1A
- US-approval ESR-1008

Cold-formed channels HTA-CE

Profiles & load ranges ($N^0_{Rd,s,l}$, indicative)



Hot-rolled channels HTA-CE

HALFEN

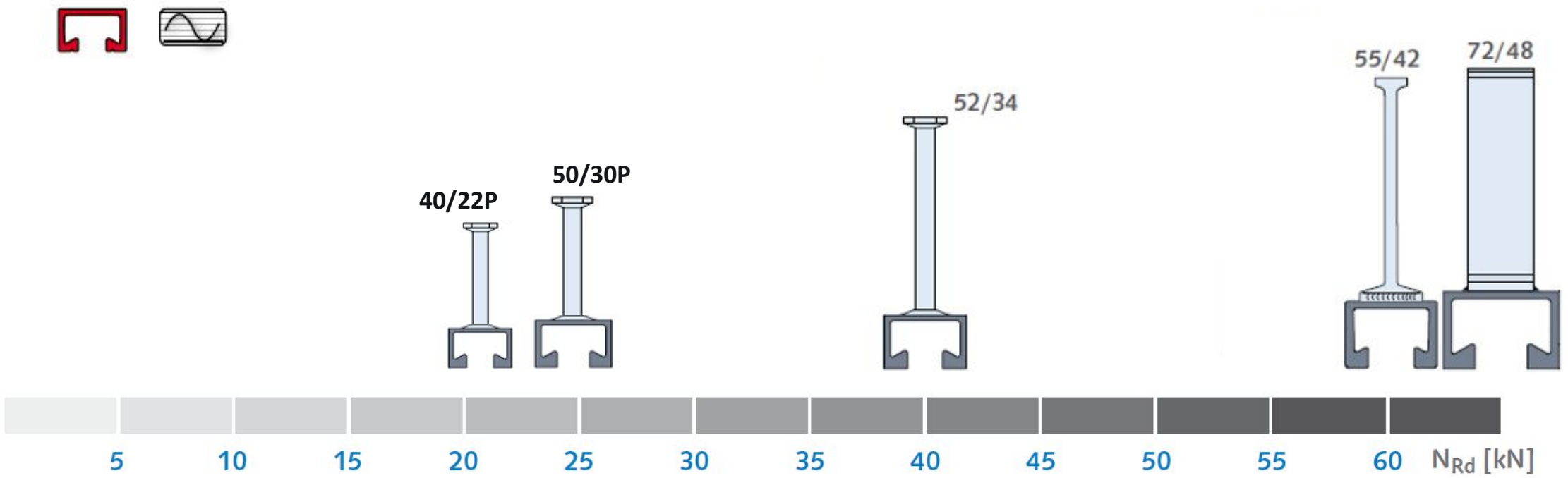
Applications

- Recommended for dynamic loads
- Tension & perpendicular shear
- Low to moderate load bearing capacity in longitudinal direction of channel (depending on type of T-bolt)

- Curtain wall facades
- Elevator guide rails (especially 40/22)
- …

Hot-rolled channels HTA-CE

Profiles & load ranges ($N^0_{Rd,s,l}$, indicative)



Hot-rolled channels HTA-CE

HALFEN

Approvals

- European Technical Assessment ETA-09/0339
- Chinese approval CABR-YMC-1A
- US-approval ESR-1008

Design:

- With HTA software:
  - Specific consideration of all relevant parameters
  - Verifications separately for all failure modes

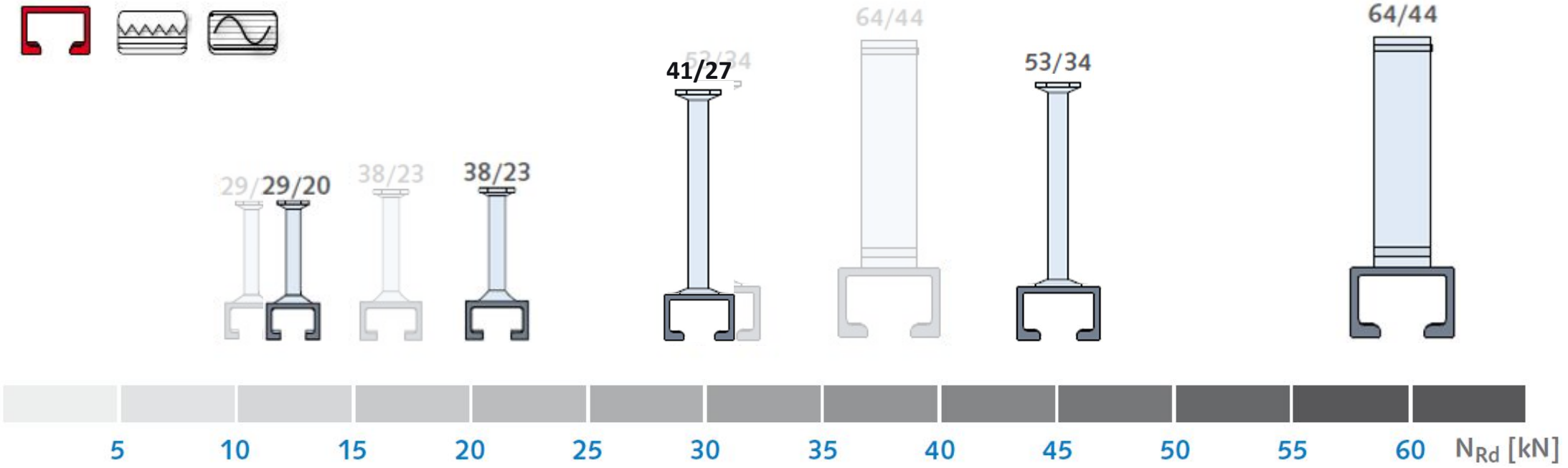
HZA serrated cast-in channels

NEW: ETA for HZA

- **Enables design acc. EN 1992-4 with specific considerations of all failure modes**
- **Modified load capacities**
- **Hot-rolled HZA 41/27 has been included in any approval for the first time**

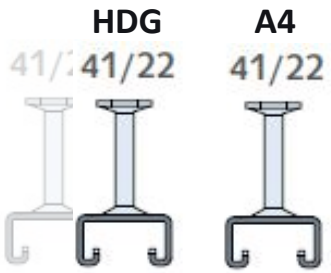
Hot-rolled channels HZA DYNAGRIP

Profiles & load ranges 2021+ ($N^0_{Rd,s,l}$, indicative)



Cold-formed channel HZA 41/22

Profiles & load ranges 2021+ ($N^0_{Rd,s,l}$, indicative)



