ISO 9001:2000
Reg. 7977-1

CONSULTANTS EUROPE bv

TECHNICAL & LEGAL EXPERTS

CASE STUDY

STRENGTH CALCULATION OF CABLE TRAY SECTION

(Resistance to Bending in Horizontal Direction)

Moment of inertia, also called mass moment of inertia or the angular mass, it is a measure of an object' s resistance to changes in its rotation rate. It is the rotational analog of mass. That is, it is the inertia of a rigid rotating body with respect to its rotation.

Moment of inertia was introduced by Euler in his book a Theoria motus corporum solidorum seu rigidorum in 1730. In this book, he discussed at length moment of inertia and many concepts, such as principal axis of inertia, related to the moment of inertia.

The Area Moment Of Inertia of a beams cross-sectional area measures the beams ability to resist bending. **The larger the Moment of Inertia the less the beam will bend**. The moment of inertia is a geometrical property of a beam and depends on a reference axis. The smallest Moment of Inertia about any axis passes throught the centroid. The following are the mathematical equations to calculate the Moment of Inertia:

Moment of Inertia:

$$M_i = \Sigma \frac{b(d)^3}{12}$$

[CABLE TRAY SECTION (300mm Wide x 50mm High)]

CASE (A) Regular Cable tray Section

Moment of Inertia:

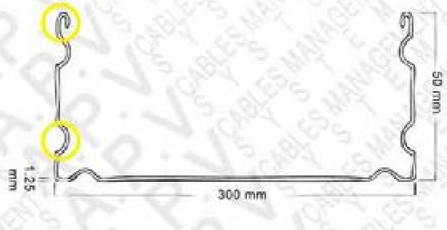
$$M_i = \Sigma \frac{b(d)^3}{12} = \frac{300x(2)^3}{12} + \frac{2\{2x(50)^3\}}{12} = \frac{502400}{12} = 41867$$

CASE (B) A.P.V Cable tray Section

Moment of Inertia:

$$M_i = \Sigma \frac{b(d)^3}{12} = \frac{[300+2\{5-2\}]x(1.25)^3}{12} + \frac{2[1.25x(50+2\{5-2\}+3+4)^3]}{12}$$

$$= \frac{598}{12} + \frac{625118}{12} = \frac{625716}{12} = 52143$$



Conclusion:

52143 > 41867

Since the larger the moment of inertia the less the beam will bend, so case (B), A.P.V Cable tray section with 1.25 mm thickness shows more bending resistance than case (A), regular cable tray section with 2 mm thickness.

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Moment of Inertia:

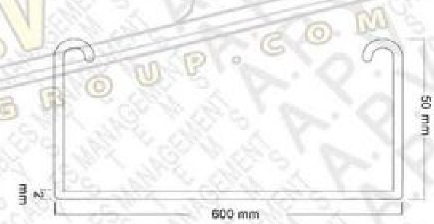
$$M_i = \Sigma \frac{b(d)^3}{12}$$

[CABLE TRAY SECTION (600mm Wide x 50mm High)]

CASE (A) Regular Cable tray Section

Moment of Inertia:

$$M_i = \Sigma \frac{b(d)^3}{12} = \frac{600x(2)^3}{12} + \frac{2(2x(50)^3)}{12} = \frac{504800}{12} = 42067$$

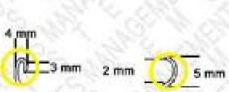


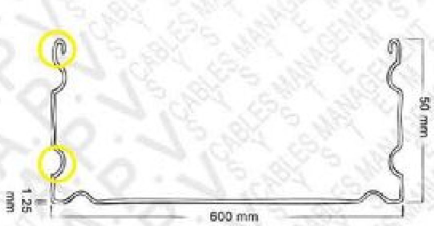
CASE (B) A.P.V Cable tray Section

Moment of Inertia:

$$M_i = \Sigma \frac{b(d)^3}{12} = \frac{[600+2\{5-2\}]x(1.25)^3}{12} + \frac{2[1.25x(50+2\{5-2\}+3+4)^3]}{12}$$

$$= \frac{1184}{12} + \frac{625118}{12} = \frac{626302}{12} = 52192$$





Conclusion:

52192 > 42067

Since the larger the moment of inertia the less the beam will bend, so case (B), A.P.V Cable tray section with 1.25 mm thickness shows more bending resistance than case (A), regular cable tray section with 2 mm thickness.

CASE STUDY

STRENGTH CALCULATION OF CABLE TRAY SECTION

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Moment of Inertia:

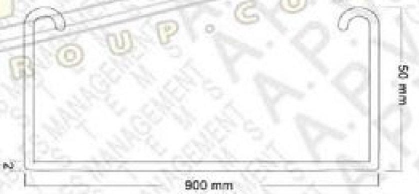
$$M_i = \Sigma \frac{b(d)^3}{12}$$

[CABLE TRAY SECTION (900mm Wide x 50mm High)]

CASE (A) Regular Cable tray Section

Moment of Inertia:

$$M_i = \Sigma \frac{b(d)^3}{12} = \frac{900x(2)^3}{12} + \frac{2\{2x(50)^3\}}{12} = \frac{507200}{12} = 42267$$

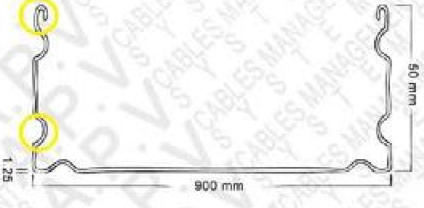


CASE (B) A.P.V Cable tray Section

Moment of Inertia:

$$M_i = \Sigma \frac{b(d)^3}{12} = \frac{[900+2\{5-2\}]x(1.25)^3}{12} + \frac{2[1.25x(50+2\{5-2\}+3+4)^3]}{12}$$

