

# KNOWLEDGE SHARE: 005

**TITLE:** DIFFERENTIAL MOVEMENT DETAIL FOR FIRE COMPARTMENT WALLS  
**BUILDING TYPE:** LONG SPAN CONCRETE FLOORS AND STEEL FRAMED BUILDINGS

## OVERVIEW OF THE PROBLEM

The deflection head gap required in a fire compartment wall is to allow for the structural movements between adjacent floors relative to each other. These movements, known as “Differential movements”, may arise from a combination of super-dead loads (SDL) and imposed loads that may occur following the installation of the deflection head. The deflection head gap should also allow for the structural movements in the fire case to ensure that the floor does not bear onto the wall making the wall a load bearing element. Tested and certified deflection head details for fire compartment wall systems typically provide an overall movement of 50mm, e.g. +25/-25 mm or -32/+18mm. The existing products satisfy the 40mm maximum movement stated within Approved Document B. However, they often fall short in supporting movements due to ‘differential’ or ‘incremental’ loading of certain structural floors, notably, flat slabs with spans over 9.0m and steel frames with composite floor construction as these tend to have greater movements than traditional concrete slabs.

The deflection head is likely to experience a range of structural movements varying from compression(-) and extension(+) eg.+20/-15mm. However, it is a common misconception that the head detail only experiences compression due to loading of the upper floor. Floors that sit above and below a wall can be loaded differently, subjecting the head joint to compress and extend differentially. This can sometimes cause the overall opening or closing of the head joint to exceed available product capacities.

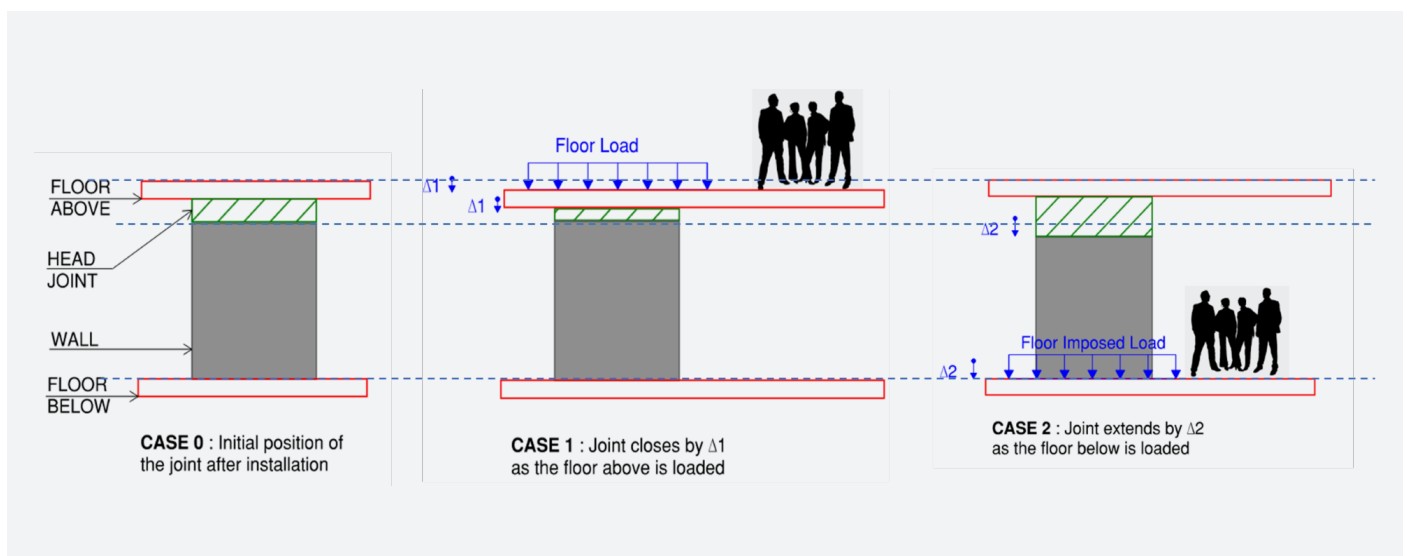


Figure 1: “Compression” and “Extension” case in a Wall head joint illustrated.

# KNOWLEDGE SHARE: 005

## WHY IS THIS A PROBLEM?

Where combined fire and differential structural deflections lead to onerous head deflection requirements, tested and certified products to support a head detail larger than 50mm are not typically available within the supply chain. The materials used to seal and provide fire resistance have limited capacity to stretch in the extension case. Significant compression in a fire scenario beyond the head gap could load the compartment wall impacting the integrity of the wall system.

If this issue is not addressed at design stage, then bespoke products or cost prohibitive solutions for structural enhancement may be required.

## RECOMMENDATIONS

Early discussions with the structural engineer to highlight the concern and define differential deflection values rather than total deflections is encouraged. Where possible, strategically position compartment walls in stiffer areas of the floor plate. A deflection plot of the floor indicating the interface of compartment walls with slab deflections can help to quantify any non-compliances. With early planning, the structural designer should be able to support with engineered routes to compliant head details and advise on reduced deflections.