HZA serrated cast-in channels

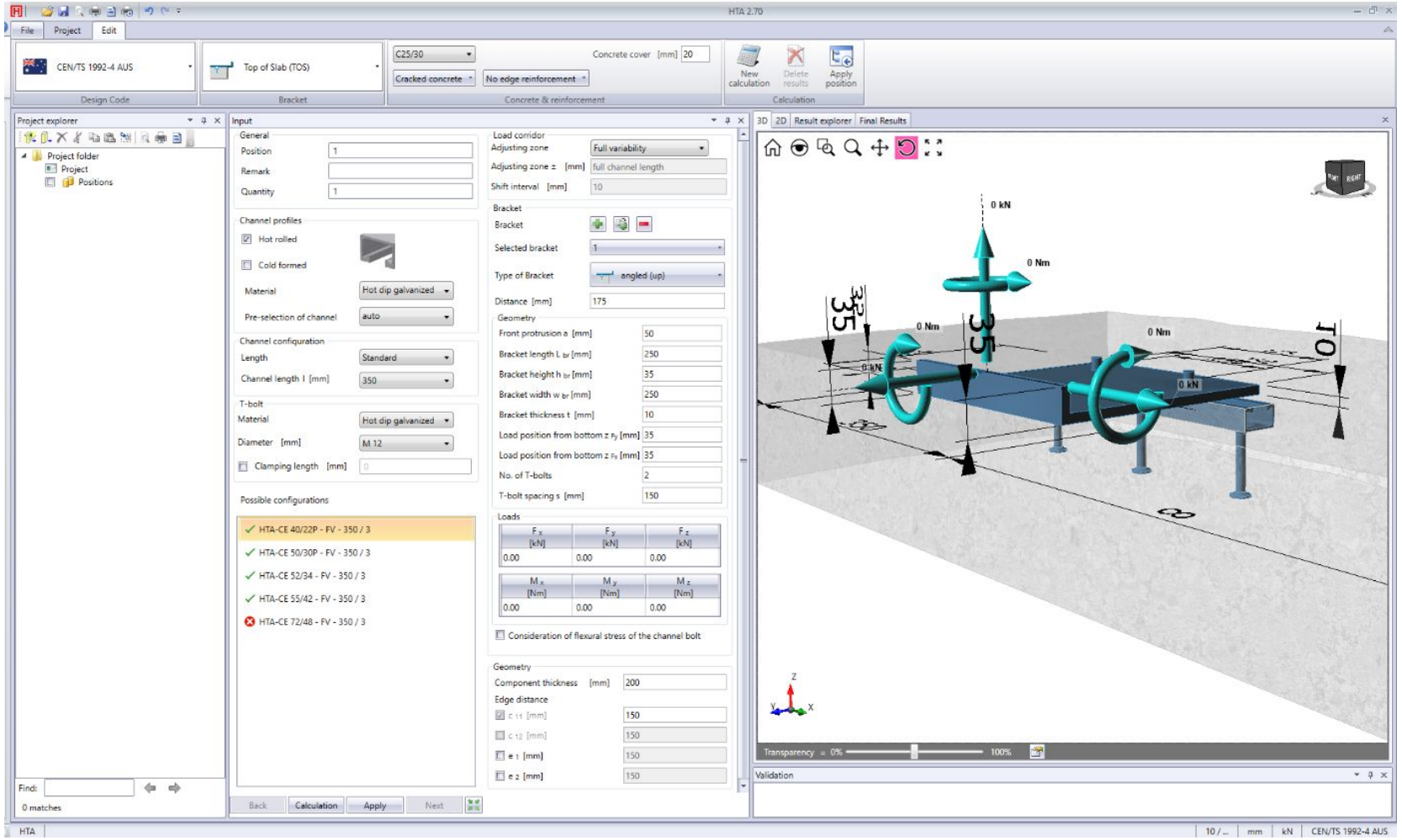
Approvals:

- NEW ETA-20/1081 for serrated HZA cast-in channels
  - Available since April 2021
- US-approval ESR-4016

Design:

- According to the rules set out in EN 1992-4, ACI 318 and AS 5216 respectively
  - Specific consideration of all relevant parameters
  - Verifications separately for all failure modes
  - Software with all channel and load options

Software – HTA 2.91



HZA-PS

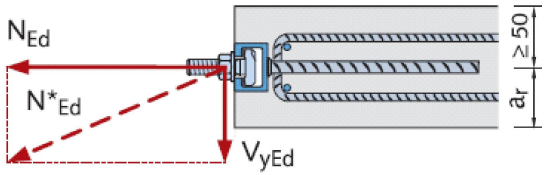
HZA-PS 53/34 with ETA-17/0728

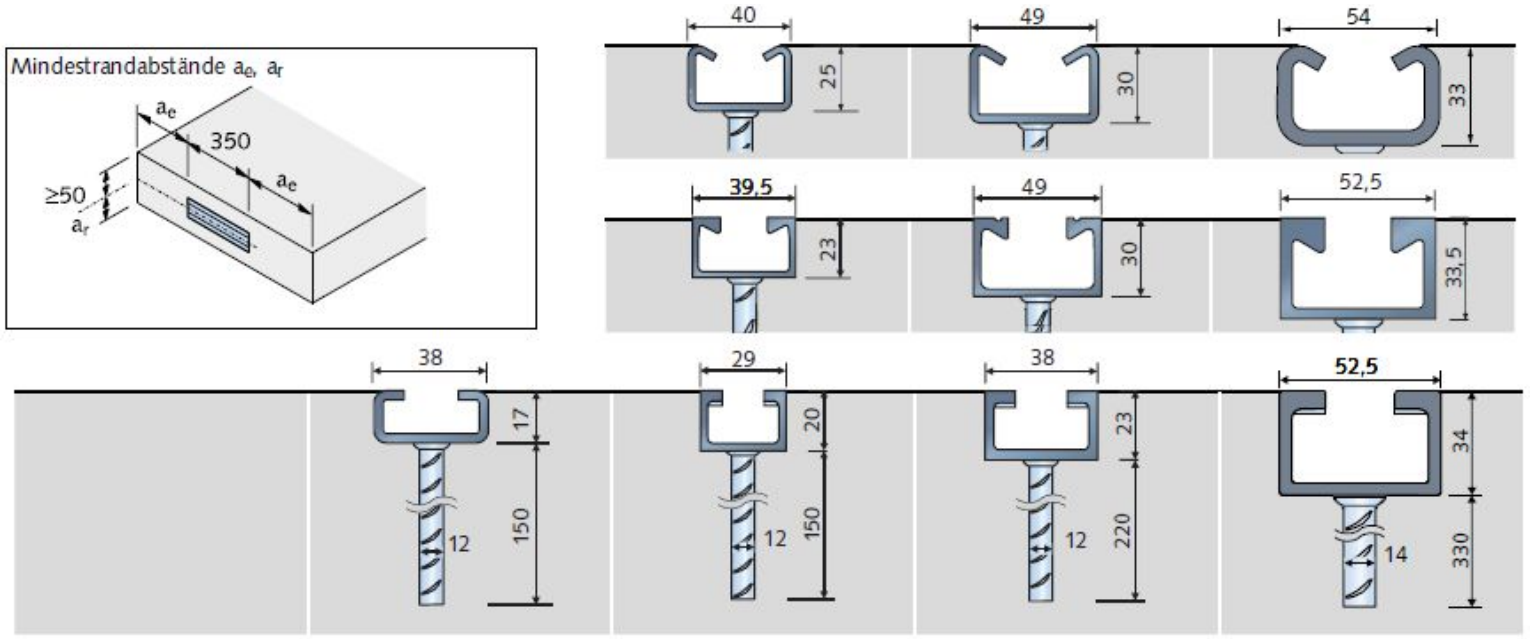
- Tested for seismic categories C1 & C2
- C1 will be included in revised ETA , C2 covered by expert reports for now

Variations of standard channels

HTA-R

- Standard profile with rebar (without specific approval)
- For high tensile- and moderate shear loads

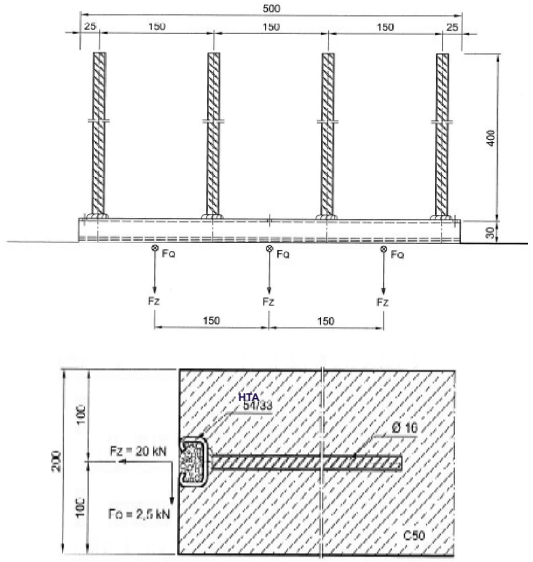




Variations of standard channels

HTA-R

- Can be configured project specific (Eng. Support)
- Especially useful for some curtain wall facade types