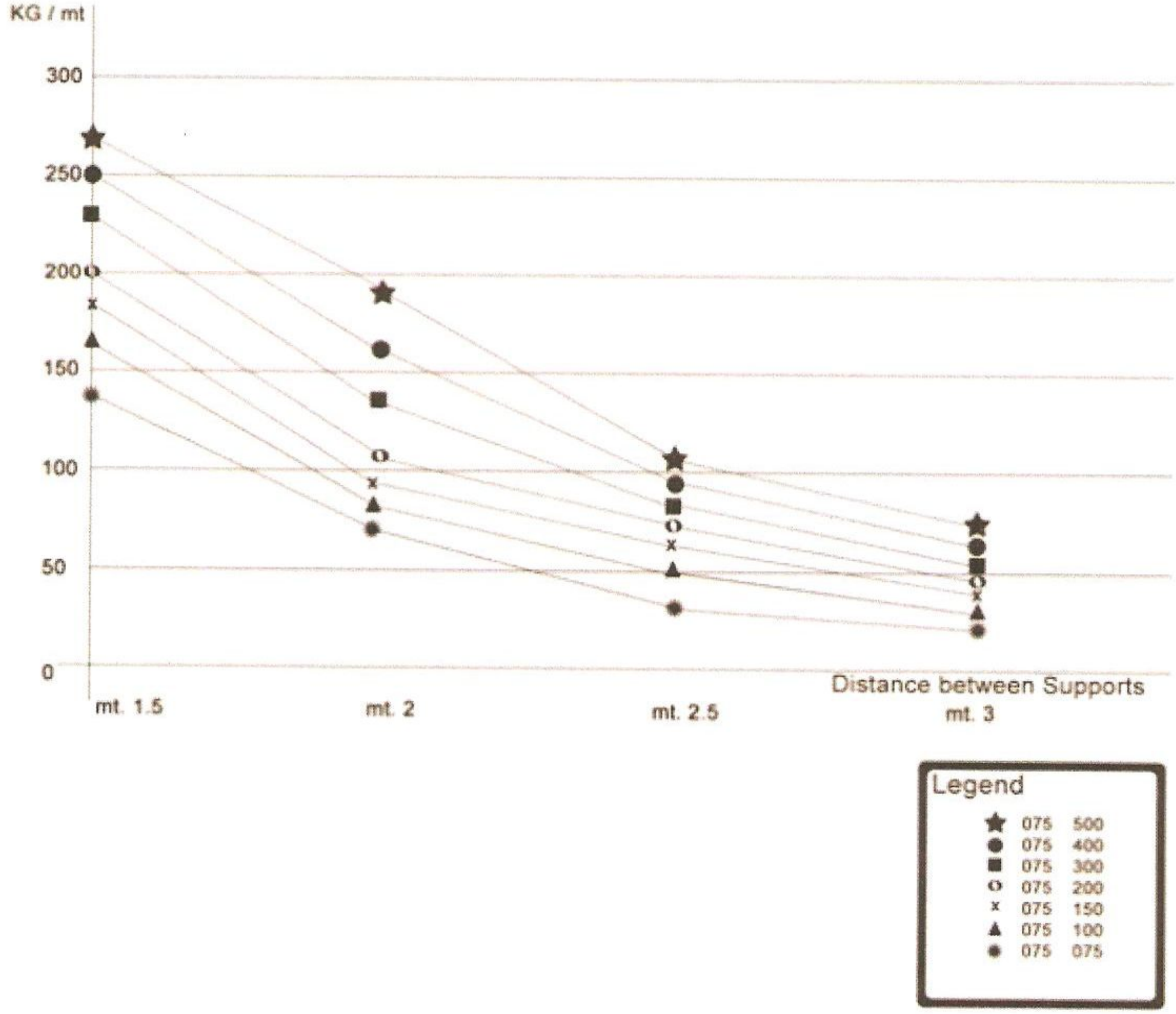
$$= \frac{1770}{12} + \frac{625118}{12} = \frac{620888}{12} = 52240$$



Conclusion:

52240 > 42267

Since the larger the moment of inertia the less the beam will bend, so case (B), A.P.V Cable tray section with 1.25 mm thickness shows more bending resistance than case (A), regular cable tray section with 2 mm thickness.


KG / mt
300
250
200
150
100
50
0
Distance between Supports
mt. 1.5
mt. 2
mt. 2.5
mt. 3
Legend
075 500
075 400
075 300
075 200
075 150
075 100
075 075

