



# ACROW ENGINEERING

## SOLUTION FOCUSED SHARING.

EDITION 6, OCTOBER 2021

# ENGINEERING UNITS

## Explanation

Structural engineers typically talk in either kN or kPa. These units define loads imposed on the structure as either a singular point load or a uniform pressure.

Structural engineers generally deal with static loads which mean loads that do not move.

## kN - Kilonewton

The definition of a newton is the force needed to accelerate one kilogram of mass at the rate of one metre per second squared in the direction of the applied force.

Because of gravity 1 kN equals 101.97kg. To simplify things just assume  $1\text{kN} = 100\text{kg}$ .

A kN is a force on a singular point, so if you see on a design an arrow with 10kN noted, this means you have approximately 1000kg of load in the direction of the arrow applied to the supporting structure.

We will generally detail the following loads as a kilonewton –

- Leg load reaction on scaffold or falsework.

- Load applied to a permanent structure.
- If there is a defined point load being applied to our system.

## kPa - Kilopascal

The kilopascal is a unit of pressure. 1 kPa is approximately 100kg per square meter. This load is uniformly distributed over a square meter.

We will show the following loads as a Kilopascal –

- Live load from people
- Concrete pressure from a wall or slab
- Wind pressure
- Required ground bearing pressure

## Common loads

- Walkways must be designed to 2.5kPa or a point load of 1.5kN, which ever imposes more load onto the structure. A walkway is typically 700mm to 1200mm wide, generally we assume 2 x workers can stand shoulder to shoulder on the walkway without issues.
- Falsework decks because they are large must be designed to a live load of 1kPa.
- Concrete loads on a falsework is approx. 25kPa per meter of thickness eg. 3m deep slab, concrete weight is  $3 \times 25\text{kPa} = 75\text{kPa}$ .
- Concrete pressure is approx. 25kPa per vertical meter of wall eg. 2m high pour, concrete pressure is  $2 \times 25\text{kPa} = 50\text{kPa}$ .
- 100km/hr of wind is approx. 0.6kPa.
- A person is approx. 1kN.
- Ground can typically withstand a load between 50kPa and 100kPa.
- An engineered piling pad typically withstands a load between 250kPa and 300kPa.

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