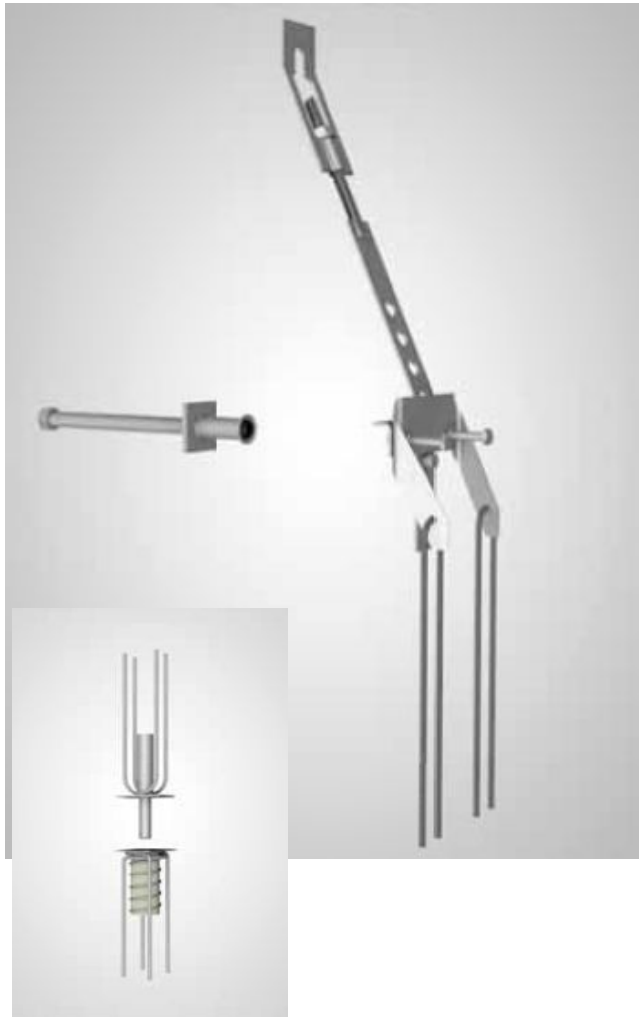


Agenda

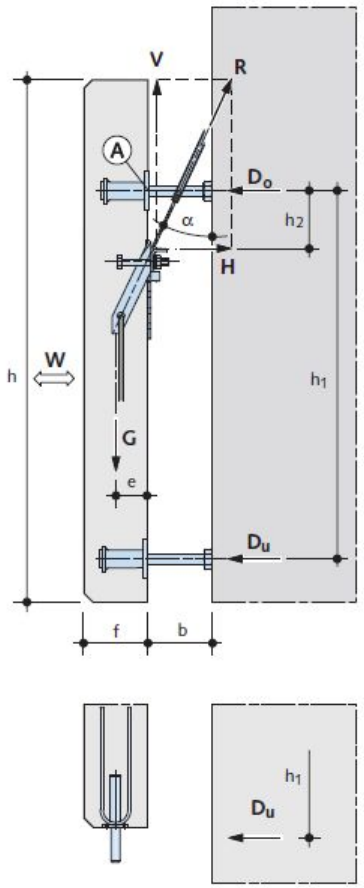
Leviat
A CRH COMPANY

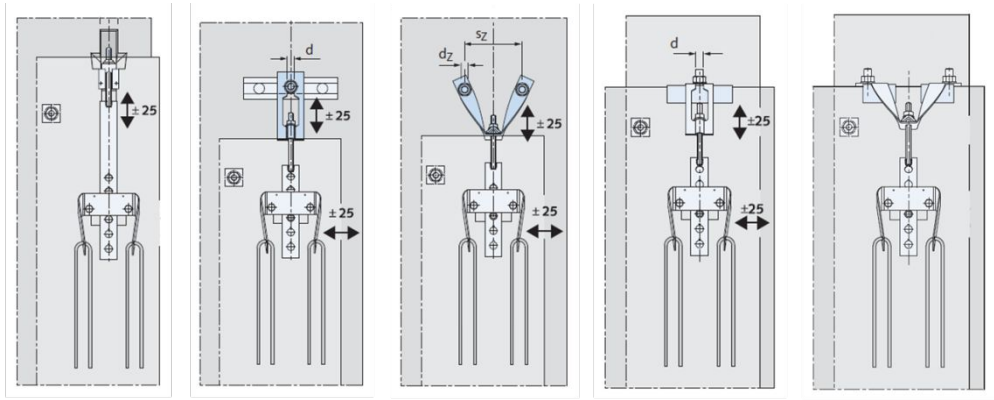
1. Introduction
2. Curtain Wall
3. Concrete Façade & GRC
4. Elevators
5. Architectural & Structural
6. Q & A

Concrete Facade

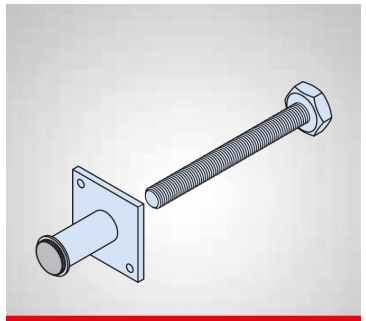


Concrete Facade

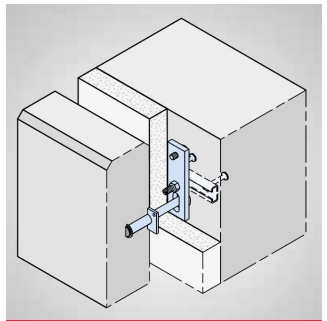




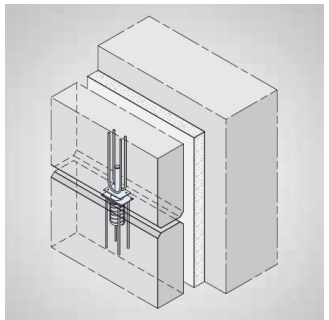
FPA-3 FPA-5 FPA-5Z FPA-5A FPA-5AZ



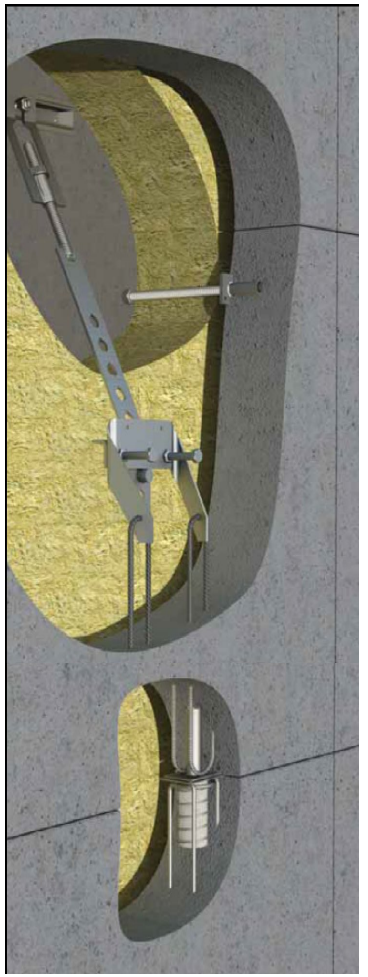
DS 13 – with tensile and compressive sockets