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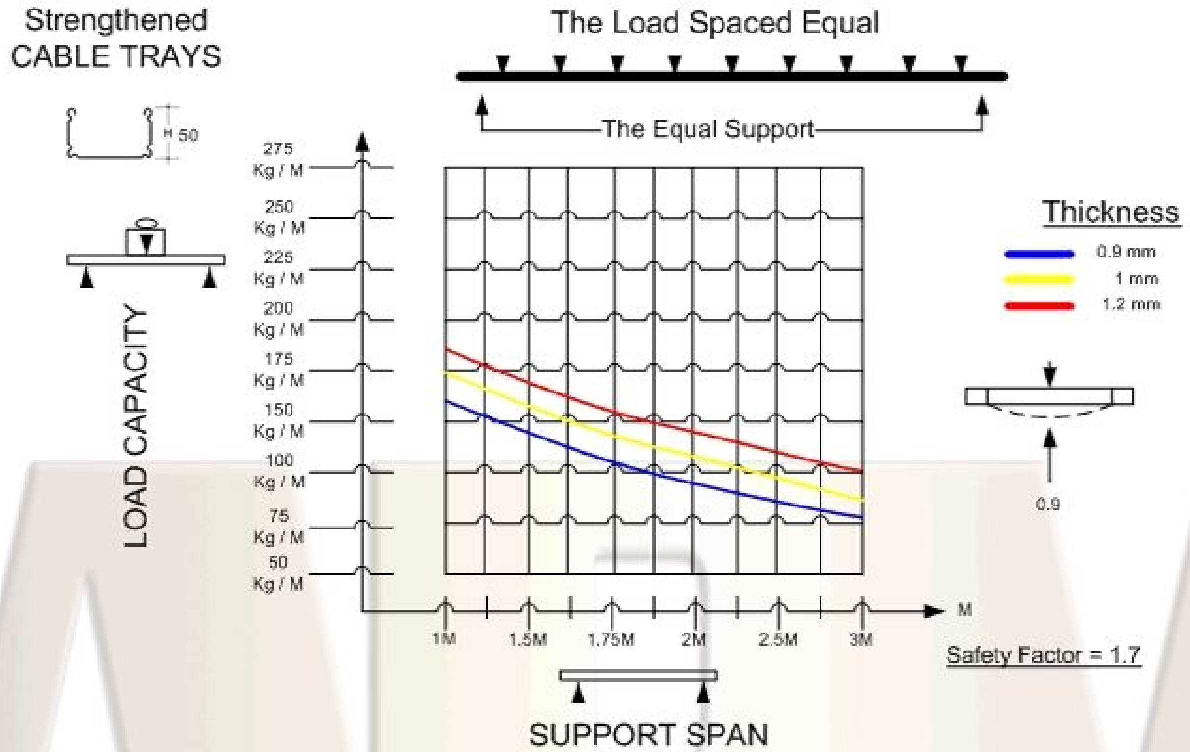

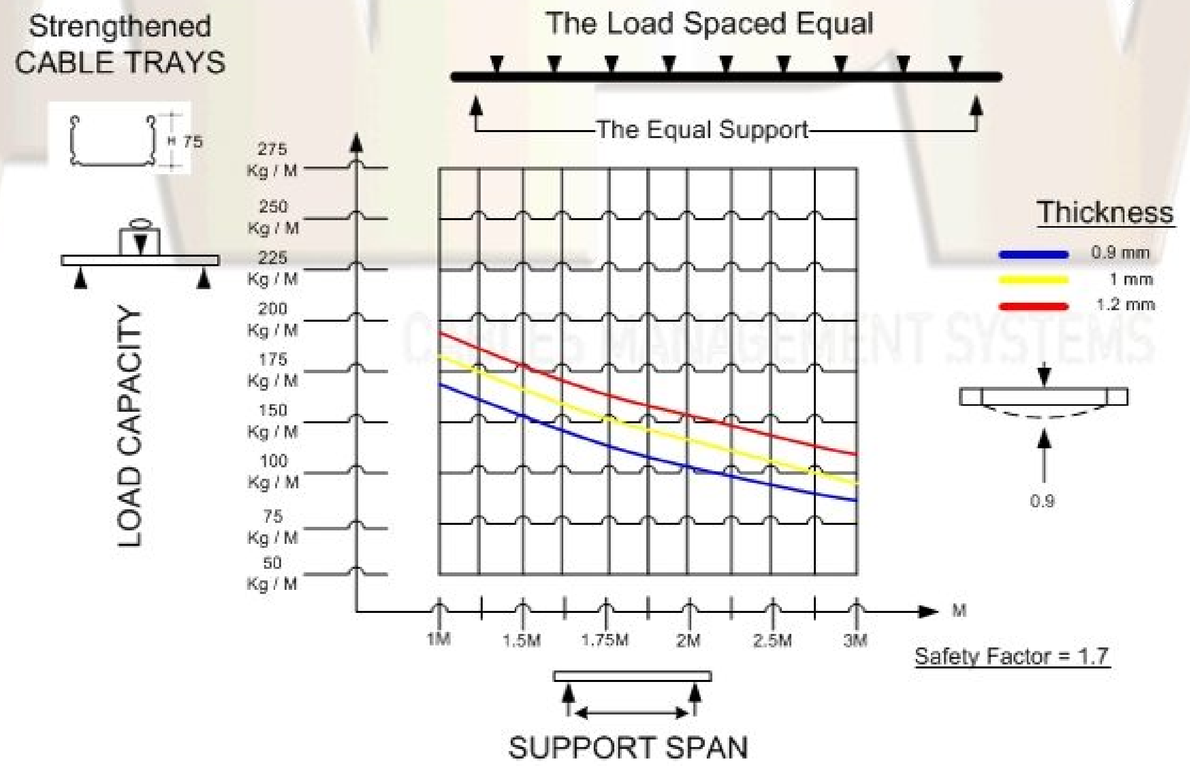

Assured Protection Vista APV for Cables Management Systems
Syria, Damascus, Daraa Old Road, AlBardeh Exit.
P.O.Box: Sbeneh 76.
Tel: +963 (0) 11 822 92 01/5
Fax: +963 (0) 11 822 92 06
Web: www.apv-group.com e-mail: info@apv-group.com

