The stressing records are part of the structural design and serve as a basis for the stressing operation. Besides the prestressing data, they contain sequence of stressing and directions for procedures directly connected with stressing operation, such as lowering of the formwork and releasing of bearings.

**Calculation Of Elongation**

The total elongation \( \Delta_{\text{tot}} \) which the tendon has to achieve during stressing should be calculated as:

\[
\Delta_{\text{tot}} = \Delta_p + \Delta_c + \Delta_{\text{isl}} + \Delta_{\text{le}}
\]

- \( \Delta_p \) = elongation of the strand tendon [mm]
- \( \Delta_c \) = elastic deformation of the concrete (shortening must be treated as a positive value) [mm]
- \( \Delta_{\text{isl}} \) = sum of anchor plates impressions and dead end wedge slip according anchorage type applied [mm]
- \( \Delta_{\text{le}} \) = elongation of the prestressing steel in the jack and seating device (if applicable) [mm]

\[
\Delta_p = \frac{1}{E_p} \int_0^l \frac{P_{x,0}}{E_p} \, dx
\]

\( l_p \) = length of tendon [m]

- \( P_{x,0} \) = prestressing force of the tendon at any point distance \( x \) [kN]
- \( P_0 \) = prestressing force at the stressing end [kN]
- \( g_x = \sum \) angle of deflection between the stressing end and at any point distance \( x \) [rad]
- \( \mu \) = coefficient of friction (see p.5)
- \( \beta \) = wobble angle (see p.5)
- \( P_e \) = prestressing force at the stressing end after unintentional slip of elongation [kN]

\[
P_e = P_0 \cdot (1 - 2 \cdot l_e \cdot \mu \cdot g_1)
\]

- \( \gamma_1 \) = average angle of deflection along the influence length \( l_e \) of tendon behind the life end [rad/m]

\[
\Delta_c = \frac{\sigma_{\text{cm}}}{E_c} \cdot l_c
\]

- \( \sigma_{\text{cm}} \) = average stress in the concrete cross section at the centre of gravity of all tendons due to prestressing force [MN/m²]
- \( l_c \) = length of the concrete member [m]

\[
\Delta_{\text{isl}} = \sum \text{anchor plates impressions and dead end wedge slip according anchorage type applied [mm]}
\]

<table>
<thead>
<tr>
<th>life end anchorage</th>
<th>dead end anchorage</th>
<th>Bond Head anchorage</th>
<th>Coupler R</th>
<th>Coupler D</th>
<th>Coupler M</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>4</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>3</td>
</tr>
<tr>
<td>-</td>
<td>3</td>
<td>*1</td>
<td>3</td>
<td>6</td>
<td>-</td>
</tr>
</tbody>
</table>

*) see german approval

**Calculation of life end prestressing force \( P_e \) [kN] and influence length \( l_e \) [m]**

due to life end wedge slip \( \Delta_{\text{isl}} \) [mm] at release of stressing jack

\[
l_e = \sqrt{\frac{\Delta_{\text{isl}} \cdot E_p \cdot A_p}{P_0 \cdot \mu \cdot \gamma_1}}
\]

\[
P_e = P_0 \cdot (1 - 2 \cdot l_e \cdot \mu \cdot \gamma_1)
\]

unintentional slip \( \Delta_{\text{le}} \) [mm]

- at the life end anchorage
- at the coupler M

\[
\gamma_1 = \text{average angle of deflection along the influence length } l_e \text{ of tendon behind the life end [rad/m]}
\]

\[
\Delta_{\text{le}} = \Delta_{\text{isl}} + \Delta_{\text{le}}
\]

<table>
<thead>
<tr>
<th>tendon type</th>
<th>standard case</th>
<th>special case</th>
</tr>
</thead>
<tbody>
<tr>
<td>6801 - 6807</td>
<td>4*1</td>
<td>2*1</td>
</tr>
<tr>
<td>6809 - 6827</td>
<td>2*3</td>
<td>4</td>
</tr>
<tr>
<td>6802 - 6812</td>
<td>8</td>
<td>-</td>
</tr>
</tbody>
</table>

*) with wedge seating  ***) without wedge seating

**modulus of elasticity** [N/mm²]

- concrete class B 25, B 35, B 45, B 55
- strand \( E_c = 30,000 \) [N/mm²]

<table>
<thead>
<tr>
<th>strand</th>
<th>partial prestressing</th>
<th>full prestressing</th>
</tr>
</thead>
<tbody>
<tr>
<td>concrete class</td>
<td>12, 18, 20, 24</td>
<td>24, 32, 40, 48</td>
</tr>
<tr>
<td>( E_p ) = 195,000 [N/mm²]</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>