Gate Insert Manufacturing and Inspection

Reference

HUSKY®

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Original Instructions

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This product manual is intended to provide information for safe operation and/or maintenance. Husky reserves the right to make changes to products in an effort to continually improve the product features and/or performance. These changes may result in different and/or additional safety measures that are communicated to customers through bulletins as changes occur.

Recommendations for Manufacturing and Inspecting Gate Inserts

This document describes the preferred methods for manufacturing and inspecting gate inserts for valve gate plunger shutoffs. Critical features of the gate inserts, including tolerances, are defined on the gate detail drawing(s) provided.

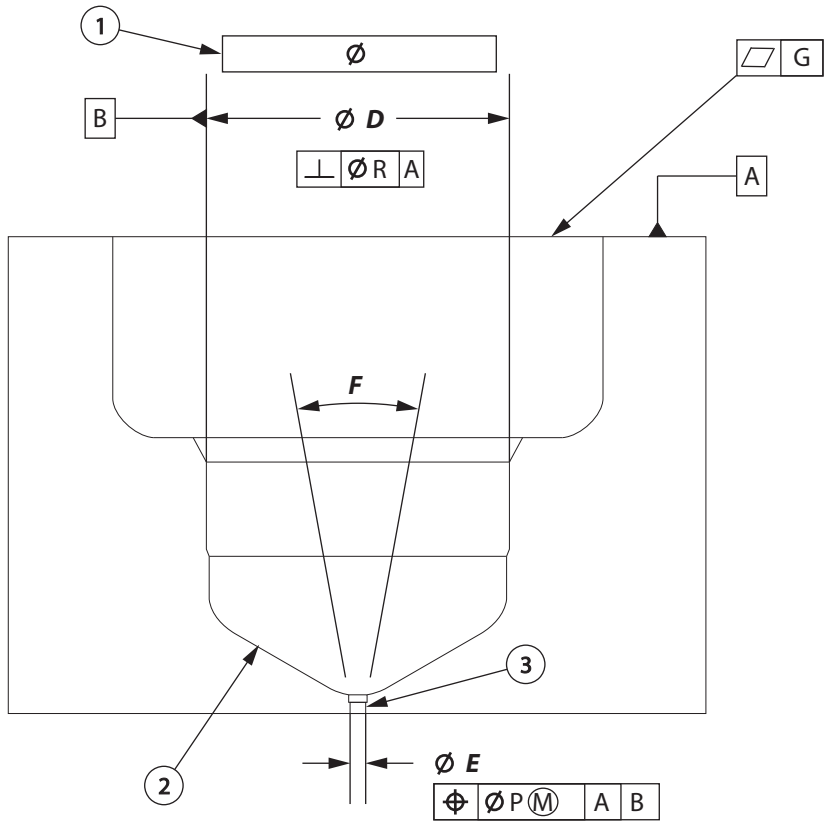

Figure 1-1 Gate Detail Drawing (Example)

1. Nozzle Seal **2.** Gate Bubble **3.** Gate Land

NOTE: The job specific gate detail drawing provides the required tolerances.

IMPORTANT!

Contact Husky with any questions related to gate insert manufacturing and inspection.

Manufacturing Requirements

Gate inserts must meet the following manufacturing requirements:

- Always machine the seal diameter (Ø D) and the gate diameter (Ø E) in one setup to achieve the required position tolerance between the diameters. Finish the lead-in angle (F) on this setup as well.

  One method of machining the gate diameter (Ø E) is jig grinding.

  NOTE: Best results have been achieved using sintered grinding pins and a low grinding pressure over this diameter.

  NOTE: Using the wrong tooling and/or a high grinding pressure can cause a trumpet shaped Gate Land. This trumpet shape can cause crowning on the plastic part and can cause premature wear of the gate and valve stem.
- A smooth surface quality on the seal diameter (Ø D), gate diameter (Ø E) and lead-in angle (F) is required to avoid wear of the valve stem and the nozzle tip seal ring. The surface quality should be ≤ Ra0.4 (Rz 2.5).
- The seal diameter (Ø D) and gate diameter (Ø E) must be perpendicular to Datum A to maintain the service life of the hot runner nozzle stack components and gate/cavity inserts.

Inspecting Gate Details

To inspect a gate detail, do the following:

1. Clean the gate insert fully with isopropyl alcohol applied by cotton swabs.
   a. Make sure there is no plastic or other residues in the bubble.
   b. Pass a pin that is 10 - 20 microns smaller than the gate to clear it.
   c. Blow compressed air through the gate insert.

   NOTE: All measurements must be taken at room temperature.
2. Let the gate insert/cavity plate sit long enough to reach room temperature (20 °C or 68 °F).
3. Taking measurements for Datum A and B:
   a. Datum A is used as a spatial alignment and a Z Origin.
   b. Datum B at one level is used as the X and Y Origin (not the cylinder axis).
4. Mount the gate insert/cavity in such a way that the probing head of the CMM (Coordinate Measuring Machine) does not need to rotate to reach the seal diameter (Ø D) and gate diameter (Ø E). Such a rotation could lead to significant angular deviations and erroneous results.

   The mounting block should have a clearance hole past the gate so the probe may fully measure the Gate Land.

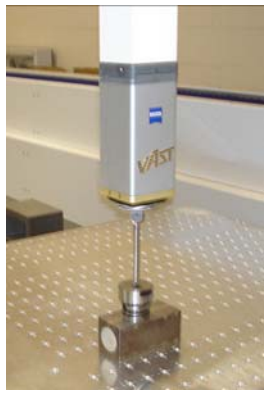

Figure 1-2 CMM Setup

Figure 1-3 Zeiss VAST Sensor Head

1. 4 Probing Head

5. Measure the flatness (G) of Datum A. The flatness (G) tolerance is 0.005 mm (0.0002 in).

6. Measure the size, perpendicularity (R) and roundness of the seal diameter (Ø D) as follows:

NOTE: The perpendicularity (R) tolerance is 0.01 mm (0.0004 in).

a. Inspect the seal diameter (Ø D) feature at three different heights over its length. Start measurement at 0.5 mm (0.002 in) from the chamfer's end. Depending on size of its chamfer, take the 2nd and 3rd height measurements 2.5 mm (0.1 in) further along.

NOTE: 1000 points are taken with filters and outliers on. The preferred method of measurement is scanning (continuous probing). If the scanning method is not available, inspect the feature by probing a minimum of 30 points at each height.

b. Measure the seal diameter (Ø D) feature size using the following CMM (Coordinate Measuring Machine) algorithm.

NOTE: The Gaussian Least Squares (GLS) algorithm is recommended.

7. Measure the size, position (P) and roundness of the gate diameter (Ø E) as follows:

NOTE: The position (P) tolerance is 0.01 mm (0.0004 in) at the maximum material condition.

a. Measure the insert prior to inspection with a height gage. The distance from the top of the insert (Datum A) to the bottom of the gate. This is to ensure the CMM probe goes deep enough and can measure very close to the “sharp” or end of the gate.

b. Take measurements every 0.050mm (0.002in) starting at 0.005mm (0.0002in) above the "sharp" feature to 0.200mm (0.008in) past the Gate Land into the gate. Example: For a typical 0.400mm (0.016in) Gate Land length, take 7 measurements on the cylindrical face (Land) with three additional measurements on the conical face.

NOTE: The Gaussian Least Squares (GLS) algorithm is recommended.