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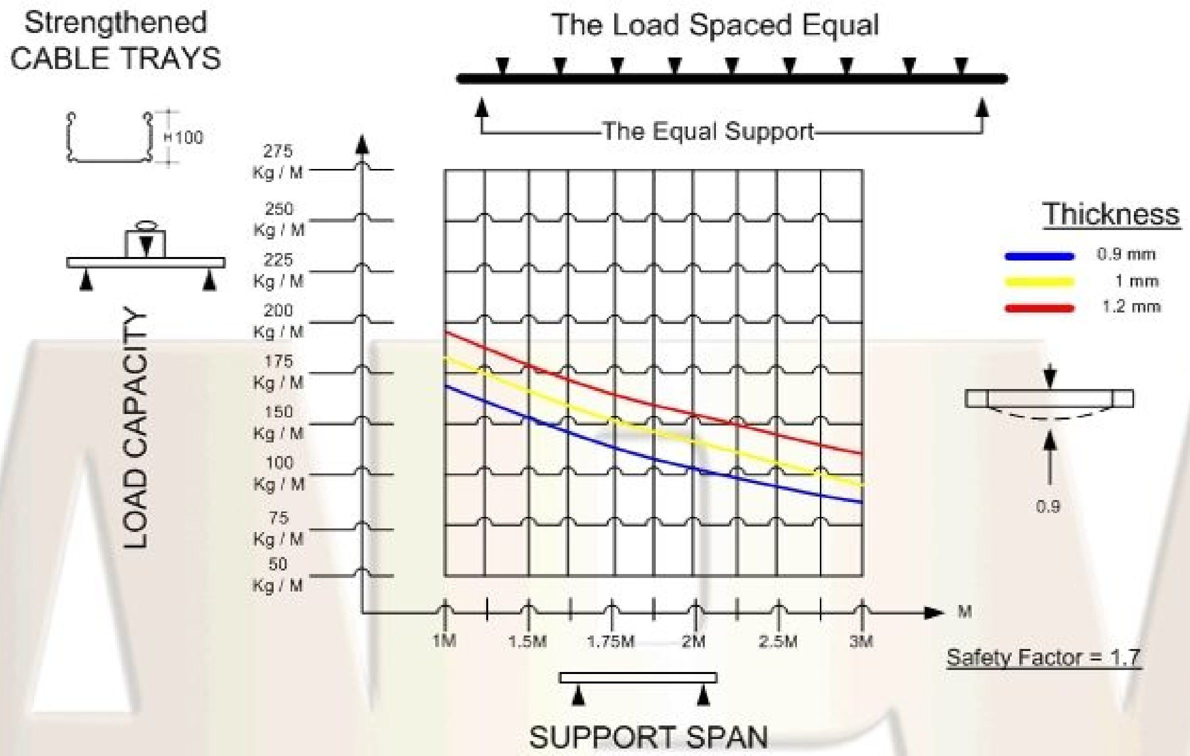

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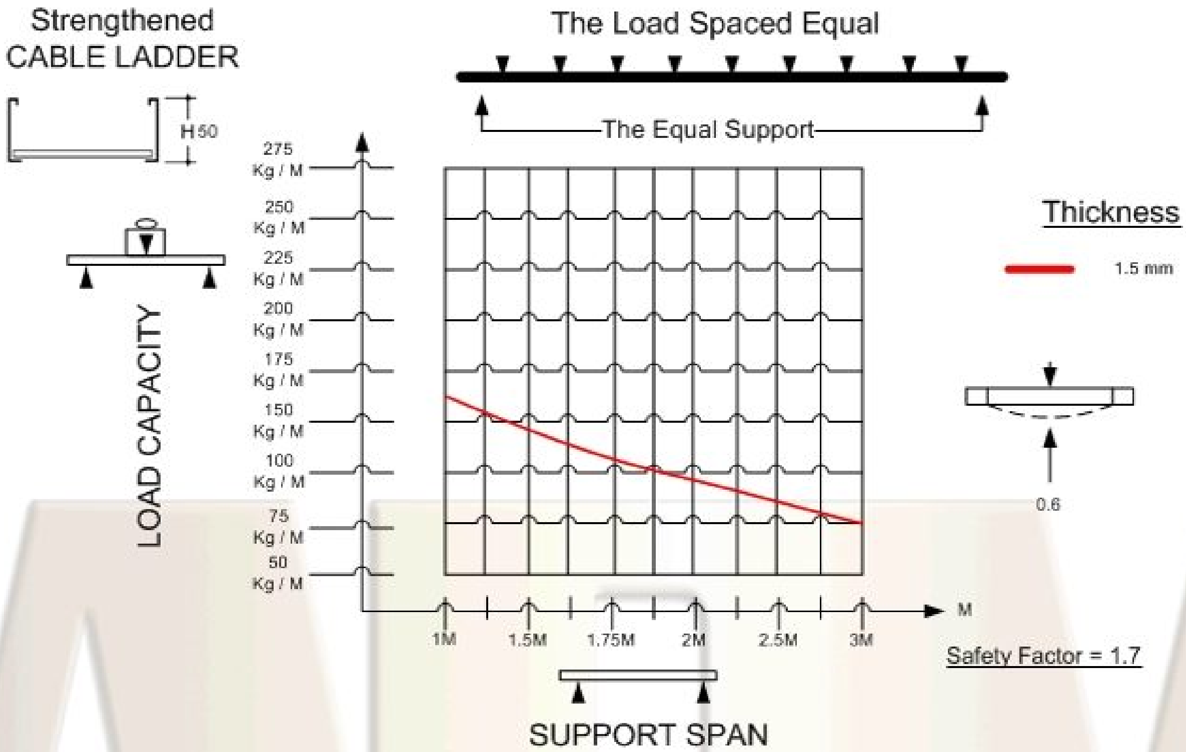

