Extrusion Load Capacity Calculations

■Deflection Calculations

The following pages assist in optimum extrusion type selections by providing a quick Load vs. Deflection Chart (below) and calculation formulas (right-hand page). In general, load calculations are typically based on beam's both ends supported for structural safety.

Selection Example

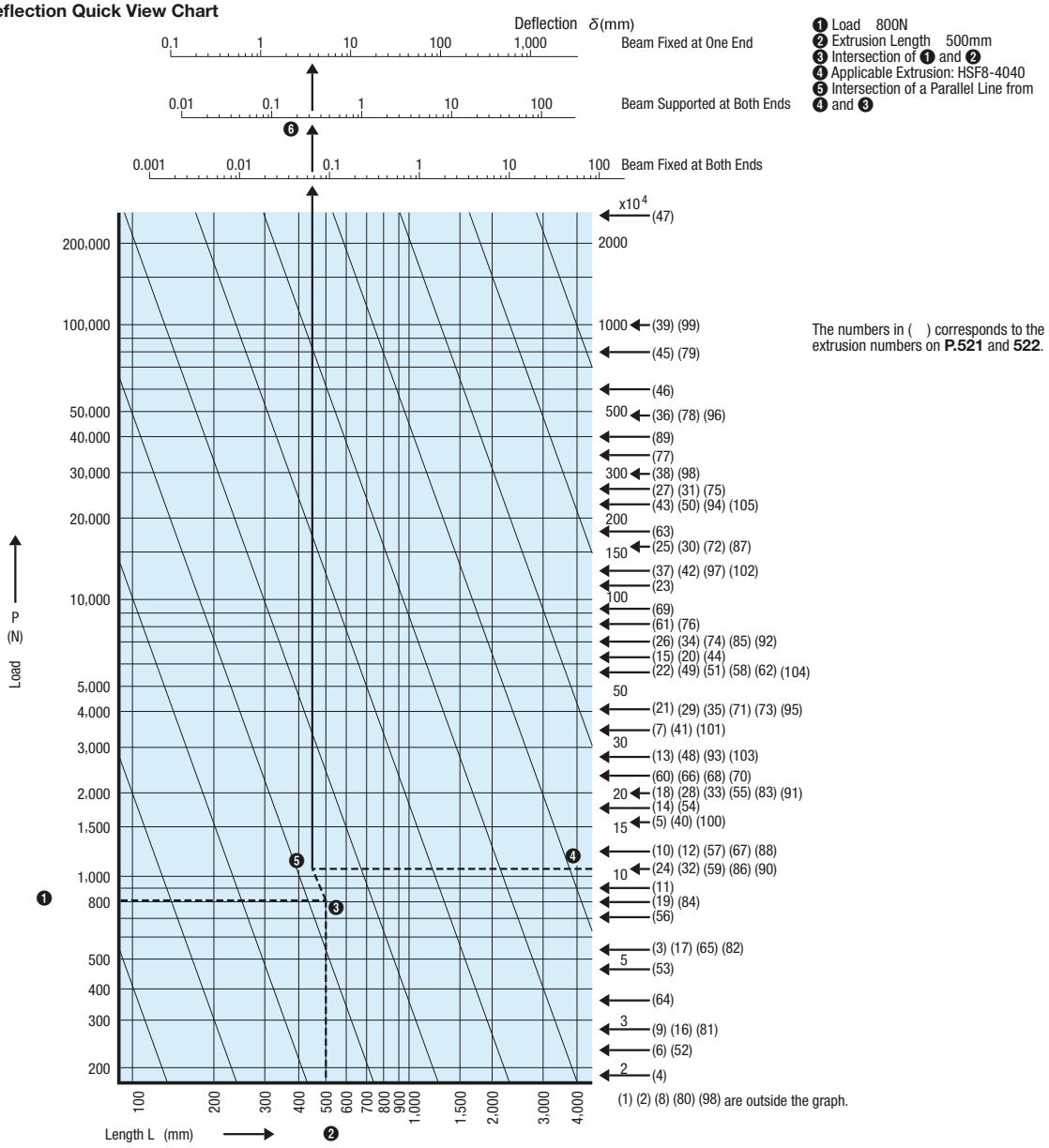
Values used for this example	
Load	800N
Extrusion	HFS8-4040
Length	500 mm

