Welcome !

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Modulus of elasticity
Expansion coefficient
Security
protection of property
Usability
Ecology
Sustainability
Durability

Why steel?
The advantages of steel

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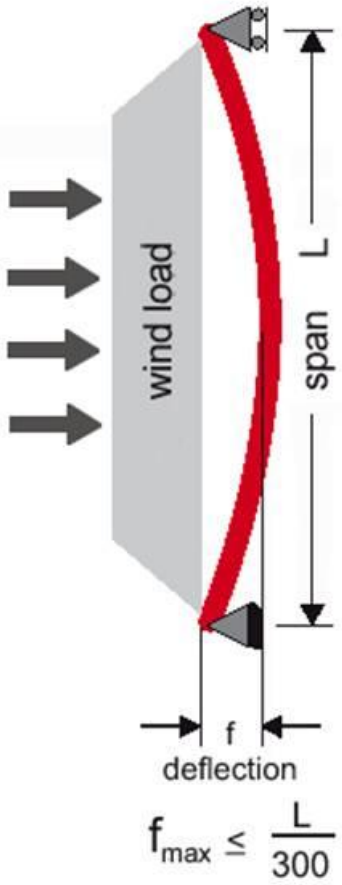
Modulus of elasticity

Formulae and values:



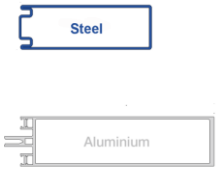
deflection (f) = $\frac{\text{wind load (q)} \times \text{span}^4 \text{ (b)}}{\text{material concerned (E)} \quad \text{geometry depending (Ix)}} \times \text{const.}$

material concerned: modulus of elasticity

geometry depending: moment of inertia

material	modulus of elasticity	effect on construction
Steel	210.000	slim-line
aluminium	70.000	
concrete	30.000	
timber	10.000	bulky

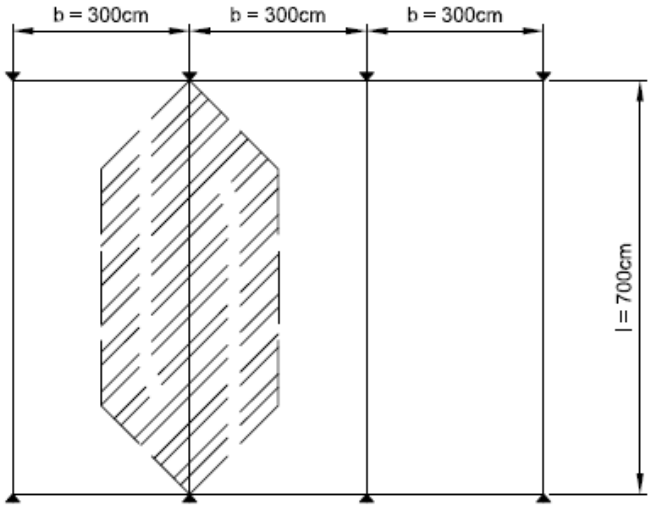
N / mm²



Formulae and values:

Calculation
Required geometriy-dependent moment of inertia ($Ix_{erf.}$)

$$Ix_{erf.} = \frac{5 \times P \times l^3}{384 \times E \times f}$$



Trapezoidal load	P	=	Q x (l-b/2) x b	
Wind load	q	=	0.5 kN/m²	
Mullion length	l	=	700 cm	
Panel width	b	=	300 cm	
Max. deflection	f	=	1.5 cm	
Modulus of elasticity	E	=	Steel	21,000 kN/cm²
			Aluminium	7000 kN/cm²