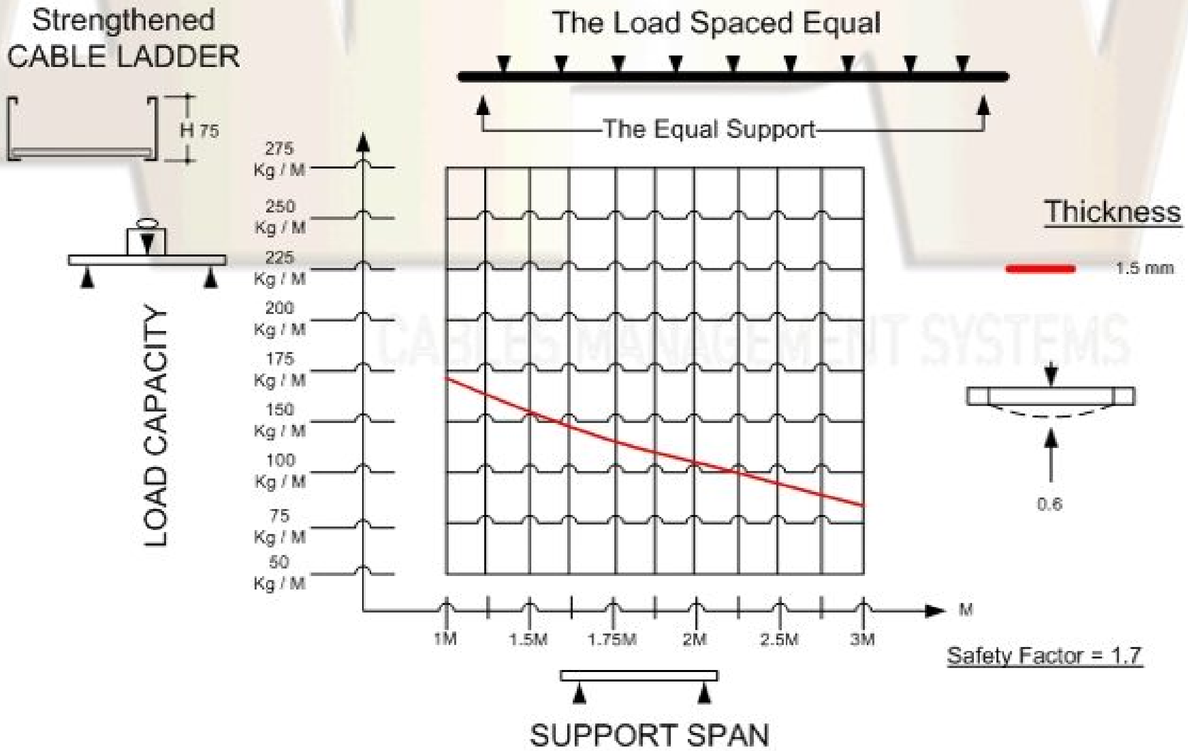

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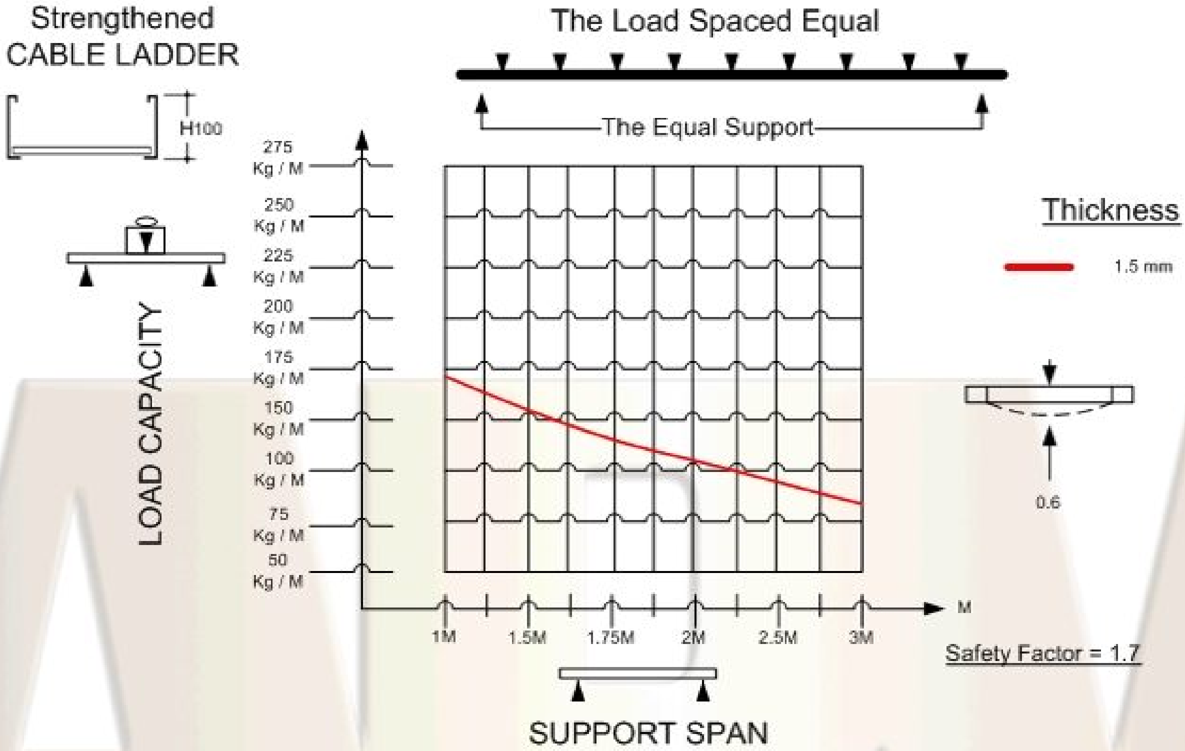