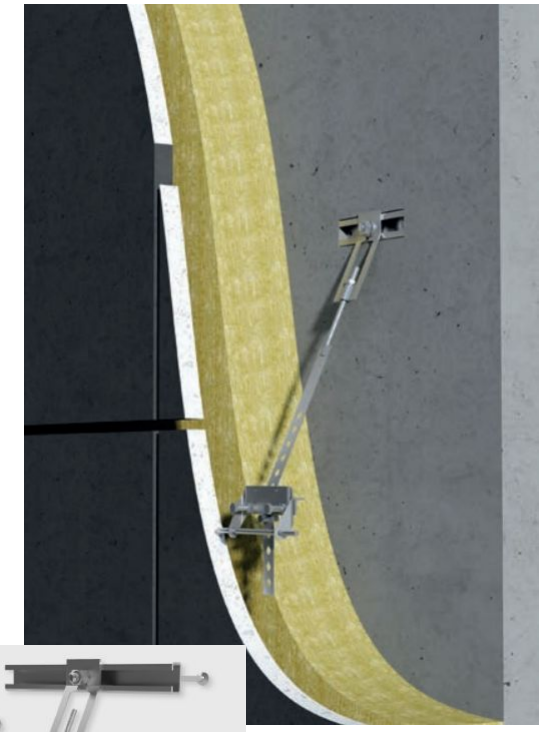
LD Adjustable restraints

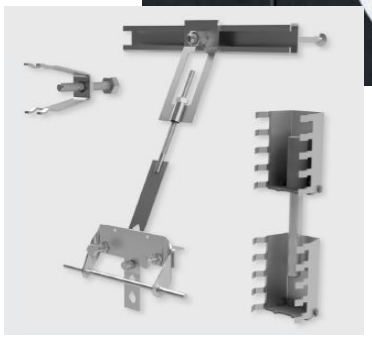


HFV Dowel restraint

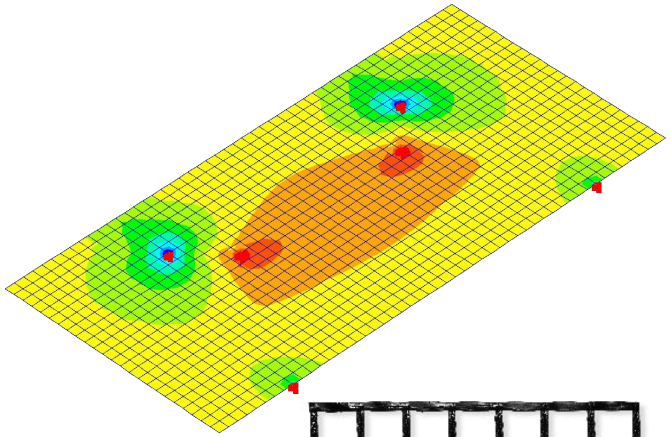


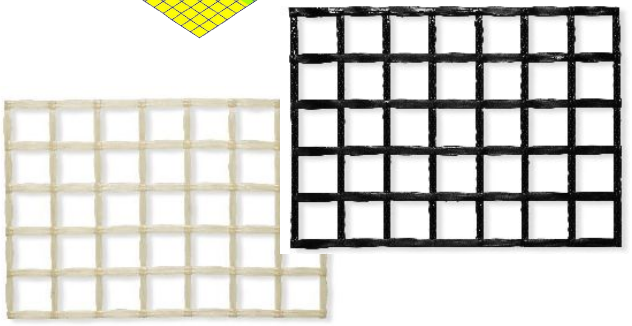
Concrete Facade





HALFEN
A CRH COMPANY

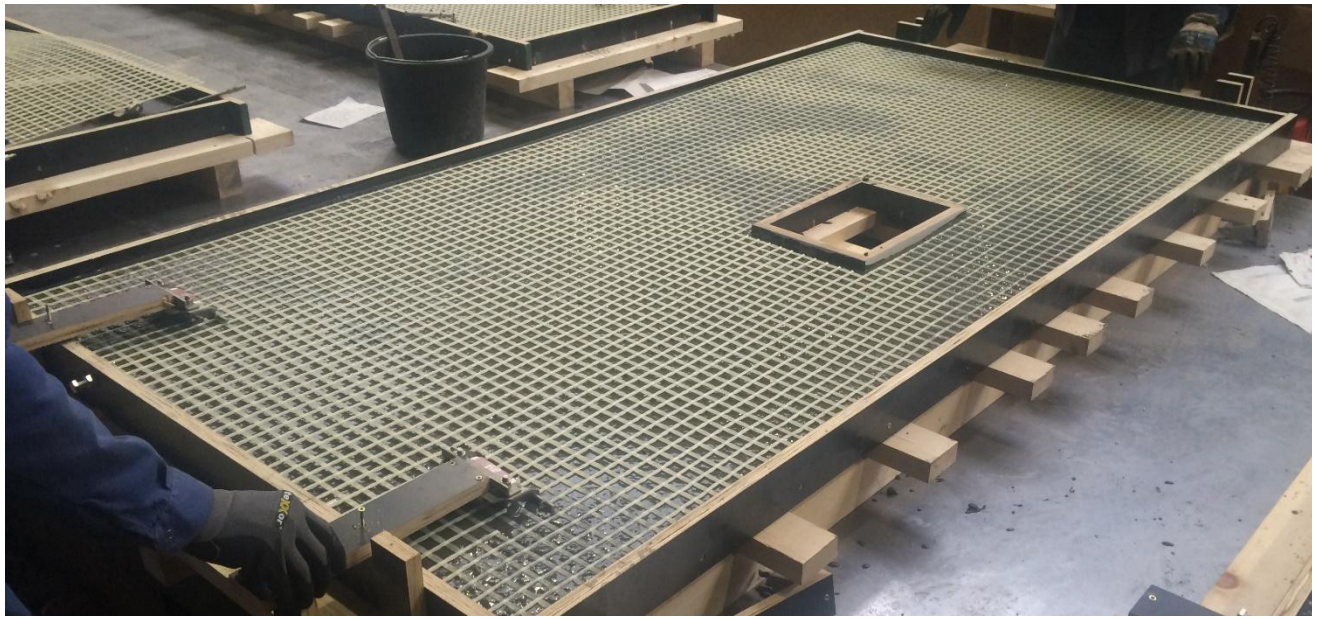


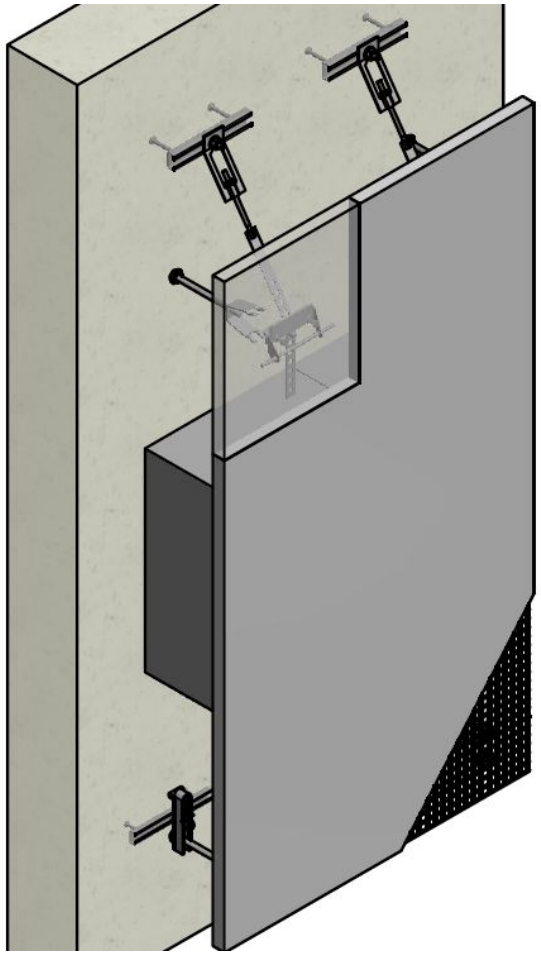


solidian®

Concrete Facade

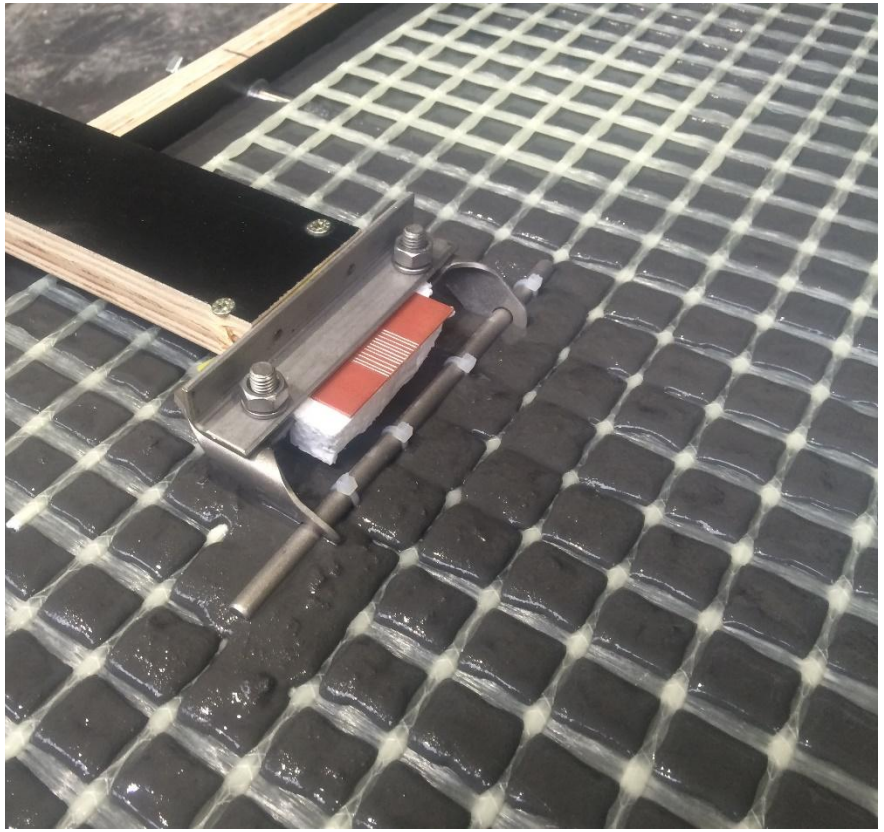
- Panel thickness ≥ 30 mm
- Concrete strength ≥ C50/60
- Glass fibre / carbon fibre textile reinforcement





