ESS-0191685

Stiffness of the column:

$k = 500\,000 \frac{kN}{m}$

Drop height:

$h = 0,02\ m$

Blow mass:

$m = 20000\ kg$

Initial load on the column:

$N_i = 400\ kN$

Colum resistance (no buckling):

$F = 2600\ kN$

Kinetic energy of the dropping blow:

$E_k = m \cdot g \cdot h = 20000 \cdot 10 \cdot 0,02 = 4\ kJ$

Column displacement due to dropping blow:

$d = \sqrt{\frac{2 \cdot E_k}{k}} = 0,004\ m$

Force increase in column:

$\Delta N = k \cdot d = 500000 \cdot 0,004 = 2000\ kN$

Force in the column:

$N = \Delta N + N_i = 2000\ kN + 400\ kN$

$N = 2000\ kN$

Conclusion:

At $h = 0,02\ m$, $N \approx F$.

Acceptable drop height equals to 2 cm.