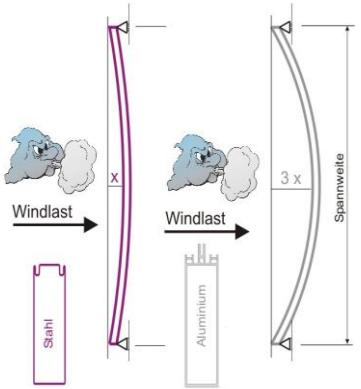
Result for steel

$$Ix_{erf.} = \frac{5 \times P \times l^3}{384 \times E \times f} = 1170$$

Result for aluminium

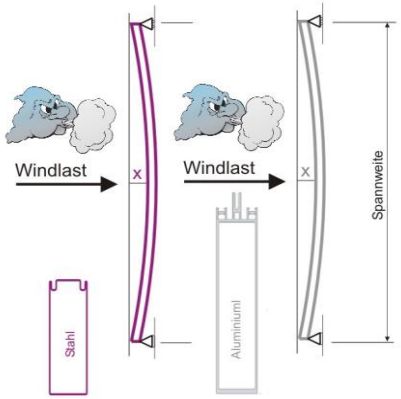
$$Ix_{erf.} = \frac{5 \times P \times l^3}{384 \times E \times f} = 3509$$

Dependence on profile cross-section / windload / deflection / span:



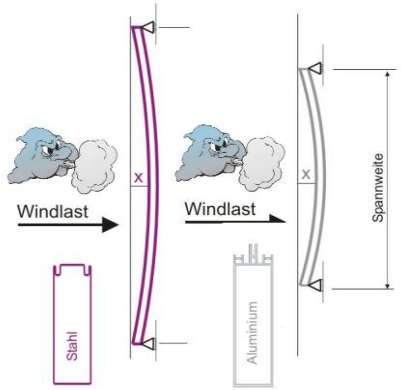
same profile geometry
same loading
same span

Deflection
for steel is 3x less than for aluminium



same loading
same deflection
same span

smaller profile cross-sections
for steel than for aluminium



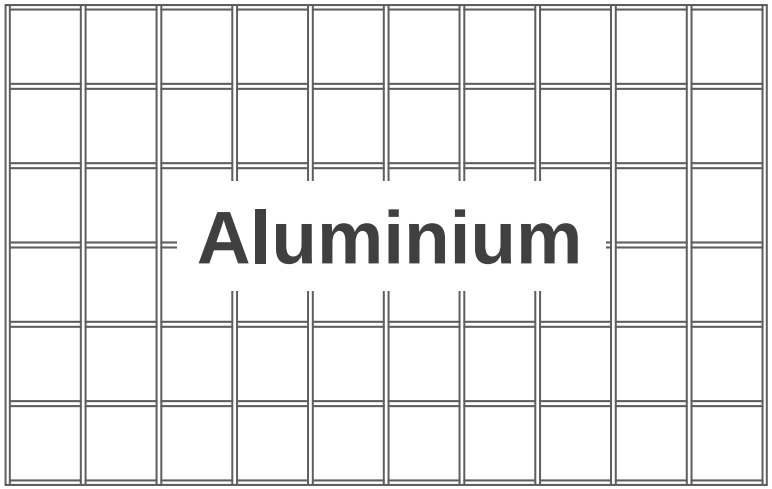
same profile geometry
same loading
same deflection

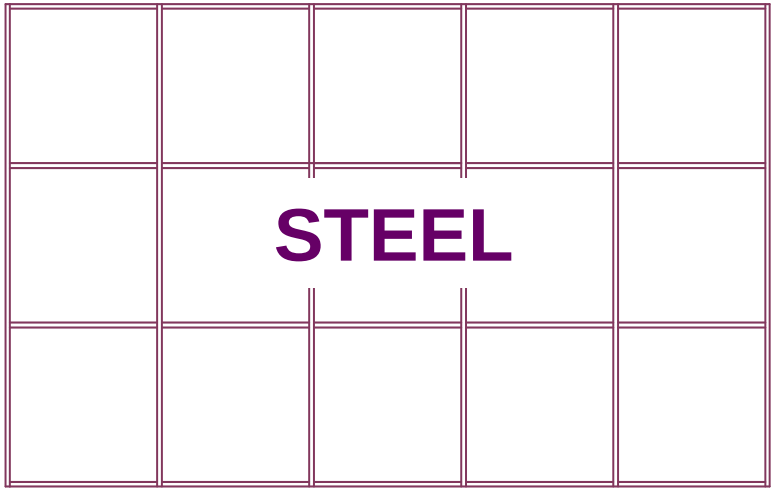
larger span breadths
for steel than for aluminium

