# Concrete beam flexure check

Design code: ACI 318-19

## Materials

|  |  |  |  |
| --- | --- | --- | --- |
| Materials | Variable | Value | Unit |
| Section Label |  | 101 |  |
| Concrete strength | fc | 25 | MPa |
| Steel reinforcement yield strength | fy | 420 | MPa |

|  |  |  |  |
| --- | --- | --- | --- |
| Geometry | Variable | Value | Unit |
| Section height | h | 60.0 | cm |
| Section width | b | 20.0 | cm |
| Clear cover | cc | 2.5 | cm |
| Mechanical top cover | cm,top | 3.3 | cm |
| Mechanical bottom cover | cm,bot | 3.3 | cm |

|  |  |  |  |
| --- | --- | --- | --- |
| Design forces | Variable | Value | Unit |
| Top max moment | Mu,top | -100 | kNm |
| Bottom max moment | Mu,bot | 110 | kNm |

## Limit Checks

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Check | Unit | Value | Min. | Max. | Ok? |
| Min/Max As rebar top | cm² | 4.02 | 3.78 | 18.06 | ✔️ |
| Minimum spacing top | mm | 102.0 | 30.0 |  | ✔️ |
| Min/Max As rebar bottom | cm² | 6.44 | 3.78 | 18.06 | ✔️ |
| Minimum spacing bottom | mm | 49.0 | 25.0 |  | ✔️ |

## Flexural Capacity Top

|  |  |  |  |
| --- | --- | --- | --- |
| Top reinforcement check | Variable | Value | Unit |
| First layer bars | n1+n2 | 2Ø16 |  |
| Second layer bars | n3+n4 | - |  |
| Effective height | d | 56.7 | cm |
| Depth of equivalent strength block ratio | c/d | 0.10 |  |
| Minimum rebar reinforcing | As,min | 3.78 | cm² |
| Required rebar reinforcing | As,req | 4.87 | cm² |
| Defined rebar reinforcing | As | 4.02 | cm² |
| Longitudinal reinforcement ratio | ρl | 0.56792 |  |
| Total flexural strength | ØMn | 83.17 | kNm |
| Demand Capacity Ratio | DCR | 1.2 | ❌ |

## Flexural Capacity Bottom

|  |  |  |  |
| --- | --- | --- | --- |
| Bottom reinforcement check | Variable | Value | Unit |
| First layer bars | n1+n2 | 2Ø12+1Ø12 |  |
| Second layer bars | n3+n4 | 2Ø12+1Ø10 |  |
| Effective height | d | 56.7 | cm |
| Depth of equivalent strength block ratio | c/d | 0.11 |  |
| Minimum rebar reinforcing | As,min | 3.78 | cm² |
| Required rebar reinforcing | As,req | 5.39 | cm² |
| Defined rebar reinforcing | As | 6.44 | cm² |
| Longitudinal reinforcement ratio | ρl | 0.56792 |  |
| Total flexural strength | ØMn | 130.28 | kNm |
| Demand Capacity Ratio | DCR | 0.84 | ✔️ |