



TECHNICAL BRIEF | #2011-05

“Original State” of Concrete / Clay Roof Tile Being Shipped from a Manufacturing Facility

Broken roof tiles are only considered a manufacturing defect when damaged during extrusion and prior to curing the concrete or firing the clay as part of the overall manufacturing process. These types of cracks or breaks are easily distinguished from breaks or cracks made after concrete tile has been cured or clay tile has been fired. In what are often called “wet” breaks before a concrete tile is cured, aggregate or sand in the mix will not be fractured as it will in a broken cured tile. The process is similar in clay tile that has not been fired. Once the concrete product is cured or the clay tile has been fired, it is a finished product. At this point, damaged products are rejected via the required formal quality control protocols at all manufacturing facilities. This would include “chips” in slurry colored tile that typically would be rejected prior to shipping from the plant, but certainly prior to installation by a qualified contractor who provides the final inspection for damage that may have occurred during shipping and loading. Any tiles that are damaged subsequent to curing are due to severe impact or force, mishandling, improper installation, misuse or improper foot traffic.

Severe impacts, point loading or forces, such as a tree branch or a heavy tool dropped onto a roof, can crack, chip or break roof tiles. While roof tiles are designed to perform well in hail regions, they may be damaged from their original manufactured state in severe hail storms producing hail stones larger than 2" in diameter. Roof tiles are tested in the range of a 1.25" to 2" ice ball impact in accordance with FM 4473 Impact Testing Standard. Roof tile products of each manufacturer that are tested are then rated in classes ranging from 1 to 4 based on their performance per the FM 4473 Impact Testing Standard. All tiles must pass the code-required physical property testing prior to tile installation, insuring the tiles will perform in accordance with the code requirements in that particular jurisdiction.

The specific cause of the tile breakage is often not accurately determined with the limited field data available when a claims manager does a quick visual site visit. The high kinetic energy of the hail impact on the lower corner of the roof tile can cause a point load break or crack at the over lock corner. This is not a manufacturing defect of the product, but a point-loading impact that has occurred in a concentrated area. In field evaluation, the trained professional should be able to identify if the break is a fresh break that has occurred during the recent event, or if it was an older crack. Some signs may be aggregate fracture, dirt accumulation, aging of the exposed aggregate material, or presence of moss, algae or other growth. Included in the tile manufacturers ICC-ES product approval is the instruction that “cracked or broken tiles must not be installed or allowed to remain on the roof.” Manufacturers’ preference is that all damaged tiles be replaced.

Is there a limit as to how large a chip can be before it affects the integrity of the roof? Please refer to the workmanship standards of the appropriate state where your roof system is installed along with the TRI Alliance. Certain states such as Arizona ROC state that a tile with a chip greater than the size of a quarter must be replaced. If the tile is cracked, chipped or broken across the face of the tile in either direction, it should be replaced.

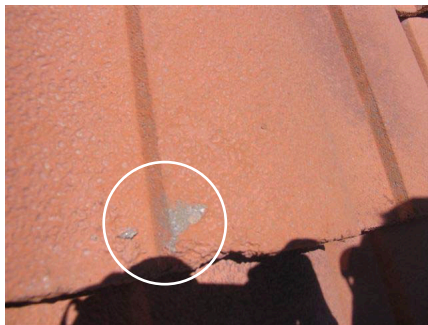
During hail events, damage to tile can occur in numerous forms. It can produce visible cracks at overlaps, produce chips at the perimeter edges of the nose of the tiles, create blowout on the backside that will appear as holes and create surface cracking from the impact of the hail stones that are not uniform in geometry and often have pointed crystalline designs moving at terminal velocity upon impact to the roofing surface.

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Picture of hail damage creating blow out



Pictures of chipping to edge of slurry-coated tile



For more information on tile roofing, please visit our website at tileroofing.org or email info@tileroofing.org for specific inquiries.