Duct Sizes & Tolerances

Question:

What are the recommended values for PT duct sizes?

Answer:

As per AASHTO LRFD (5.4.6.2)	Value
Inner diameter for single strand tendon	≥ 6mm than the nominal diameter of strand
Inner diameter for multi-strands tendons (Push-in method)	≥ 2 times of the net area of strands
Inner diameter for multi-strands tendons (Pull-through method)	≥ 2,5 times of the net area of strands
Outer diameter of ducts	≤ 0.4 times the least gross concrete thickness at the duct

Question:

What are the recommended duct support intervals?

Answer:

EN 13670 – Execution of concrete structures

7.2.5 (2) The spacing of the tendons supports shall be such to ensure the sheath conform to the required line and level

FIB Bulletin 31 – Post Tensioning in Buildings

Par. 2.4.1 Unbonded - Spacing of tendons supports 0.6-1.5m

Par. 2.4.2.2 Bonded - Flat duct – corrugated steel Spacing of tendons supports 0.8-1.0m

ACI 318

Par. R26.10.1(f) – Guidance for specifying duct requirements for bonded tendons is provided in PTI M50.3 and M55.1

PTI/ASBI M50.3 - 13670 – Specification for multi-strand and grouted post tensioning

PTI/Post tensioning Manual - 4.4.5.5 Duct support spacing

9.6 Securely support ducts in place at regular intervals not exceeding 48 in (1,2m) for steel pipes, 48 in (1,2m) for round galvanized metal duct, 24 in (0,60m) for round plastic duct, 24 in (0,60m) for flat ducts with strands preinstalled, and 12 in (0,30m) for flat ducts without strand preinstalled to prevent displacement and damage during concreting.

PTI/technical note 5-Unbonede and Bonded Post Tensioning Systems in Building Construction

Par. 2.3 Depend on flexibility flat ducts are required to be secured at closer intervals for profile control in the vertical plane at 3-4 ft (1.0—1.3m)

PTI/technical note 8-Layout of Post Tensioning and Passive Reinforcement in Floor Slabs

Par. F For tendons heights (center of gravity) greater than 30mm (1.25 in) the support bars are secured on chairs at typically 1.2m (4ft) on centre. For tendons heights of 30mm (1.25 in) or less, slab bolsters are used. The spacing of support bars depends upon the designated profile and the type of tendon, but usually does not exceed 1.5m (48 in).

AASHTO LRFD/Bridge Construction Specifications

10.4.1 Placement of ducts

Polyethylene duct and metal duct for longitudinal or transverse post-tensioning in the flanges shall be supported at intervals not to exceed 2.0 ft. (0.60m) Polyethylene duct in webs for longitudinal post-tensioning shall be tied to stirrups at intervals not to exceed 2.0 ft (0.60m), and metal duct for longitudinal post-tensioning in webs shall be tied to stirrups at intervals not to exceed 4.0 ft (1.2m).

Question:

What are the recommended values for PT duct positioning?

Answer:

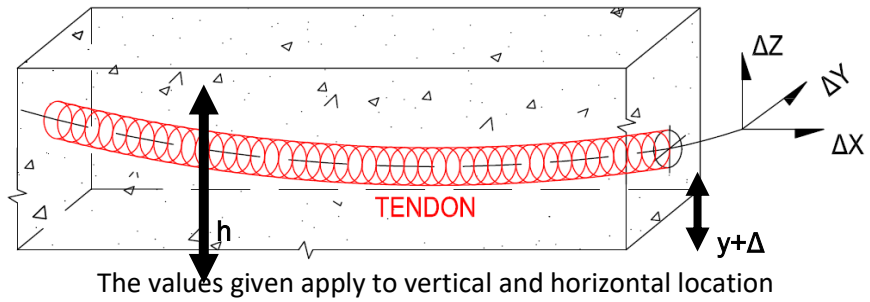
TOLERANCES	VERTICAL mm	LATERAL mm
Horizontal tendons in slabs or in slab regions of larger members	±6mm	±12mm
Longitudinal draped superstructure tendons in webs over supports or in middle third of span	±6mm	±6mm
Tendons in middle half of web depth	±12mm	±6mm
Longitudinal, generally horizontal superstructure tendons usually in top or bottom of member	±6mm	±6mm
Horizontal tendons in substructures and foundations	±12mm	±12mm

TOLERANCES	LONGITUDINAL mm	TRANSVERSE mm
Vertical tendons in webs	±6mm	±6mm
Vertical tendons in pier shafts	±6mm	±6mm

TOLERANCES	VERTICAL mm
Tendons in building slabs	±6mm when slab thickness < 200mm ±9mm when 200mm <slab thickness < 600mm ±12mm when slab thickness > 600mm
	Horizontal profile < 1:6

ADDITIONALLY	TOLERANCES
In all other cases	±6mm in all directions
Anchorage's axis	±3 degrees with smooth transition
Anchorages	±6mm laterally ±25mm along the tendon considering that min cover requirements must be maintained
Couplers/Joints	±3 degrees with smooth transition
Anchorage reinforcement (spiral, W and additional stirrups)	Must be centred around the duct and to start within 12mm of the back of the main anchor plate
	If conflicts exist between the reinforcement and PT duct, the position of duct always supersedes the reinforcement (adjustment of reinforcement upon Engineer's approval)

Note: Above Tables as per AASHTO LRFD & PTI

LONGITUDINAL SECTION	DESCRIPTION	PERMITTED DEVIATION Δ
 The values given apply to vertical and horizontal location	h ≤ 200mm	± 0.03h
	h > 200mm	The smaller of ± 0.03h or ± 30mm
	Concrete cover measured to duct	-15mm

Note: Above Table as per EN-13670 (Execution of Concrete Structures)