



PREPARATION OF RAW MATERIALS AND SHAPING OF CERAMIC TILES

INTRODUCTION: RAW MATERIALS FOR THE PRODUCTION OF CERAMIC TILES

Mariano Paganelli

FIRST PART: RAW MATERIALS PREPARATION

Chapter 1. BODY FORMULATION AND GRINDING: GENERAL PRINCIPLES

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3. Grinding: general principles
 - 3.0 General
 - 3.1 Specific surface area
 - 3.2 The reason for grinding
 - 3.3 Determining the threshold dimension
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 - a) Impact
 - b) Crushing
 - c) Shearing
 - d) Chemical/physical action
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 - 1.1 Variability of raw materials
 - 1.2 Ageing
 - 1.3 First screening
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 - 2.1 Purpose
 - 2.2 Jaw crusher
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 - 2.5 Pan mill
 - 2.6 Blade type lump crusher
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 - 1.1 Pendular mill
 - 1.2 Vertical roller mill
 - 1.3 Rotating pin mill
 - 1.4 Hammer mill
 - 1.5 Peg mill
 - 1.6 Projection mill
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 - 2.2 Speed of rotation
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 - 2.4 Grinding media
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 - 2.6 The internal mill lining
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- 2.2 Granulator
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 - 3.1 Particle size distribution
 - 3.2 Cumulative particle size curve
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 - 3.5 Weighing belt feeders
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- 2. Preparation defects
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 - 2.3 Non-uniform powder
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 - 2.6 Presence of lumps
 - 2.7 Powder contamination

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 - 3.1 Blockage of conveyor systems
 - 3.2 Losses of powder during transport
 - 3.3 Powder segregation
 - 3.4 Loss of flowability (crushing of particles)
 - 3.5 Abrasion

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 - 2.1 Particle size distribution check
 - 2.2 Residue check
 - 2.3 Apparent density check
 - 2.4 Particle shape check
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 - 3.1 Moisture check
 - 3.2 Flowability check
 - 3.3 Pressing test

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Appendix B. Comparison between the various grinding processes

Appendix C. Consumptions and energy savings

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 - 1.1 Dry grinding
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 - 1.3 Savings
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 - 3.3 Start-up/shutdown
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 - 2.2 Typical defects
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 - 1.1 Effects of specific pressure on density
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 - 1.3 Influence of moisture content of powders
 - 1.4 Specific pressure: optimal value
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 - 6.1 Cavity filling
 - 6.1.1 Movement of carriage
 - 6.1.2 Filling
 - 6.1.3 Punch descent
 - 6.2 First pressing
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 - 6.4 Second pressing
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 - 1 – Base plate
 - 2 – Mould punch or ejector block
 - 3 – Lower punches
 - 4 – Die box
 - 5 – Upper punch
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5. Determination of permeability
 - 5.1 Determination of pore distribution
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 - 2.1 Lamination
 - 2.2 Non-uniform compactness (density)
 - 2.3 Excessive expansion
 - 2.4 Cracks/fractures
 - 2.5 Fettle
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 - 3.1 Extraction cracks
 - 3.2 Lamination
 - 3.3 Black core
 - 3.4 Dimensional defects
 - 3.5 Stains
4. Problems
 - 4.1 Fall of fettle
 - 4.2 Dirt on mould

Chapter 6. SPECIAL APPLICATIONS

1. Pressing of pieces of non-uniform thickness
 - 1.1 Trim pieces (bullnose, steps, corners, etc.)
2. Relief
3. Double filling
4. Advanced aesthetic effects obtained at the press
 - 4.1 Through-body decoration (entire thickness of tile)
 - 4.2 Surface thickness decoration
 - 4.3 Decal decoration
 - 4.4 Surface decoration / glazing (decoration pressing)
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1. The hydraulic press
 - 1.1 Press body or frame
 - 1.2 Pressing unit
 - 1.3 Demoulding unit
 - 1.4 Hydraulic power unit
 - 1.5 Electrical command and control panel

- 2. Powder feeding carriage
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 - 3.5 Press collector

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APPENDICES

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- a) Gravity filling by simple feeder
 - b) Gravity filling by long feeder carriage
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- Forces acting on powder during movement of carriage

Appendix H. Distribution of internal stresses during pressing

Appendix I. Pores and degassing

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- Coefficients of friction on steel
- Coefficients of internal friction and angles of rest