



Number of Connectors Required for Building Construction Formulas

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Examples!

Conversions!

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List of 14 Number of Connectors Required for Building Construction Formulas

Number of Connectors Required for Building Construction

1) Maximum Moment in Span given Number of Shear Connectors



Open Calculator

$$\mathbf{M}_{ ext{max}} = rac{\mathbf{M} \cdot \mathbf{N}_1 \cdot \mathbf{eta}}{(\mathbf{N} \cdot (\mathbf{eta} - 1)) + \mathbf{N}_1}$$

ex
$$108$$
kN*m = $\frac{30$ kN*m · $12 \cdot 0.6$ } $(25 \cdot (0.6 - 1)) + 12$

2) Moment at Concentrated Load given Number of Shear Connectors

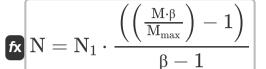
$$\mathbf{M} = \left(rac{(\mathrm{N}\cdot(eta-1)) + \mathrm{N}_1}{\mathrm{N}_1\cdoteta}
ight)\cdot\mathrm{M}_{\mathrm{max}}$$

Open Calculator 🚰

ex
$$28.05556 \text{kN*m} = \left(\frac{(25 \cdot (0.6 - 1)) + 12}{12 \cdot 0.6}\right) \cdot 101 \text{kN*m}$$



3) Number of Shear Connectors 🗗



Open Calculator

$$oxed{ex} 24.65347 = 12 \cdot rac{\left(\left(rac{30 \mathrm{kN^*m \cdot 0.6}}{101 \mathrm{kN^*m}}
ight) - 1
ight)}{0.6 - 1}$$

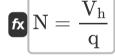
4) Number of Shear Connectors required between Maximum and Zero Moment

$$N_1 = rac{N\cdot(eta-1)}{\left(rac{M\cdoteta}{M_{
m max}}
ight)-1}$$

Open Calculator

ex
$$12.16867 = rac{25 \cdot (0.6-1)}{\left(rac{30 \mathrm{kN^*m \cdot 0.6}}{101 \mathrm{kN^*m}}
ight) - 1}$$

5) Total Number of Connectors Resisting Total Horizontal Shear



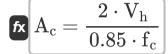
Open Calculator 🗗

$$= 24042.86 = \frac{4207.5 \text{kN}}{175 \text{N}}$$



Shear on Connectors

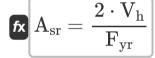
6) Actual Area of Effective Concrete Flange given Total Horizontal Shear



Open Calculator 🗗

$$extbf{ex} 200000 ext{mm}^2 = rac{2 \cdot 4207.5 ext{kN}}{0.85 \cdot 49.5 ext{MPa}}$$

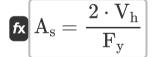
7) Area of Longitudinal Reinforcement at Support within Effective Area given Total Horizontal Shear



Open Calculator 🗗

$$\mathbf{ex}$$
 $56100 \mathrm{mm}^2 = rac{2 \cdot 4207.5 \mathrm{kN}}{150 \mathrm{MPa}}$

8) Area of Steel Beam given Total Horizontal Shear to be Resisted by Shear Connectors



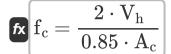
Open Calculator

$$=$$
 $33660 ext{mm}^2 = rac{2 \cdot 4207.5 ext{kN}}{250 ext{MPa}}$





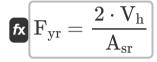
9) Specified Compressive Strength of Concrete given Total Horizontal Shear



Open Calculator 🗗

$$=$$
 $49.5 \mathrm{MPa} = rac{2 \cdot 4207.5 \mathrm{kN}}{0.85 \cdot 200000 \mathrm{mm}^2}$

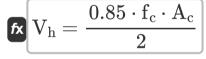
10) Specified Minimum Yield Stress of Longitudinal Reinforcement given Total Horizontal Shear



Open Calculator

$$ext{ex} 150 ext{MPa} = rac{2 \cdot 4207.5 ext{kN}}{56100 ext{mm}^2}$$

11) Total Horizontal Shear 🛂



Open Calculator

$$ext{ex} egin{array}{c} 4207.5 ext{kN} = rac{0.85 \cdot 49.5 ext{MPa} \cdot 200000 ext{mm}^2}{2} \end{array}$$



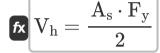
12) Total Horizontal Shear between Interior Support and Point of Contraflexure



Open Calculator

 $extstyle = rac{56100 ext{mm}^2 \cdot 150 ext{MPa}}{2}$

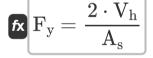
13) Total Horizontal Shear to be Resisted by Shear Connectors



Open Calculator

 $ext{ex} \ 4207.5 ext{kN} = rac{33660 ext{mm}^2 \cdot 250 ext{MPa}}{2}$

14) Yield Strength of Steel given Total Horizontal Shear to be Resisted by Shear Connectors



Open Calculator 🗗

 $\mathbf{ex} = \frac{2 \cdot 4207.5 \mathrm{kN}}{33660 \mathrm{mm}^2}$



Variables Used

- A_C Actual Area of Effective Concrete Flange (Square Millimeter)
- As Area of Steel Beam (Square Millimeter)
- Asr Area of Longitudinal Reinforcement (Square Millimeter)
- f_C 28-Day Compressive Strength of Concrete (Megapascal)
- F_v Yield Stress of Steel (Megapascal)
- F_{Vr} Specified Minimum Yield Stress (Megapascal)
- **M** Moment at Concentrated Load (Kilonewton Meter)
- M_{max} Maximum Moment in Span (Kilonewton Meter)
- N Number of Shear Connectors
- N₁ No. of Shear Connectors Required
- q Allowable Shear for One Connector (Newton)
- V_h Total Horizontal Shear (Kilonewton)
- β Beta





Constants, Functions, Measurements used

- Measurement: Area in Square Millimeter (mm²)
 Area Unit Conversion
- Measurement: Force in Kilonewton (kN), Newton (N) Force Unit Conversion
- Measurement: Torque in Kilonewton Meter (kN*m)
 Torque Unit Conversion
- Measurement: Moment of Force in Kilonewton Meter (kN*m)
 Moment of Force Unit Conversion
- Measurement: Stress in Megapascal (MPa)
 Stress Unit Conversion





Check other formula lists

- Allowable-Stress Design Formulas (
- Base and Bearing Plates Formulas [7]
- Bearing, Stresses, Plate Girders & Number of Connectors Required **Ponding Considerations** Formulas
- Cold Formed or Light Weighted Steel Structures Formulas
- Composite Construction in **Buildings Formulas**

- Design of Stiffeners under Loads Formulas
- Economical Structural Steel Formulas (
- for Building Construction Formulas 4
- **Webs under Concentrated Loads** Formulas C

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