Modulus of elsticity

on profile cross-section / windload / deflection / span

Visual comparison:





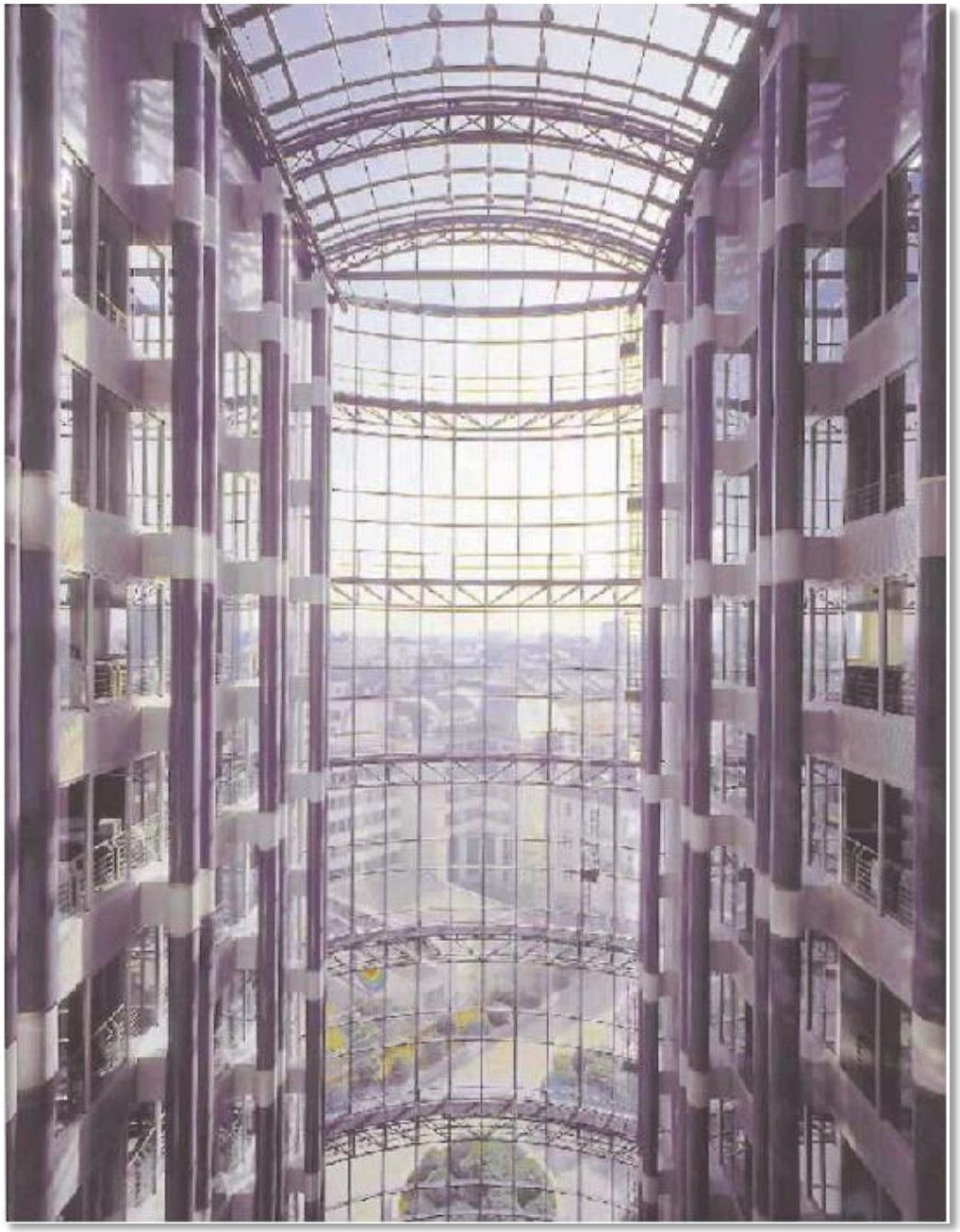
Larger span width for STAHL

Higher transparency employing less material

Modulus of elsticity

Large spans

Large spans:

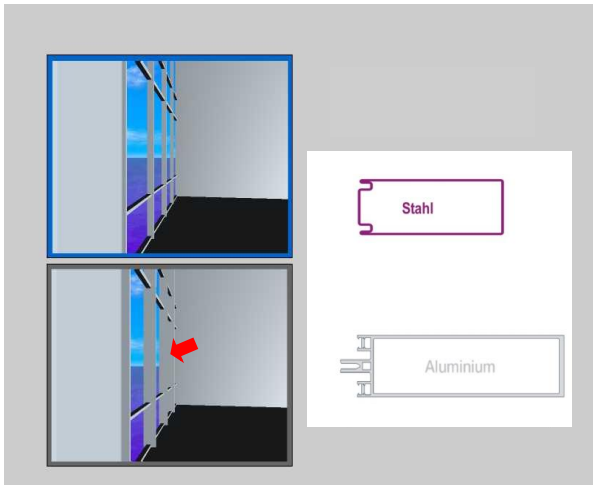


Curtain wall

14m wide, 48m high

Transparency:

Profile depth 160 mm
Glass weight up to 600 kg



Video

Visual comfort

Advantages at a glance:

- Because of its 3-times higher modulus of elasticity, steel has a much larger loading capacity.
- For the same profile cross-section, the deflection for steel is 3 x less than for aluminium.
- The same deflection for the same load requires a smaller steel profile
- Larger spans can be achieved with steel profiles for the same profile cross-section.
- Elegant, transparent lightweight and delicate structures.
- Lightweight steel constructions offer optimum prerequisites for visual comfort.
- Slim frameworks offer diverse design freedom and innovative building structures

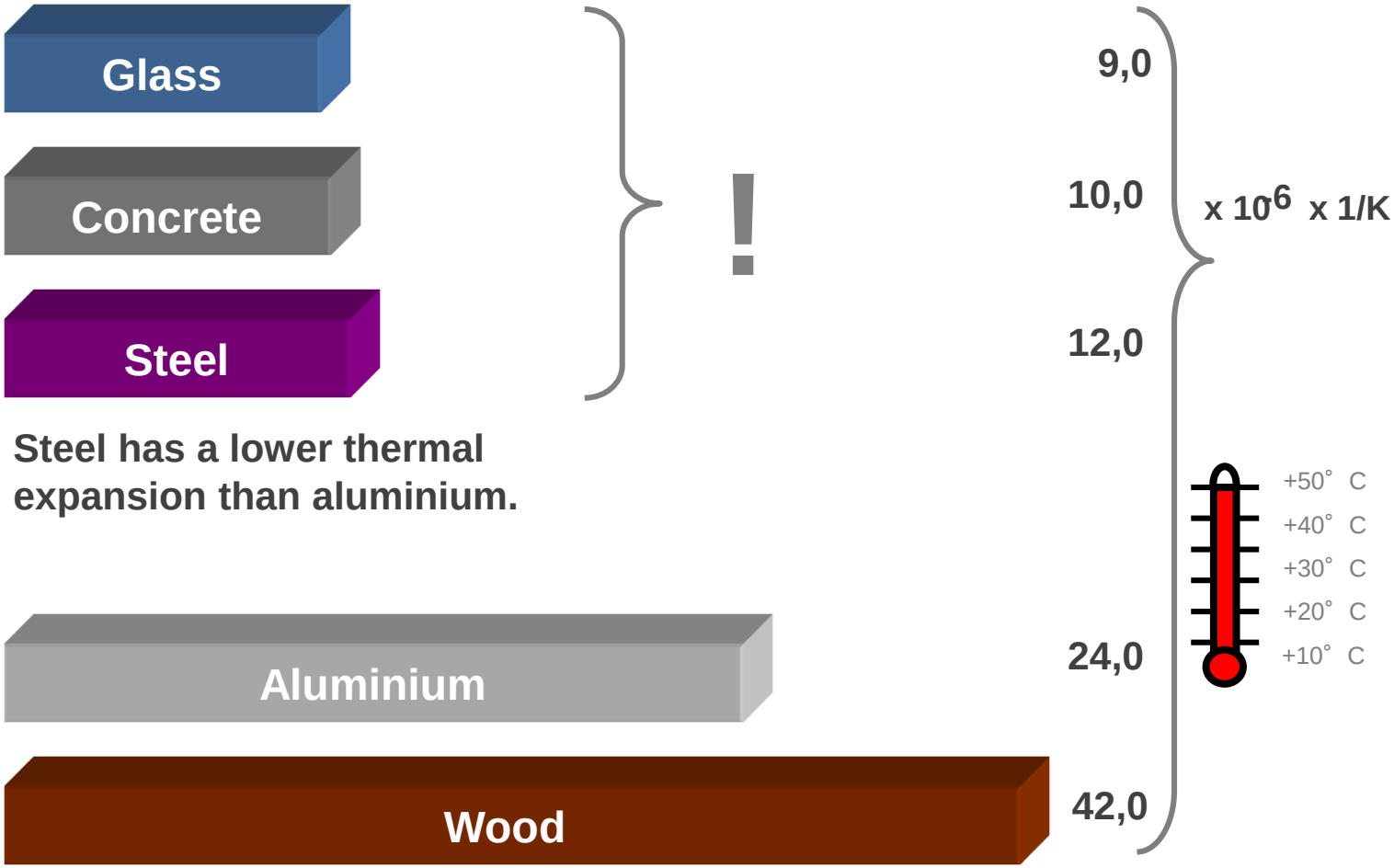
Steel	210.000 N/mm^2
Aluminium	70.000 N/mm^2