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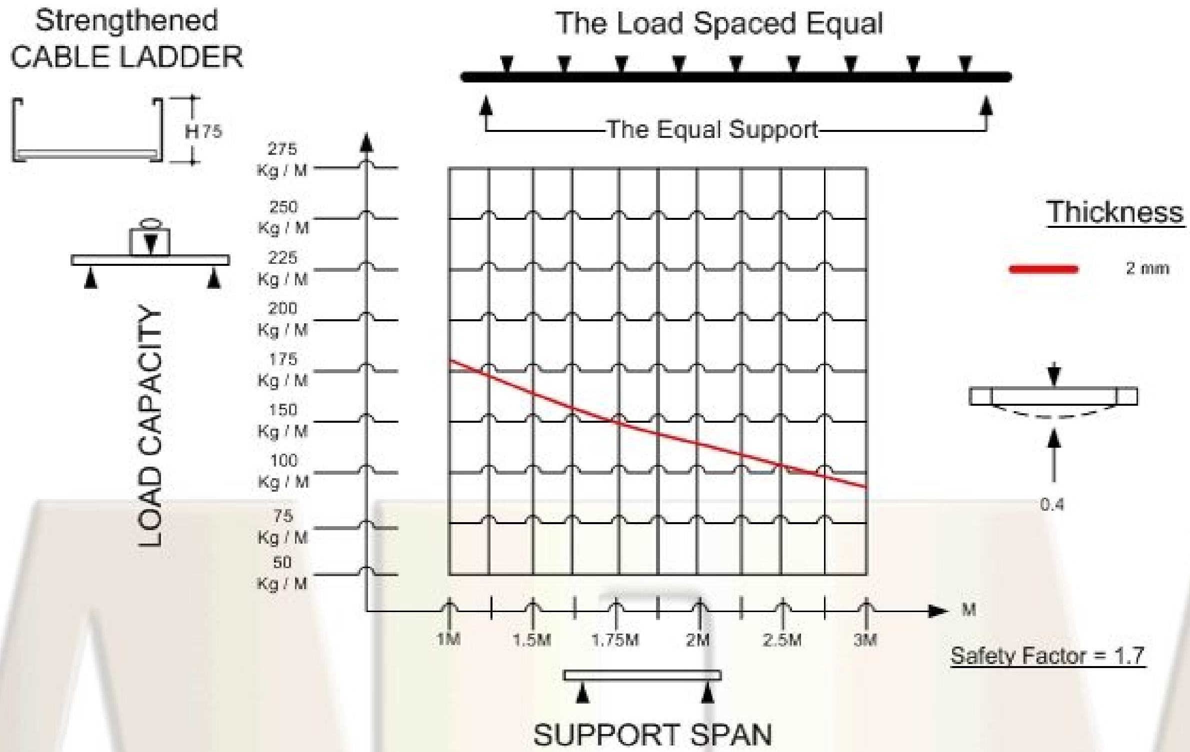
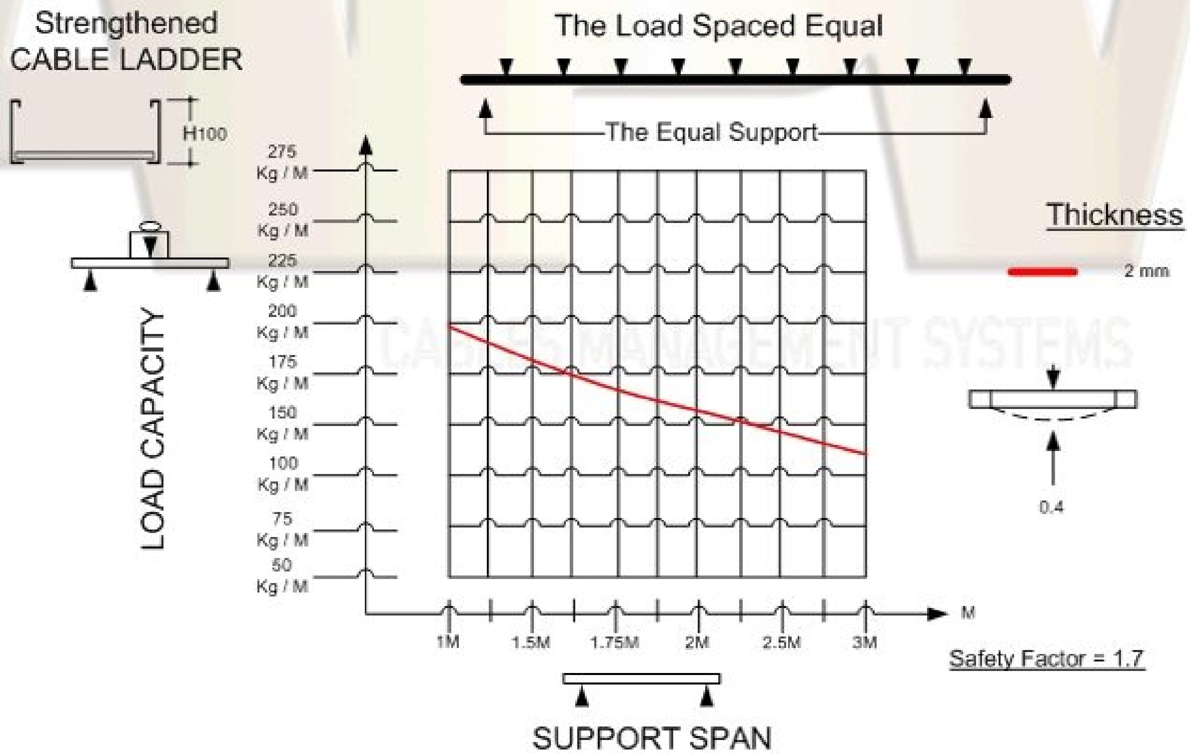
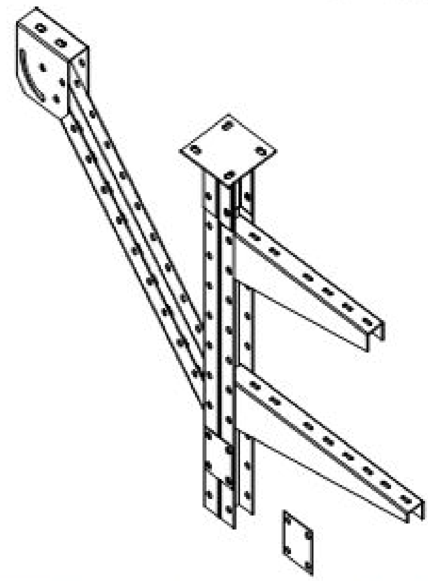




