

Eight roof substrates. *One structural answer each.*

Mounting method, survey approach, dominant risk factor, and standards anchor for every commercial roof substrate we see on solar PV projects. Cards are starting points, not substitutes for site-specific calculation.

STANDARDS BACKBONE
 Wind: BS EN 1991-1-4
 Snow: BS EN 1991-1-3
 PV Uplift: BRE Digest 489
 Building Regs: Approved Doc A

01 Trapezoidal sheet *steel*

WAREHOUSES · DISTRIBUTION · LIGHT INDUSTRIAL

Profiled steel sheets with trapezoidal corrugation, typically 32–40mm deep. The UK's most common commercial roof.

MOUNTING Penetrating self-tapping screws into the sheet crown, A2 stainless. **Non-penetrating** Trapez clamps (SL Rack, Schletter SingleFix-T) where profile permits, preserving sheet warranty.

SURVEY Drone roof condition assessment for overview, on-site verification for fastener pull-out and sheet end-lap detail.

RISK Fastener uplift utilisation in corner zones. Sheet end-lap watertight integrity at penetrations. Mitigation: targeted load testing where utilisation exceeds 70%.

STANDARDS BS EN 1991-1-4 · BRE Digest 489 · Manufacturer fastener pull-out spec

02 Standing seam *metal*

ARCHITECTURAL · CIVIC · MODERN INDUSTRIAL

Vertical seam joints rolled or folded between sheets. No through-fixings to weather plane, warranty-sensitive substrate.

MOUNTING **Non-penetrating** only. Seam clamps (S-5! ProteaBracket, MetalBox, SL Rack Falz Premium). Selection driven by seam profile measurement.

SURVEY Drone + on-site with seam profile measurement (seam height + width to nearest mm) to confirm clamp model compatibility.

RISK Seam compatibility with available clamps. Thermal expansion movement at long runs. Mitigation: targeted load testing where utilisation exceeds 70%.

STANDARDS BS EN 1991-1-4 · BRE Digest 489 · Roof manufacturer warranty terms

03 Built-up *felt*

OLDER INDUSTRIAL · RETAIL · PUBLIC SECTOR

Multi-layer bituminous felt on insulation or deck, often pre-1990s. Wear-sensitive, degradation expected.

MOUNTING **Ballasted** with engineered protection mat (typically EPDM walkway membrane), or **mechanically fixed** through to deck where structure permits.

SURVEY On-site walkover essential. Drone supplements with thermal but does not replace tactile assessment of membrane condition.

RISK Membrane degradation under ballast points. Deck deflection beyond serviceability limit. Mitigation: protection layer + ballast point-load spreading.

STANDARDS BS EN 1991-1-4 · BS EN 1991-1-3 · BRE Digest 489

04 Single-ply *membrane*

MODERN COMMERCIAL · LOGISTICS · DATA CENTRES

TPO, PVC, or EPDM membrane mechanically fixed or adhered to insulation. Modern standard for new commercial flat roofs.

MOUNTING **Ballasted** with manufacturer-compatible protection mat. **Hot-air-welded** mounting feet (TPO/PVC) where load case allows non-penetrating attachment.

SURVEY Drone + on-site to confirm membrane lap detail, mechanical fixing pattern, and existing wind-uplift detailing at perimeters.

RISK Membrane puncture risk at ballast point loads. Manufacturer warranty void on non-approved fixings. Mitigation: spec match membrane type to mat type.

STANDARDS BS EN 1991-1-4 · BRE Digest 489 · Membrane manufacturer spec

05 Asbestos / *fibre cement*

PRE-2000 INDUSTRIAL · OLDER WAREHOUSES · AGRICULTURAL

Corrugated cement sheets with chrysotile/crocidolite fibre reinforcement. Pre-2000 stock. Special handling under CAR 2012.

MOUNTING **Non-penetrating** only. Over-purlin rail systems bridging the sheet (Renusol AlphaSet, K2 ZP Insertion). Never fastening through the sheet.

SURVEY Drone first to limit on-roof exposure. On-site under CAR 2012 plan with HSE Asbestos Management Survey on file.

RISK Asbestos fibre disturbance. Sheet fragility under foot traffic. HSE Asbestos Licence required for any disturbance. Mitigation: walkway boards + RAMS.

STANDARDS CAR 2012 · HSE Asbestos Licence · BS EN 1991-1-4

06 Composite / *insulated panel*

MODERN INDUSTRIAL · COLD STORAGE · ARCHITECTURAL

Factory-bonded metal/insulation/metal sandwich panels (PIR, PUR, mineral wool core). Thermal-performance roofs.

MOUNTING **Penetrating** with insulated fixing kit (collar bushings to avoid thermal bridge) or **seam clamps** where compatible with the panel profile.

SURVEY Drone + on-site with panel manufacturer spec to verify thermal envelope continuity at fixing positions.

RISK Thermal bridging cold-spot condensation. Panel core delamination at over-tight fixings. Mitigation: torque-limited fixing + dewpoint check.

STANDARDS BS EN 1991-1-4 · Panel manufacturer spec · Building Regs Part L

07 Concrete slab *with waterproofing*

CIVIC · HOSPITALS · MULTI-STOREY · SCHOOLS

Reinforced concrete slab finished with liquid-applied or torch-on waterproofing. Inverted or warm-roof build-up common.

MOUNTING **All options viable:** ballasted, mechanically fixed, or chemical-anchored to slab subject to spare load capacity. Slab capacity is typically the binding constraint.

SURVEY On-site essential to verify slab spans, reinforcement layout (cover meter + as-builts), and waterproofing condition.

RISK Slab dead-load utilisation exceeded by PV + ballast. Waterproofing penetration detail at fixings. Mitigation: per-fixing flashing + spare capacity check.

STANDARDS BS EN 1991-1-4 · BS EN 1992-1-1 · Building Regs Approved Doc A

08 Clay or concrete *tile*

HERITAGE · OFFICE CONVERSION · SOME RETAIL

Pitched roof with clay or concrete interlocking tiles on battens. Less common in commercial PV; heritage-sensitive substrate.

MOUNTING **Penetrating** hook fixings to rafters or purlins through the batten. Tile interface sealed to maintain weathertight integrity. In-plane mounting only.

SURVEY On-site walkover to assess rafter spacing, tile condition, batten integrity, and underlay membrane.

RISK Rafter spacing capacity exceeded. Tile breakage during install. Listed building consent on heritage assets. Mitigation: rafter strengthening + planning check.

STANDARDS BS EN 1991-1-4 · BS 5534 · Building Regs Approved Doc A