Concrete Facade

- Panel production



Concrete Facade

HALFEN

Areas of application

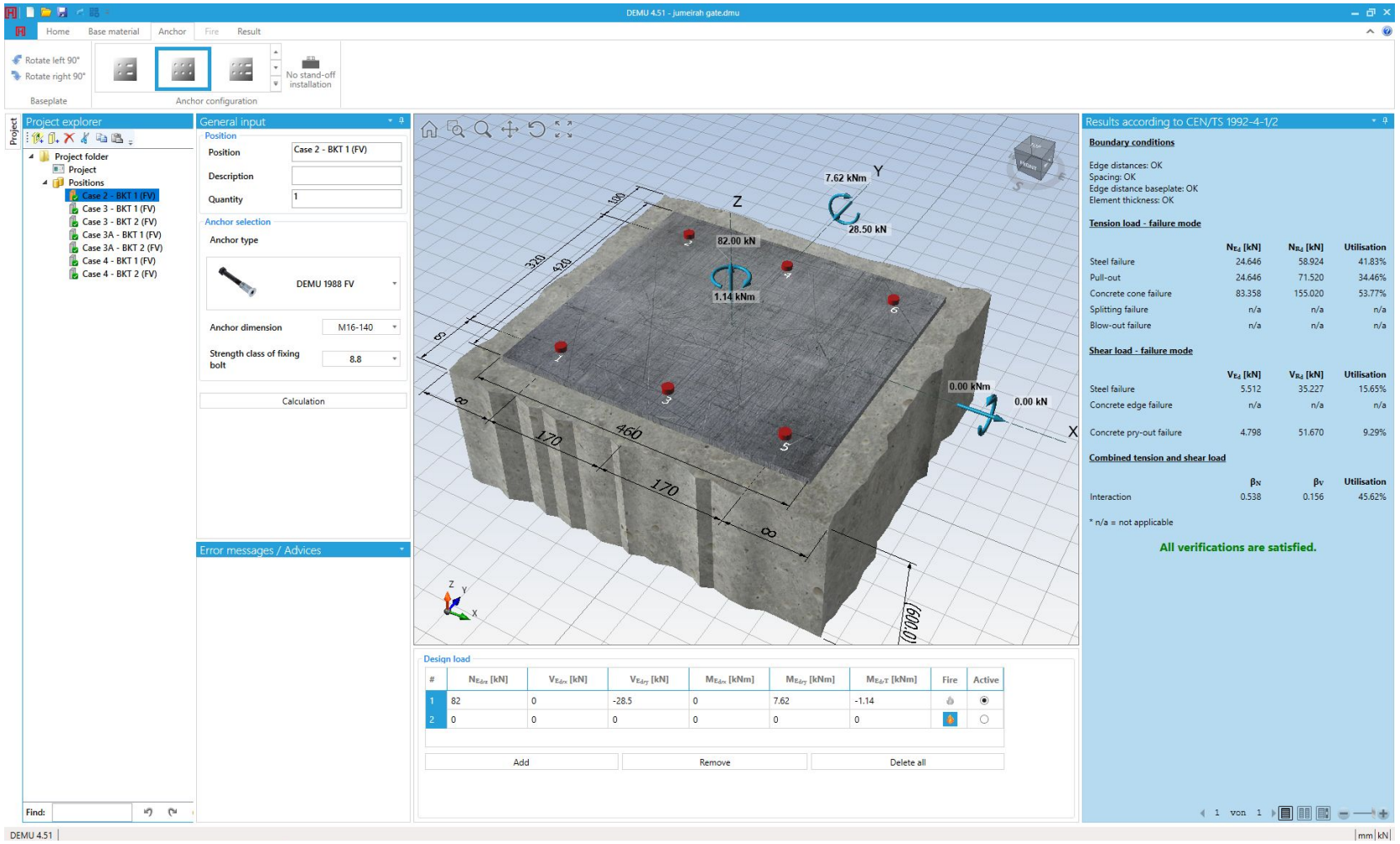
- New buildings
  - Optimized use of building footprint
  - Time saving due to quick installation
- Façade refurbishment (due to fire safety issues):
  - Low weight -> can be carried by most existing structures
  - Not flammable

Mixed Facade

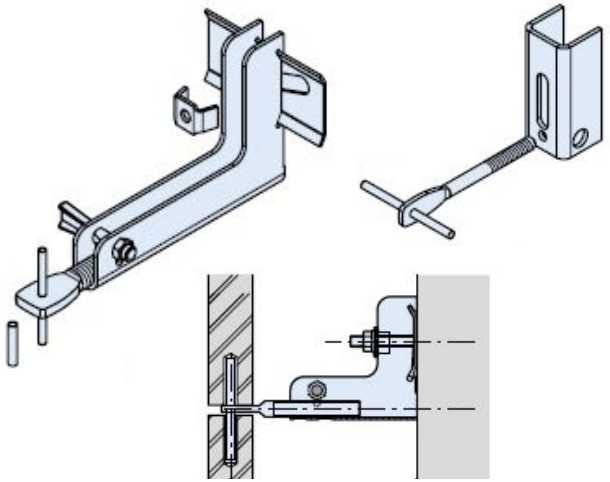
- **One Tower Limassol**

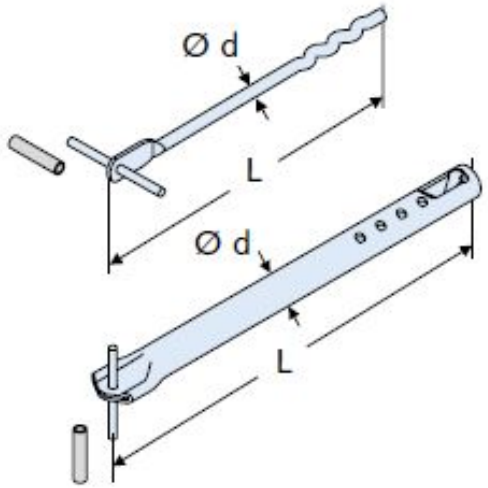
- HZA cast-in channels for Curtain Wall
- DEMU T-FIXX inserts for GRC panels
  - Product with ETA
  - Stainless Steel (GV also available)