Step
(1) Find a point ❶ on the Y (Load) axis for the applied load P (Unit: N)*1.
(2) Find a point (❷) on the X (Length) axis for the extrusion length.
(3) Draw a horizontal line from ❶ and a vertical line from ❷, and name the intersection of the two as ❸.
(4) Find a point ❹ on the right hand Y axis for the Cross Sectional Moment of Inertia of the extrusion used.
(5) Draw a horizontal line from ❹, and draw a parallel line to the graph's diagonal lines from ❸.
(6) Name the intersection of the lines from (5) as ❺.
(7) Draw a line UP from ❺ and locate an intersection ❻ corresponding to the extrusion support method used.
Result: According to the example values used and the calculation based on the values, the deflection amount would be 0.3mm when the extrusion is supported at both ends.

*1. Conversion: 1kgf=9.80665N (Ex.) 81.6kgf=800N

• MISUMI defines the Load Capacity (Max Allowable Load) to be a deflection 1/1000 of the extrusion length.

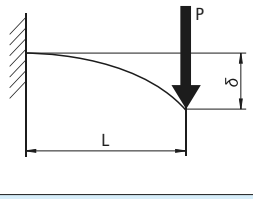
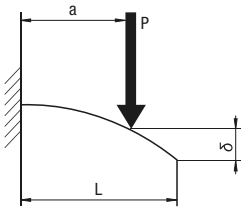
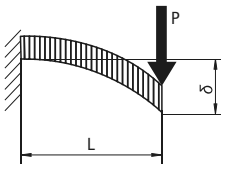
• Deflection Quick View Chart



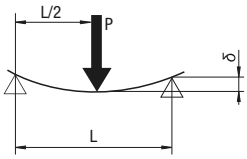
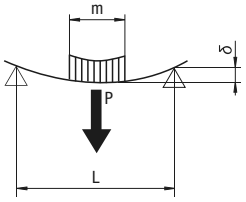
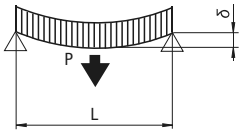
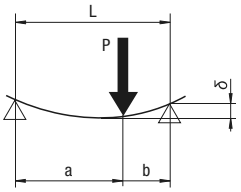
The numbers in ( ) corresponds to the extrusion numbers on **P.521** and **522**.

(1) (2) (8) (80) (98) are outside the graph.

• Deflection Calculations

	1	2	3
Cantilever			
Deflection δ	$\delta = \frac{P \cdot L^3}{3E \cdot I}$	$\delta = \frac{P \cdot a^3}{3E \cdot I}$	$\delta = \frac{P \cdot L^3}{8E \cdot I}$

▥ means that the load is equally distributed.

	4	5	6	7
Both Ends Supported				
Deflection δ	$\delta = \frac{P \cdot L^3}{48E \cdot I}$	$\delta = \frac{P \cdot L^3}{(48+\frac{29m}{I}) \cdot E \cdot I}$	$\delta = \frac{5P \cdot L^3}{384E \cdot I}$	$\delta = \frac{P \cdot a^2 \cdot b^2}{3E \cdot I \cdot L}$

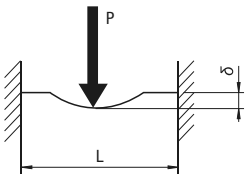
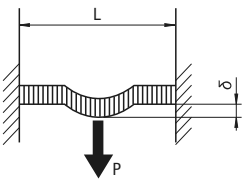
Example of No.4 as "Beam Supported on Both Ends"

P	(N)	Load
L	(mm)	Extrusion Length
E	(N/mm^2)	Young's Modulus $69{,}972 N/mm^2$
I	(mm^4)	Cross Sectional Moment of Inertia
δ	(mm)	Deflection

When the selection is calculated as "Beam Supported on Both Ends"

$$\delta = \frac{800 \times 500^3}{48 \times 69{,}972 \times 10.4 \times 10^4}$$

≈ 0.29 (mm)

	8	9
Both Ends Fixed		
Deflection v	$\delta = \frac{P \cdot L^3}{192E \cdot I}$	$\delta = \frac{P \cdot L^3}{384E \cdot I}$