SUPPORT SYSTEM



FEATURES :

- A choice of moteriols
- Designed to suppert cable trays, trunkings and cable ladders.
- Has great filxibility.

PARTICULARS:

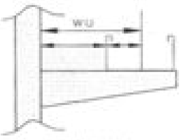
- a complete All-purpose use of perforated sections.

* Evaluate the Lu load per bracket

Lu (N) = cable weight per meter (N/ml) x distance between supports (ml)

* Evaluate the Momentum

$$\underset{(N.m)}{M} = \sum_{u=1}^{n} \underset{(m)}{wu} \times \underset{(N)}{Pu}$$

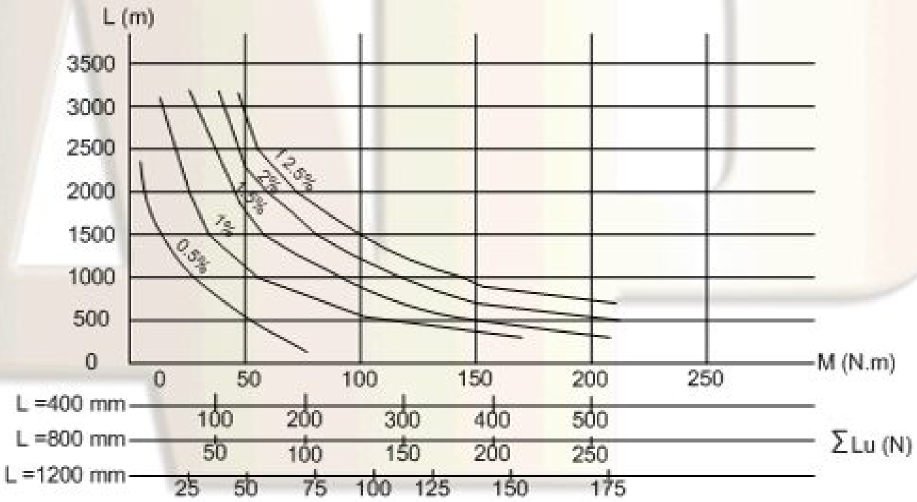


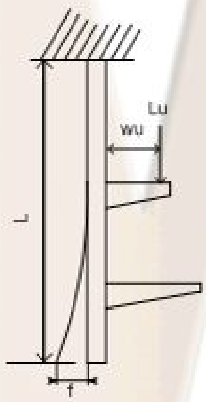
wu =1/2 width of cable trays + overlength

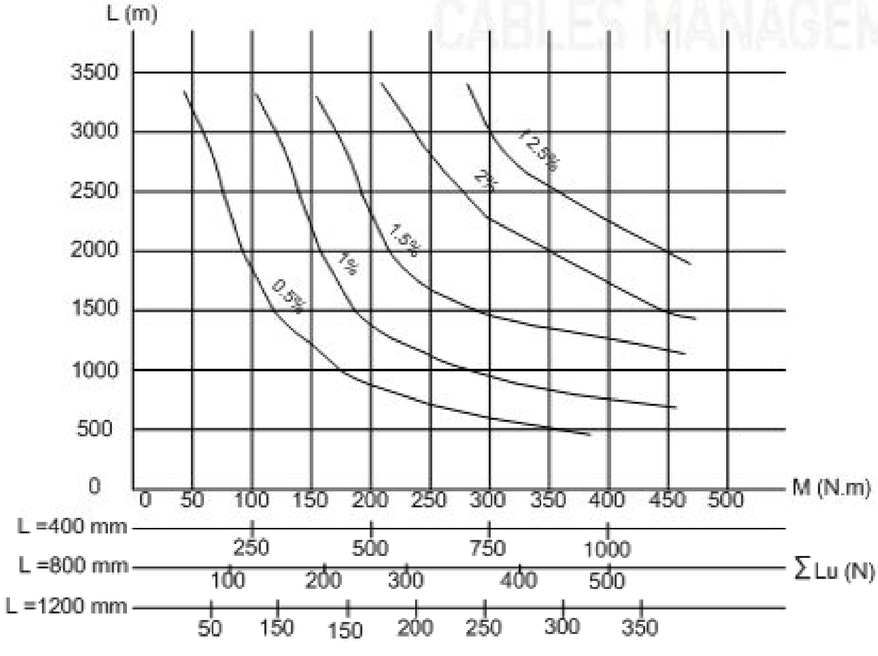
* See loading graphs for deflection f according to length L of the hanging system. In practice the limit will be 1.5% of length L to take into account the possible over loads.