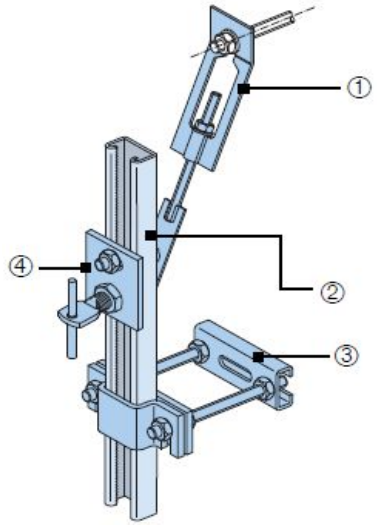
Concrete Facade



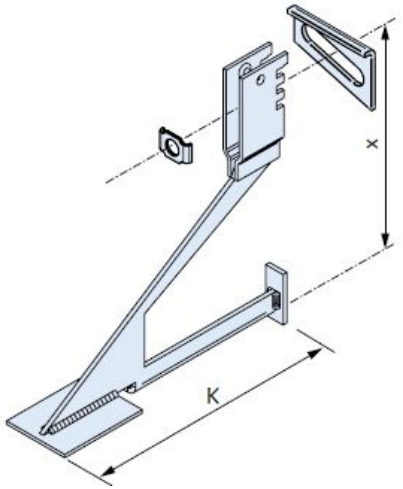
Natural Stone Facade

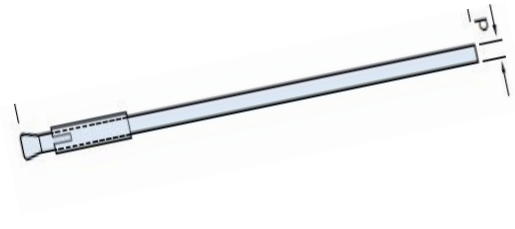


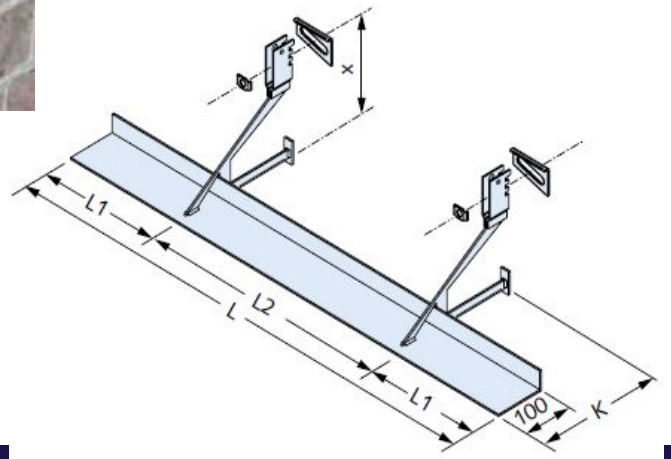




Brickwork Facade







Agenda

Leviat
A CRH COMPANY

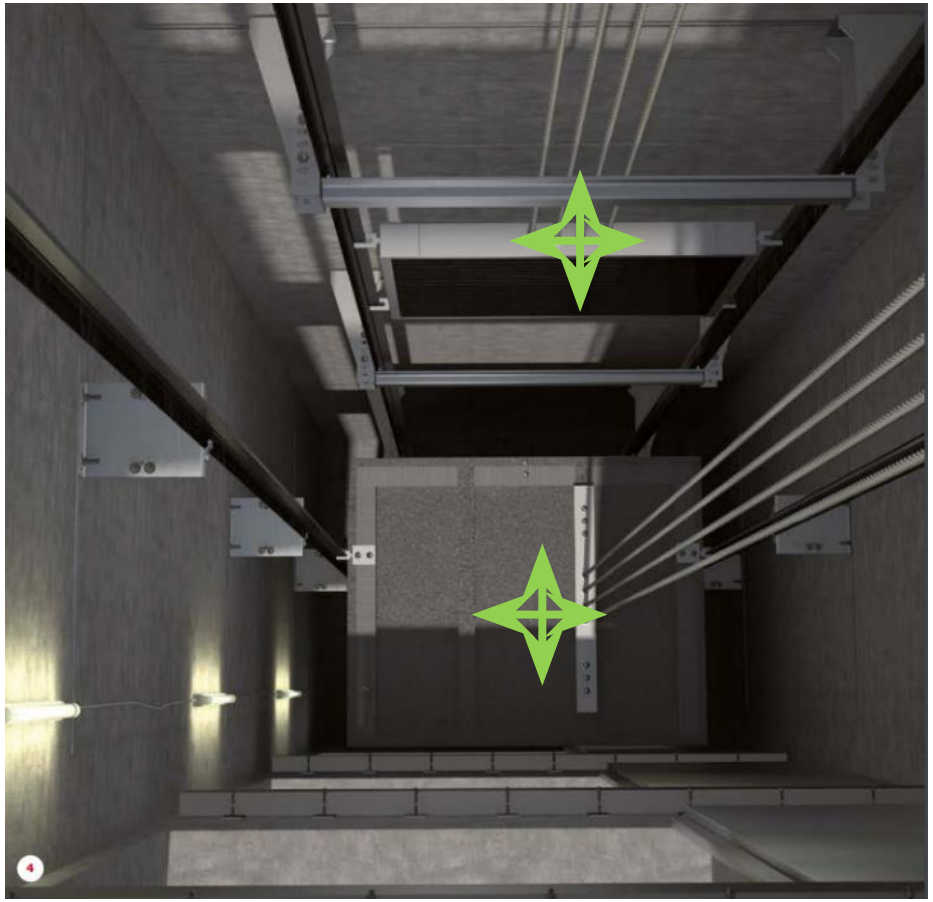
1. Introduction
2. Curtain Wall
3. Concrete Façade & GRC
4. Elevators
5. Architectural & Structural
6. Q & A

Elevators

Elevators

Service loads:

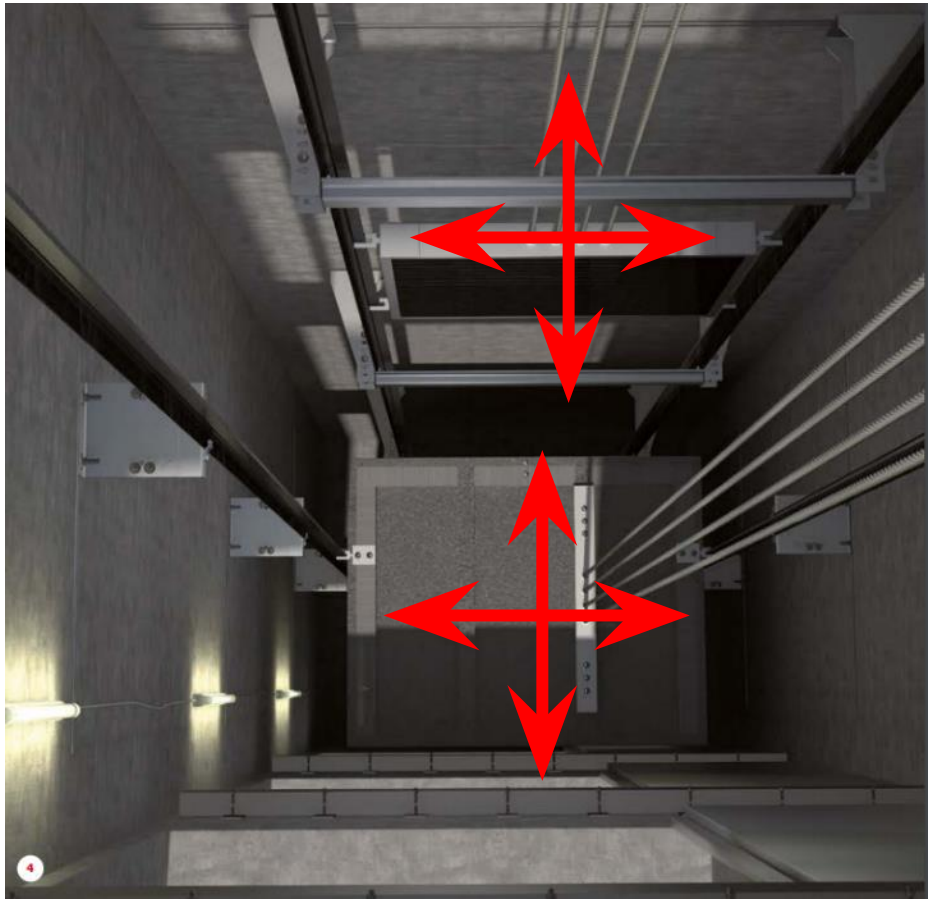
- Generally small (to moderate)
- Fatigue often a concern due to high load cycle count
  - Hot-rolled **HTA-CE 40/22P** has become the industry standard



Elevators

Exceptional loads:

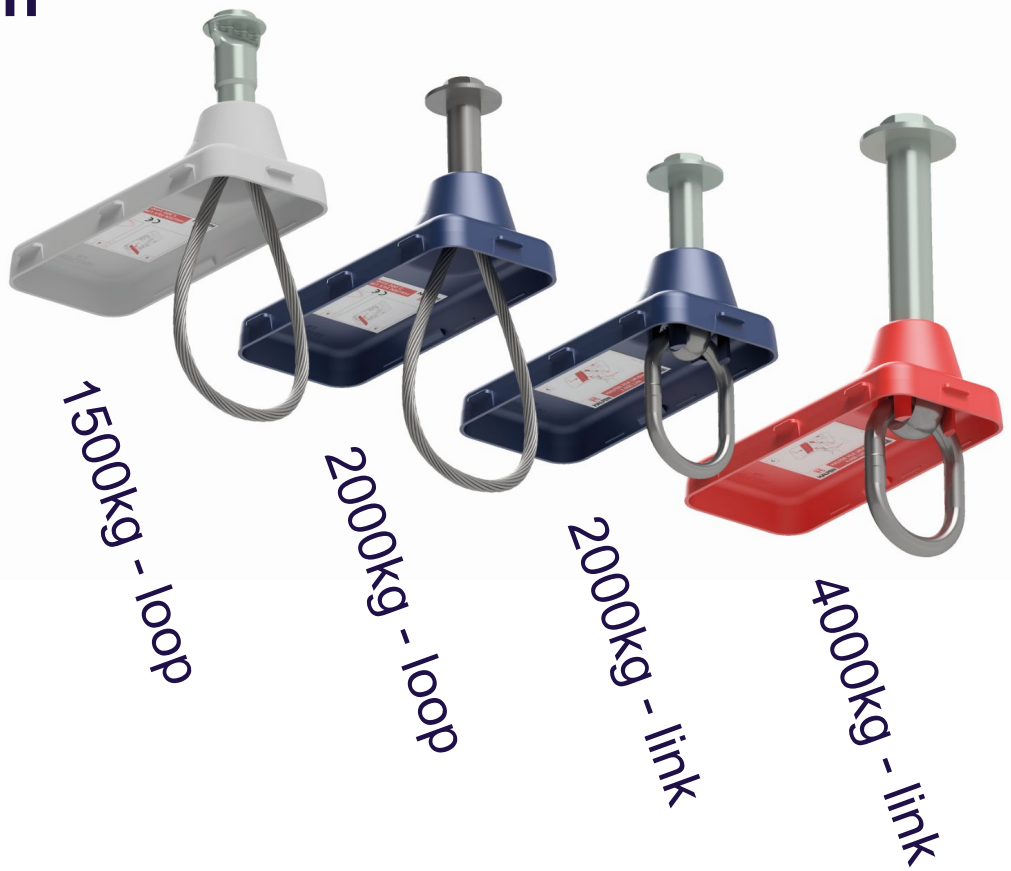
- Seismic
- Emergency Stop (depending on layout)
  - **HZA serrated** channels (eg. HZA 38/23) can be used to cater for significant load components along the channel axis



Elevators – HLX LiftBox

Attachment point for load handling devices with CE marking under European Technical Assessment ETA-17/0488

- Used as an assembly aid for the elevator interior installation
- For maintenance work during elevator repairs
- Secure & permanent attachment in the shaft ceiling



Elevators – HLX LiftBox

Elevators

- Increasingly high reinforcement density and concrete grades
- Anchor spacing of HALFEN cast-in channels can be configured project specific to suit rebar grid!

Elevators

- Alternative: Post-drilled anchors

- High number of mis-hits and material wear
- **Health & Safety issue**: Noise, vibration & silica dust!

Agenda

Leviat
A CRH COMPANY

1. Introduction
2. Curtain Wall
3. Concrete Façade & GRC
4. Elevators
5. Architectural & Structural
6. Q & A

Architectural - DETAN

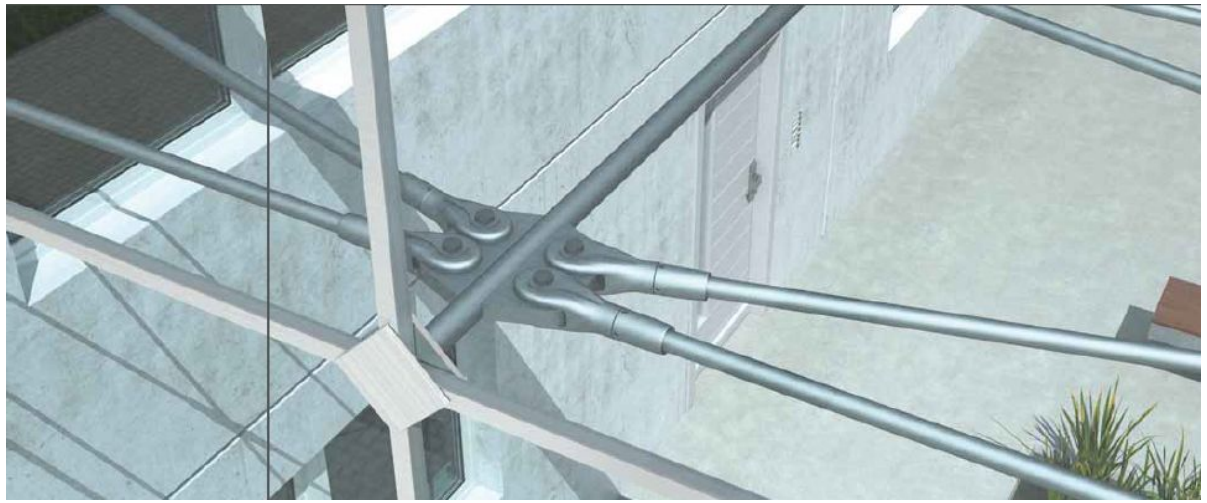
- **Form meets Function**
- Innovative and delicate structures
- Meets highest demands in terms of appearance and quality