Expansion coefficient

Expansion coefficient

comparison

Comparison:



Steel has a lower thermal expansion than aluminium.

Steel, glass and concrete have almost the same expansion coefficient, hence, as a rule, no expansion profiles are necessary when using steel.

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Expansion coefficient

References

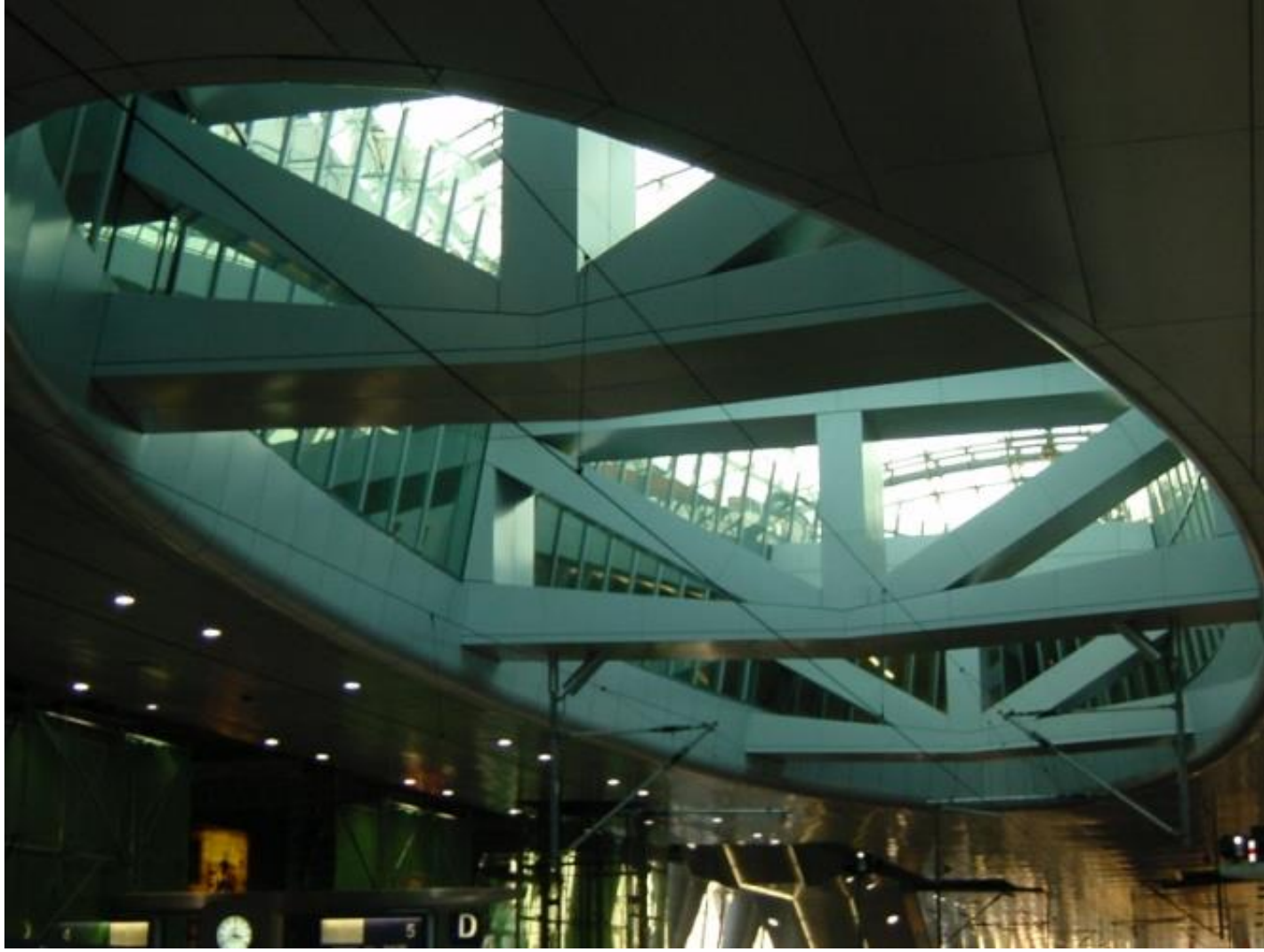
References:

167 m without expansion profiles

a gap of just 1mm between transom and mullion

Advantages at a glance:

- The expansion coefficient for steel is half as large as for aluminium.
- For this reason, no additional measures are necessary to counter different material expansions within a steel system.
- Steel, glass and concrete expand together approximately uniformly – giving good combination possibilities.
- Because the expansion coefficient is twice as large for aluminium, expansion profiles must always be used in aluminium systems.



Security and protection of property

Fire protection – burglar resistance – anti-vandalism - bullet resistance

Fire protection:

- **The fire resistance of steel is significantly higher than that of aluminium.**

  melting point of steel = 1.500° C
  melting point of aluminium = 660° C

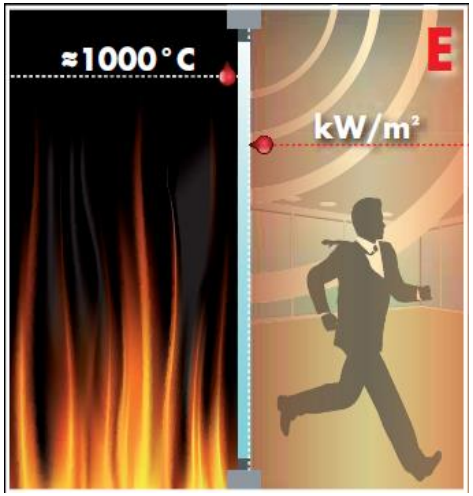
- **Steel does not melt**
  - does not result in caustic or corrosive fumes in the event of a fire
  - remains stable

Klassifizierungen:

- Optimal escape and rescue possibilities because of the transparency and openness of steel structures
- Steel structures can be attained for all fire resistance ratings
- from E30 to E120 - without additional insulation
- and EI30 to EI120
- for curtain walls using CR seals

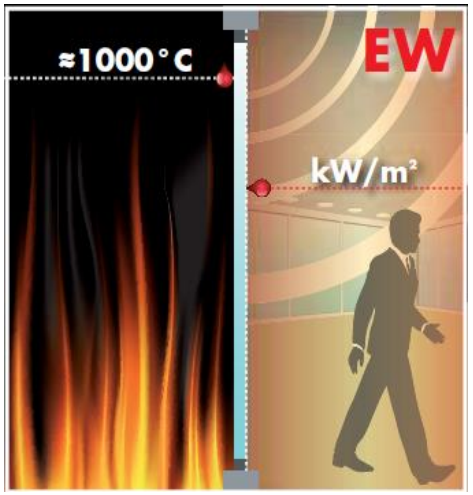
INSULATION

No transmission of the fire to the side away from the fire due to the substantial heat conduction barrier, for protection of people close to the structural elements.



