

4.2.2 — Safety Measures for All Tensioning Operations

The operation of tensioning has more potential for serious accidents than all other phases of prestressed concrete production combined. The following basic rules applicable to tensioning shall be included in the safety requirements of all plants:

- (1) Prior to tensioning any bed, a visible and audible signal shall be given and all personnel not required to perform the tensioning shall leave the area adjacent to the bed.
- (2) Jacks shall be held by means preventing the jack from flying longitudinally or laterally in case of tendon failure.
- (3) Personnel shall never be permitted to stand at either end of the bed, directly in line with the tendon being tensioned.
- (4) Personnel shall not stand over tendons being tensioned to make elongation measurements. Such measurements shall be preferably be made by jigs or templates from the side or from behind shields.
- (5) For personnel engaged in the tensioning operation, protection shall be provided by means of effective shields adequate to stop a flying tendon. These shields should be provided at both ends of the bed and should be of reinforced concrete or heavy timbers. Shields of wire mesh are not satisfactory as broken strands often fly end first and may penetrate the wire openings.
- (6) Eye protection shall be provided for personnel engaged in wedging and anchoring operations as a protection from flying pieces of steel.

4.2.3. — Safety Measures for Pretensioning

Principal causes and remedies for tendon failure during pretensioning include the following:

- (1) Defective or improper strand vises: Clean, inspect and lubricate strand vises between each use. Use of at least a three-power illuminated magnifying glass for inspecting strand vises is recommended. Discard any worn or distorted chucks. A small amount of sand or dirt between chucks and the barrel can cause failure or slippage of the strand.
- (2) Improper alignment of strand vises: See that vises are in line with pull and are seated normally.
- (3) Overstressing: Check elongation and keep tension-indicating devices properly calibrated.
- (4) Kinks or nicks in strand: Use care in handling strand to avoid damage. Do not begin tensioning if a strand has been nicked.
- (5) Failure of individual wires in strand: These often occur in factory welds and cannot be avoided. Do not tension any strand with a broken wire.
- (6) Heating of a tensioned strand: Keep all torches and welding equipment away from tensioned strand.
- (7) Sudden multiple revolutions of strand being pulled from a coil: Use approved swivel grips or other effective methods.
- (8) Local overstress due to friction in tensioning of draped strands: For strands tensioned in the draped position, use roller bearings at all hold-down and support points. Before placing concrete, the bearings within the members can be replaced with less expensive devices. For strands tensioned in a straight line and subsequently deflected, do all deflecting simultaneously or on a predetermined schedule symmetrically about the center of the bed.