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BRICK CLAYS OF AUSTRIA - MINERALOGICAL AND GRAIN-SIZE CHARACTERISTICS

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According to Austrian mining data, approximately 1.9 million tonnes of clay raw materials were mined in 2015 [1]. Currently, 55 clay pits are in operation and supply 25 brickworks. The material produced is used primarily for rising back-up masonry, roofing tiles, clinker bricks, and in the production of expanded clay. The economically important clay raw materials are extremely varied and widely distributed. In terms of age, they range from Palaeogene and Neogene to late Holocene. The genetic classification shows marine, brackish, limnic or aeolian sediments in all stages of weathering.

Clay deposits from the Quarternary period are found all over Austria. In Tirol, Vorarlberg, Salzburg and parts of Carinthia, post- and late glacial lake deposits are the only source of brick clays. In Upper and Lower Austria and in Styria, Pleistocene eolian deposits, such as loess and loamy loess still have considerable economic importance, even though they were much more widely used in the past.

Sediments from the Paleogene and Neogene are by far the chief and most important sources of raw material for all kinds of bricks. The clay pits are concentrated mainly in the Austrian MolasseZone, an Alpine foreland basin extending between the Bohemian Massif in the north and the Alpine front in the south. Other important resources are found in the Vienna Basin, and in the Styrian and other associated intramontane basins.

In Upper Austria, the Austrian federal state with the largest number of brickworks, the marine pelitic sediments from the Ottnangian period are the most important source of raw material. The silt content is relatively high and the clay content quite low. The bulk mineralogy is characterized by high carbonate content. When finely and homogenously distributed, the carbonates have a favourable influence on the firing behaviour. However, they also have a determining influence on the fired colour of the brick, and it is only possible to obtain the traditional brick-red colour with an admixture of Quaternary loam. The clay mineral assemblage is characterized by the absence of kaolinite. In addition to traces of chlorite, the predominant clay minerals are smectite and muscovite/illite.

In Lower Austrianorth of the Danube, marine pelitic sediments from the Karpatian periodwith little variation in mineralogy and grain-size distribution offer the best conditions for consistent brick qualities. The bulk mineralogy consists of carbonates und high amounts of phyllosilicates. The clay mineral assemblage is dominated by smectite followed by illite/muscovite, kaolinite and chlorite. South of Vienna, in the Vienna Basin, where the centre of the Austrian brick industry started to develop 150 years ago, a brackish to limnic sequence of clayey silty sediments of Pannonian age is still extensively exploited.

In Burgenland, the so-called “Stoober Tone” have been used for centuries as an important raw material for pottery. Today, these kaolinitic, early-sintering silty clays fromthe Late Miocene Period are also widely used for roof tile production.

In Styria, the brick clays in use show greater variation. For example, Pliocene to Lower Pleistocene maar lake sediments and Late Miocene limnic-deltaic sediments are used in the production of lightweight expanded clays.

Bulk rock composition, clay mineralogy and grain-size analyses -- including geological information --onAustrian clay deposits that are currently or have been exploited in the past are stored in a digital database maintained by the Geological Survey of Austria. An overview of petrographic characteristics is represented in order to illustrate the diversity of Austrian brick clays and their common characteristics.

[1] Bundesministerium für Wissenschaft, Forschung und Wirtschaft (2016): Österreichisches Montan-Handbuch Bergbau Rohstoffe Grundstoffe Energie. - p. 280, Vienna.