SPACE SEPARATION

No transmission of the fire to the side away from the fire due to the breakthrough of flames or substantial quantities of hot gases.



RADIATION REDUCTION

The thermal radiation measured on the side away from the fire remains below a given value for a certain period of time.

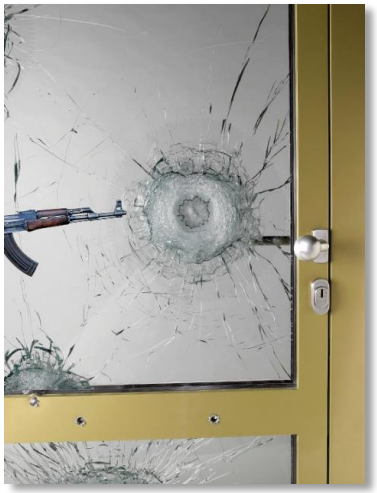
Burglar resistance and anti-vandalism protection:

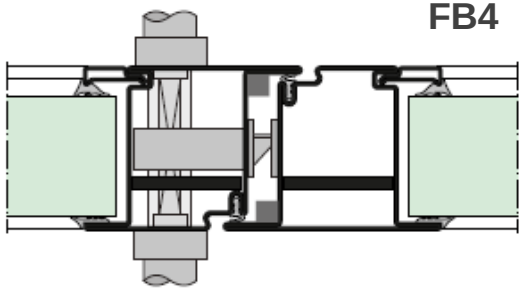
- Steel is robust and stable
- High load capacity and durability
- Ideal for installation in security relevent areas

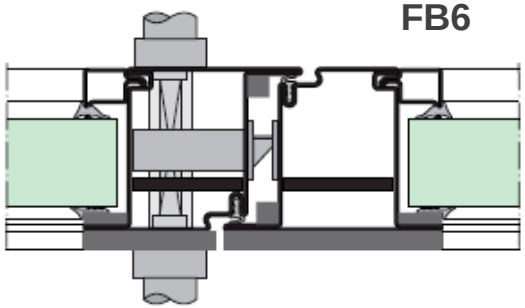
Unsuccessful break-in attempt

Bullet resistance:

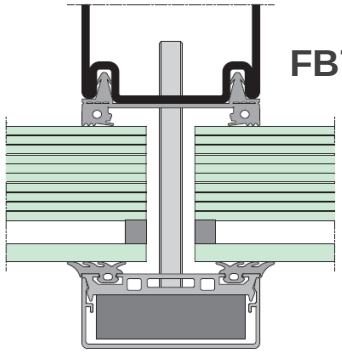
- No additional on-site reinforcement is required for FB4
- No additional on-site reinforcement of the lock area or of the mitre corners is reqired
- for FB6, use only the customary steel profiles for additional on-site reinforcement







- FB7 for curtain walls, use only the customary steel profiles for additional on-site reinforcement



bauseits

Long-lasting usability

Comparison – doors with high use:

RP steel door
In astrogly frequented area
(Universiy of Essen)

Aluminium door
In astrogly frequented area
(Universiy of Essen)

Advantages at a glance:

- **Ideal for large area, slim functional doors**
- **High load capacity**
- **Long-lasting**
- **Shock-proof**
- **Stable**
- **Secure**
- **Guarantees durable location of the hinges**
- **Optimal escape and rescue possibilities because of the transparency and openness of steel structures**

Ecology – Sustainability - Durability

Steelmaking:

- Resource economic, industrial manufacture of steel components
- Significantly lower energy use during steelmaking compared with aluminium production.
- During steelmaking there are no pollutant bearing waste products.
- Iron, the starting material for steel, is the third most abundant element in the Earth's crust.

Recycling:

- Steel is 100% recyclable.
- Secondary steel is obtained by melting scrap iron and is an established component of steelmaking.
- Long-lasting structures with long service lives.
- Generally simple to refurbish.
- No waste to be disposed of, instead it is recycled.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profile services
Thank you
for your attention !