

READER COMMENTS

Tolerances for Precast and Prestressed Concrete*

by PCI Committee on Tolerances

Comments by H. Mochizuki, Joseph Nagle, C. E. Joe Warnes and Committee

H. MOCHIZUKI†

After reading the PCI committee report "Tolerances for Precast and Prestressed Concrete," which appeared in the January-February 1985 PCI JOURNAL, we have found the following improper points.

1. Detailing Suggestions for Column to Footing Connection — We do not understand why "anchor bolt" is mentioned in Item 1 and thus assume that it must be a mistake for the "footing dowels" mentioned in Fig. 4.3. In addition, Item 2 states, "Also, this clearance must be adequate for proper grouting of reinforcing bar sleeves." It appears to us that PCI misunderstands the application; the grout is poured into the splice sleeve from the joint space after the upper column is placed on the footing.

2. Fig. 4.3, p. 90 — The location of the splice sleeve is inappropriate. The wide end of the splice sleeve should be in

line with the top level of the footing. We feel that the figure should be corrected and the post grout application in which the splice sleeve is embedded at the bottom of the column be added.

JOSEPH NAGLE‡

Following are comparisons of the PCI Tolerances Report with Penn DOT tolerances for length and camber deviations with respect to bridge beams. Note that Penn DOT recommends having a beam that is a little short to minimize beam end-clearance problems associated with beam expansion. To account for camber and elastic loss deviations, the length tolerance should not be applied to the location of bulkheads.

With regard to the position of tendons, Penn DOT allows $\pm\frac{1}{2}$ in. on the vertical positioning of deflected strands at the ends of beams, which is preferable to $\pm\frac{1}{4}$ in. for two reasons: variation in location of deflected strands in beams with a large number of straight strands has a negligible affect on eccentricity, and significant economic benefits can be realized when a single deflection set-up can be utilized repetitively. Varying beam lengths necessitate at least

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Table A. Penn DOT Tolerances (I Beams).

	PENN DOT	PCI
LENGTH	+ 1/2", - 1"	± 1/4" Per 25' ± 1" Max.
CAMBER- DEVIATION FROM DESIGN	CAMBER > 1" ± 50%	± 1/8" Per 10' ± 1/2" Up To 80'
	CAMBER < 1" ± 1/2"	± 1" Over 80'
POSITION OF DEFLECTED STRAND AT ENDS OF BEAMS	± 1/2"	± 1/4"

± 1/2 in. tolerance on the location of deflected strands. The most comprehensive tolerance on strand position would be to set a tolerance of ± 1/4 in. on the location of the center of gravity of the strand pattern.

We agree totally with the commentary on the location of strand deflection points and would add that designers should show jacking force and the center of gravity of strands required to allow the prestresser some flexibility in tailoring the strand pattern to fit production methods. The use of partially unbonded strands should not be ignored when stresses are borderline between straight and deflected.

C. E. JOE WARNES*

I would like to make the following comments in regard to the article "Tolerances for Precast and Prestressed Concrete," which was published in the January-February 1985 PCI JOURNAL.

Our experience in the United States is a product of five years actual splice sleeve use in the field. As such, we now

make the following recommendations to precasters and design engineers.

For wall panels, both panel-to-panel and panel-to-foundation connections, we recommend the use of the pressure-grouted application where the bottom of the splice sleeves are located in the bottom of the structural element. In addition, when dealing with column connections, we still recognize the use of both pre- (sleeve up) and post- (sleeve down) grout installations for column-to-column connections. However, for column-to-foundation connections, we recommend only the post-grout connection.

Our reason for making the above recommendations is that when sleeves are located in the foundation, it is very difficult to correct mislocation errors. However, when rebar dowels are located in the foundation instead, there are a number of methods which can be used to make corrections, most of which have been developed for effectively correcting mislocated anchor bolts.

Finally, we also noted that the report contained no provision for a grouted sleeve connection for wall panel-to-footing connections. The most used splice sleeve application in North America is for shear wall connections.

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CLOSURE by PCI COMMITTEE ON TOLERANCES

We would like to thank Mr. Nagle for his comments. The committee's mission was to derive tolerances that were reasonable from the designer's, owner's, and producer's point of view. This document was derived with input from all three categories and it is hoped it will act as a model for the construction industry and help to standardize tolerances nationally.

We agree with Mr. Nagle that owners and designers should relate tolerances to the finished product, not the forms. Many physical properties affect the final size of a member such as shrinkage, humidity, and temperature to name a few. These effects vary from state to state and from plant to plant. Therefore, form dimensions and form layout should be left to the manufacturer.

The committee felt that a length error was equally likely in all directions and hence, the same $\pm$ tolerance on length. Bearing concerns vary greatly from project to project. We feel it is the duty of the designer to determine if length is more critical in one direction or the other on a per project basis.

The tolerance for the strands at the

ends of the member were set tightly, since the strands pass through the bulkheads. Both producers and form manufacturers that replied to our surveys found this to be a realistic number. It was also a concern of the committee that bridge beams tend to be deep and thin in many instances. We felt that a tight tolerance was necessary to control sweep in the lateral direction.

The committee would like to thank Mr. Mochizuki and Mr. Warnes for pointing out some errors and in explaining their product more fully. The committee would like to emphasize to PCI JOURNAL readers that Chapter 4 was placed in this report to stress the importance of considering practical tolerances when detailing projects. It is not the purpose of this chapter to recommend actual details. The designer should always consult with a manufacturer of any products if they are considering using the product in their projects.

The committee would also like to ask all PCI JOURNAL readers to relate their personal experiences with these tolerances back to this committee. No time limit applies. It is important to get continued input from the construction industry so that this report can be updated as required.

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