

Surface Tension

A.1 How will surface tension affect a building or structure?

Surface tension and capillary action are linked,

Water is drawn into a structure by the surface tension and capillary action working through to minute pores in a structure.

Moisture being drawn into timber within a building can cause decay.

Moisture in the walls can bring in soluble salts allowing efflorescence to decay plaster and internal finishes.

This is one reason why we build with a cavity between the external 'weathered' wall and internal wall.

If we install a DPC or DPM the moisture cannot pass as this membrane is non-porous.

A.2 How / why does temperature affect surface tension?

Surface tension changes with temperature, If you wash your hands with warm water your hands are easier to clean than with cold water, this is because the water surface tension has altered.

Same with a building as it warms up, with let's say central heating, the surface tension of the water within the wall changes altering the moisture content. This change is small but significant.

As water when warm evaporates, this draws in more water to replace evaporated moisture. The whole structure becomes 'damp' as the temperature rises, we need ventilation to remove this moist air.

A.3 How can we stop surface tension therefore stopping capillary action?

You cannot stop surface tension is part of natural physics.

We can reduce its effect on a structure with good building practices, good quality materials, good workmanship, and proper installation of DPC's and DPM's. Ventilation to remove unwanted moisture from the air.

A.4 Why are dense materials more resistant to capillary action?

Dense materials have less voids or pores, so there is no space for water to enter.

The pores are very small so the water molecules are unable to pass through the materials.

A.5 How does 'breathable' roofing felt work?

This works because the pores are so small water droplets will not pass through.

The surface coating and the manufacturing process make water molecules bind together using surface tension to form droplets of water, these are then too big to pass through the pores in the felt.

Air can pass freely in and out of the roof space.

The problem with this felt is where timber or debris touches the felt, surface tension is broken down and the water can pass through soaking the timber or forming drips. Also dust and roof insulation can block the small pores, reducing ventilation.

A.6 What is a vapour barrier?

This is placed in an area where the external surface is near the internal surface, it restricts the passage of water vapour into the building stopping damage to internal finishes.

The water vapour forms droplets and is bound together by surface tension.

A vapour barrier would be used behind special external finishes such as cladding etc.

A vapour barrier is also used in timber frame construction where there is no internal masonry. This stops any moisture within the cavity passing into the timber frame, insulation and internal finishes.