# Concrete beam shear 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 |
| Concrete density | wc | 2500.0 | kg/m³ |
| Normalweight concrete | λ | 1 |  |
| Safety factor for shear | Øv | 0.75 |  |

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| --- | --- | --- | --- |
| Geometry | Variable | Value | Unit |
| Section height | h | 50.0 | cm |
| Section width | b | 20.0 | cm |
| Clear cover | cc | 2.5 | cm |
| Longitudinal tension rebar | As | 1.01 | cm² |

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| --- | --- | --- | --- |
| Design forces | Variable | Value | Unit |
| Axial, positive for compression | Nu | 0 | kN |
| Shear | Vu | 220 | kN |

## Limit checks

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Check | Unit | Value | Min. | Max. | Ok? |
| Stirrup spacing along length | cm | 20.0 |  | 11.72 | ❌ |
| Stirrup spacing along width | cm | 14.4 |  | 23.45 | ✔️ |
| Minimum shear reinforcement | cm²/m | 2.83 | 1.75 |  | ✔️ |
| Minimum rebar diameter | mm | 6.0 | 10 |  | ❌ |

## Design checks

|  |  |  |  |
| --- | --- | --- | --- |
| Shear reinforcement strength | Variable | Value | Unit |
| Number of stirrups | ns | 1.0 |  |
| Stirrup diameter | db | 6.0 | mm |
| Stirrup spacing | s | 20.0 | cm |
| Effective height | d | 46.9 | cm |
| Minimum shear reinforcing | Av,min | 1.75 | cm²/m |
| Required shear reinforcing | Av,req | 11.39 | cm²/m |
| Defined shear reinforcing | Av | 2.83 | cm²/m |
| Shear rebar strength | ØVs | 39.78 | kN |

|  |  |  |  |
| --- | --- | --- | --- |
| Shear strength | Variable | Value | Unit |
| Effective shear area | Acv | 938.0 | cm² |
| Longitudinal reinforcement ratio | ρw | 0.00107 |  |
| Size modification factor | λs | 0.834 |  |
| Axial stress | σNu | 0.0 | MPa |
| Concrete effective shear stress | kc | 0.85 | MPa |
| Concrete strength | ØVc | 59.8 | kN |
| Maximum shear strength | ØVmax | 291.95 | kN |
| Total shear strength | ØVn | 99.58 | kN |
| Max shear check |  | ✔️ |  |
| Demand Capacity Ratio | DCR | 2.21 | ❌ |