SIMPLE HANGING SYSTEM
(thickness 2.5 mm)

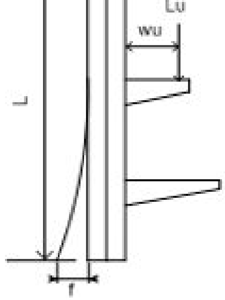
LOADING GRAPH

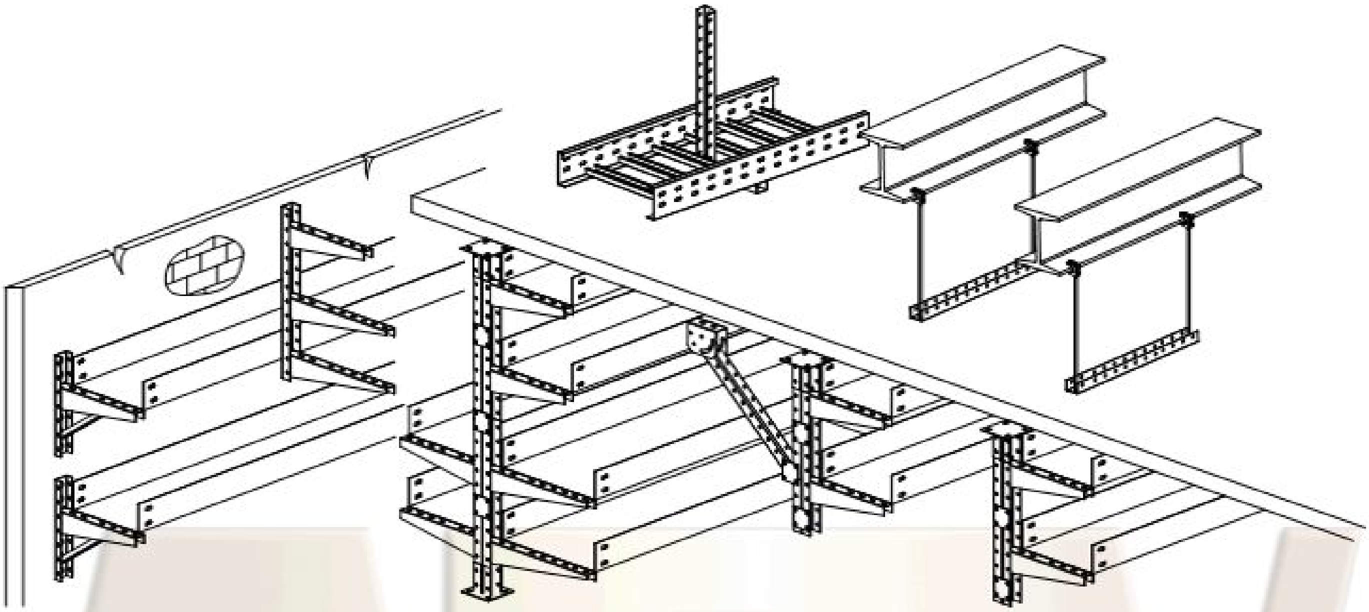


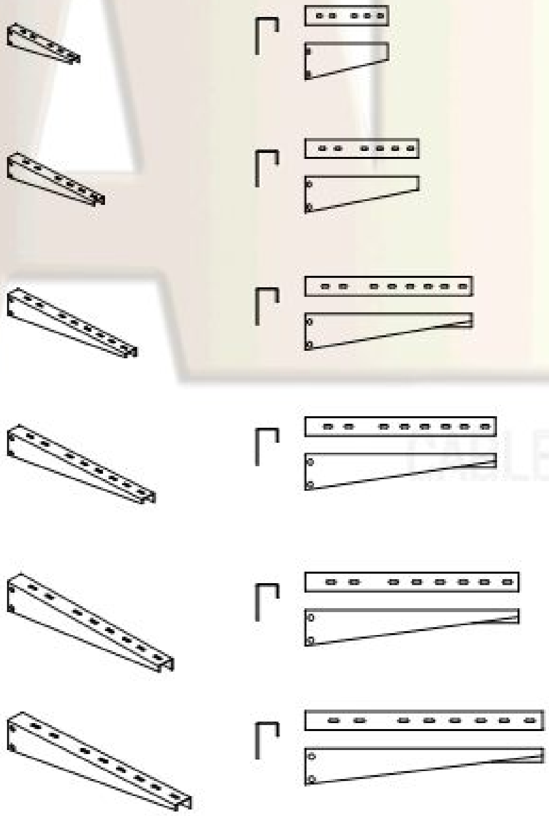


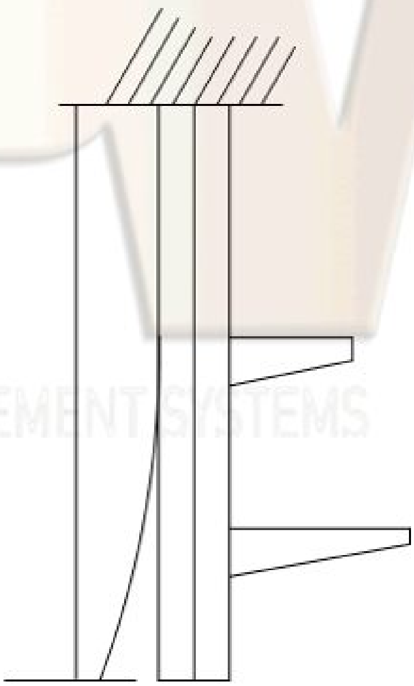


DOUBLE HANGING SYSTEM
(thickness 2.5 mm)









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