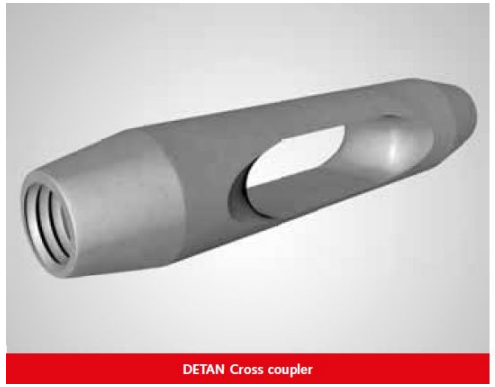
Architectural - DETAN

Student Accomodation Building, *Bergen, Norway*

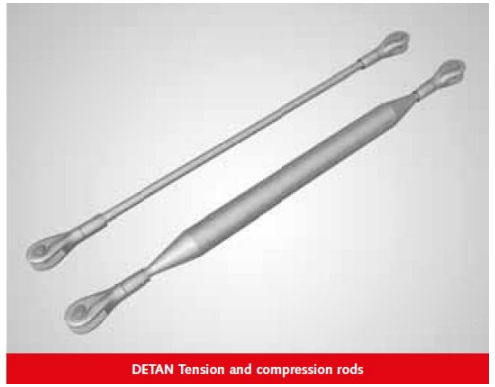
Architectural - DETAN

HALFEN





DETAN Cross coupler

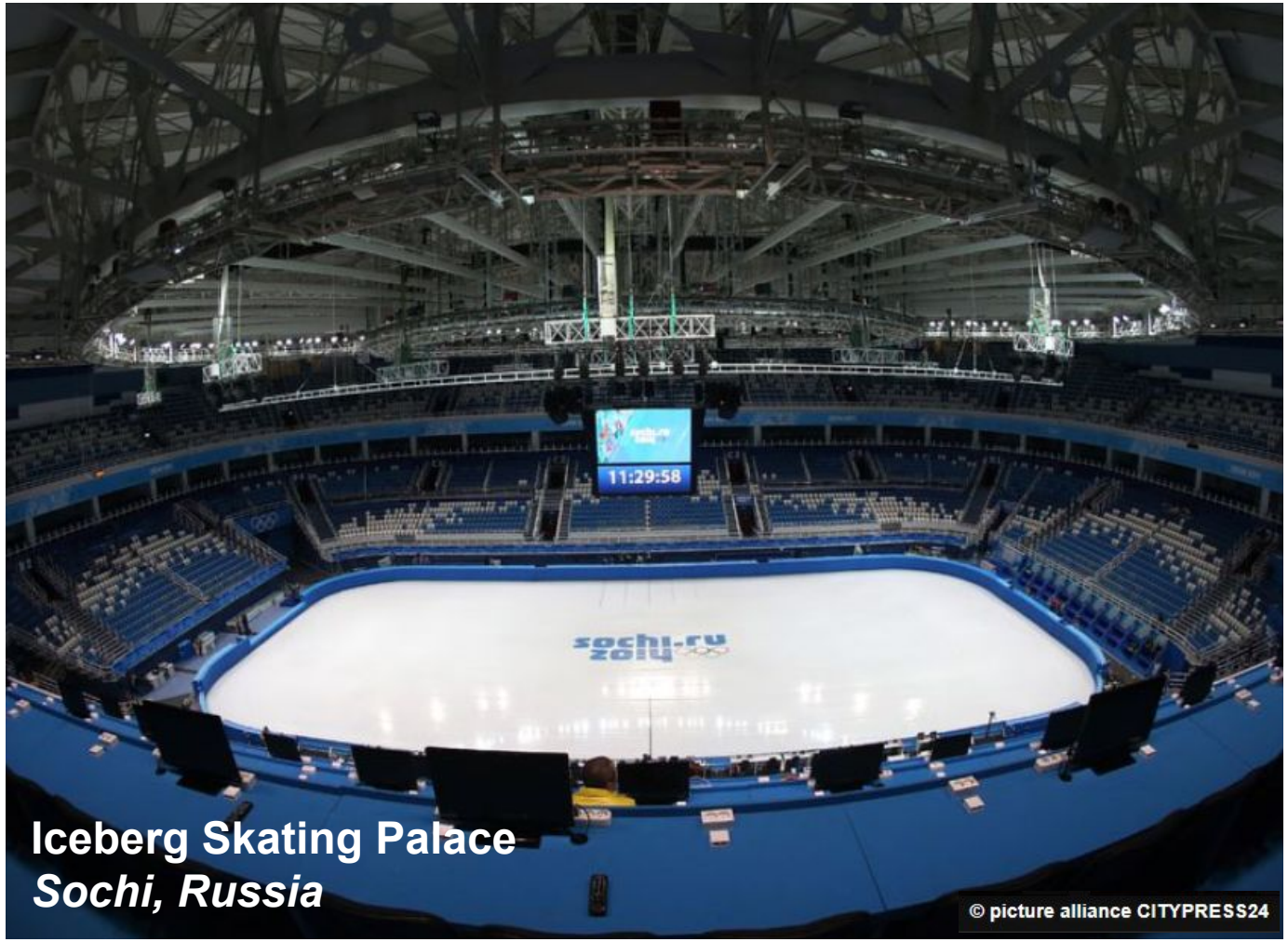


DETAN Tension and compression rods

DETAN Fork

DETAN Anchor disc

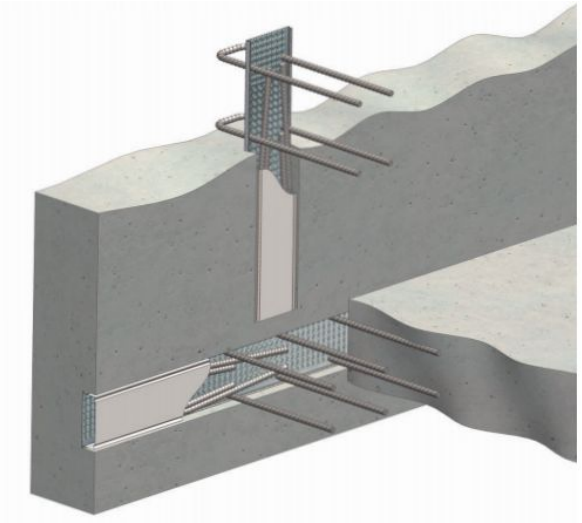
Architectural - DETAN



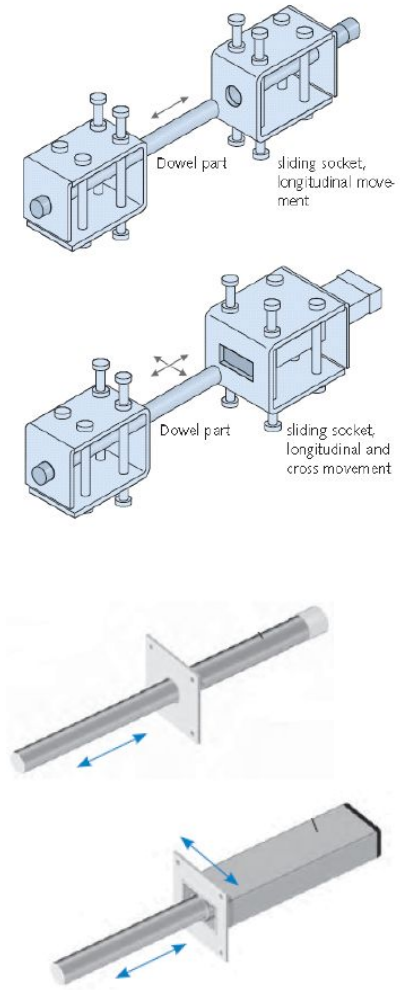
Iceberg Skating Palace
Sochi, Russia

Structural - HBT

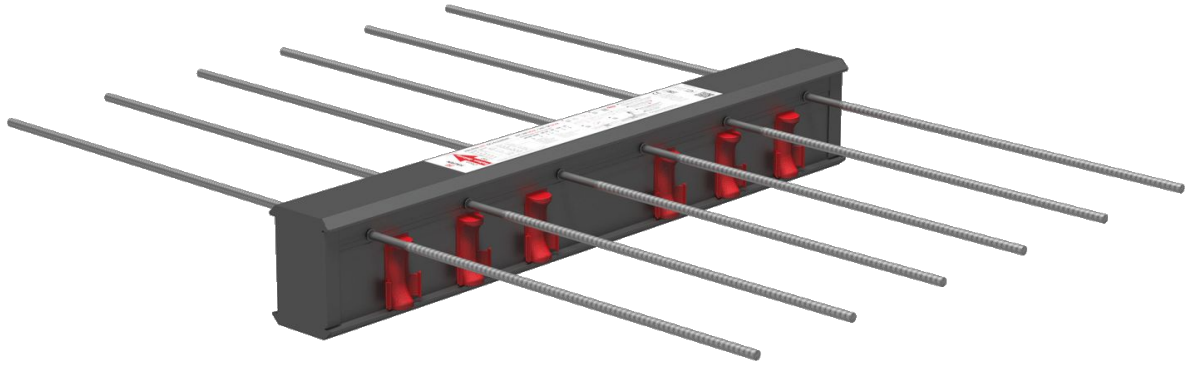
HALFEN

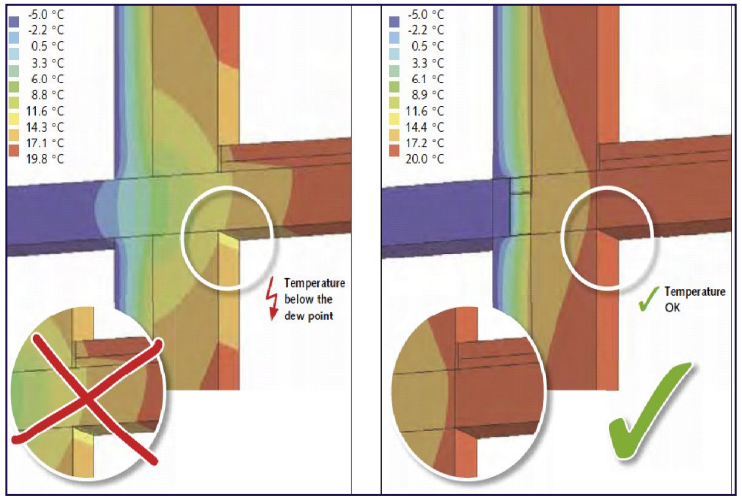


Structural – Shear Dowels



Building Physics – HIT insulated connection





Engineering Support

Leviat
A CRH COMPANY

Questions?

Leviat
A CRH COMPANY

Gracias por vuestra atención!