

Plastics Division
ISO 9001:2008

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Design Guideline for Ceramics (Compression-Molded)

General

1. Technical Ceramics should be designed with a configuration as simple and regular as possible.
2. Round parts have a lower tooling expense than other shapes.
3. Avoid undercuts that require split molds.
4. Avoid large variations in thickness of cross-sections. Chamfers on corners and edges reduce chipping during de-scaling and enhance appearance.
5. Remember that all parting lines (around part periphery and holes) have scale that requires removal prior to firing.
6. The addition of glaze (ceramic coating) improves appearance and aids in cleaning of surfaces. The use of glaze also retards the speed in which moisture is absorbed into the ceramic part.

Cross-Sections

Try to maintain uniform wall sections to reduce the potential of cracking during the drying/firing process. Inconsistent wall sections will result in cracking of parts, thus increasing the amount of scrap and cost.

Vertical Projections

The higher the wall section, the thicker the section must be to properly support ejection from the mold. Allow for 2° of draft on internal walls. External walls of parts can be straight (no draft).

Holes/Counterbores

Keep holes to a minimum of 0.060". Thru-holes do not require draft. Blind holes need 2° draft (1° minimum). Avoid rectangular or oval holes due to machining requirements for spares. Oval holes can be used with success to offset shrinkage concern where mounting holes are critical.

Grinding

Where part thickness/flatness is critical, small grinding pads can be added as stock to be ground. This feature requires a secondary operation and will add to the cost of the part.

Tolerances:

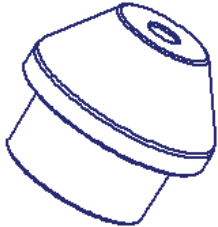
Take care in ensuring that tolerances are developed for functional performance of the part. Ceramic tolerances need to be designed as liberal as possible and if accomplished will yield a lower-cost part.

Standard Tolerances:

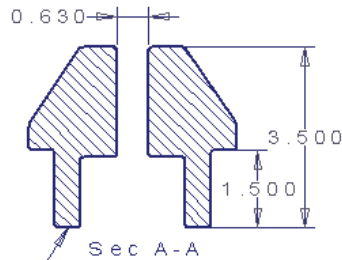
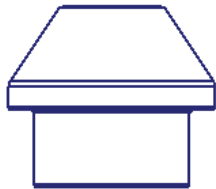
Pressed ware: +/- .015" per inch, minimum of +/- .015", add +/- .005" for each glazed surface, add +/- .031 for pressing dimensions.
 Injection molding: Divide the above tolerances by a factor of three, for example use +/- .005" per inch.

Tolerancing Example:

Tolerancing Example for a Compression Molded Glazed Porcelain Insulator



Diameter Spec: 0.630"
 Tolerance Calculation:
 .015 minimum: .015
 Two Glazed Surfaces: .010
 Total Tolerance = +/- .025
 Min and Max are: 0.605" to 0.655"



Overall Height Spec: 3.500"
 Tolerance Calculation:
 .015 x 3.500 = .053
 Pressing Dimension: .032
 One Glazed Surface: .005
 Total Tolerance = +/- .090
 Min and Max are: 3.410" to 3.590"

Glaze on all surfaces
 except bottom

Height Spec Below Parting Line: 1.500"
 Tolerance Calculation:
 .015 x 1.500 = .023
 One Glazed Surface: .005
 Total Tolerance = +/- .028
 Min and Max are: 1.472" to 1.528"