

Composite Profile Tolerance

Where a pattern of surfaces requires their location tolerance to be larger than their orientation tolerance to a datum reference frame, a composite profile tolerance is specified. The composite profile tolerance may also be used to refine the spacing or alignment tolerance between surfaces within a pattern, as well as their form and size (if applicable). This section introduces how to specify multiple levels of controls using composite profile tolerances.

Composite profile tolerances look similar to multiple single-segment profile tolerances, but they have different interpretations and requirements. Composite profile tolerances are a complex topic and are only introduced in this text.

A **composite profile tolerance** is a feature control frame that contains a single entry of a profile symbol that is applicable to all horizontal segments of the feature control frame. A composite profile tolerance may have more than two horizontal segments, each with rules for how to specify the tolerance value, modifiers, and datums. See Figure 27-9.

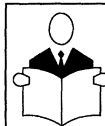
A composite profile tolerance can only be applied to patterns of surfaces. Each segment creates different requirements for allowable deviations in location, orientation, and/or spacing or alignment, size, and form of the pattern. The uppermost segment is the pattern-locating control. It specifies a location tolerance for the pattern of surfaces relative to the datums references specified. Depending upon the datums referenced, the uppermost segment can constrain translation and rotational degrees of freedom.

The lower segments cannot control location, they can only constrain rotational degrees of freedom. Therefore, the lower segments can only control orientation, spacing or alignment, size and form of the surfaces in a pattern.

If datum references are not specified in a lower segment, the segment can only control size and form, in addition to spacing or alignment between surfaces in the pattern.

A major difference between multiple single-segment and composite profile tolerances is shown below:

- In a multiple single-segment profile tolerance, each segment can constrain translational and rotational degrees of freedom.
- In a composite profile tolerance, only the uppermost segment can constrain translational and rotational degrees of freedom. The lower segments can only control rotational degrees of freedom.



Author's Comment

This text only introduces the topic of composite profile tolerances. To learn about the requirements and limitations of composite profile tolerances see ETI's *Advanced Concepts of GD&T*.

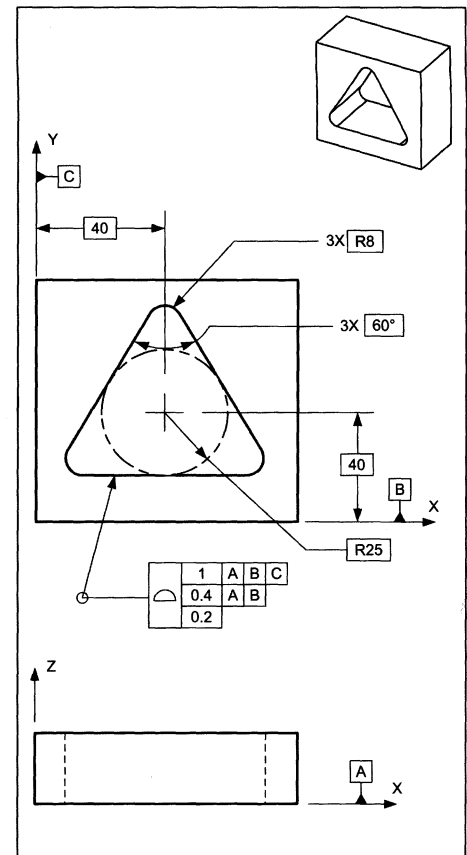


FIGURE 27-9 Composite Profile Tolerance

Composite Profile Tolerance Interpretation

In Figure 27-10, the uppermost segment of the composite profile tolerance controls the location of the hole (the pattern of surfaces). The middle segment only controls the orientation of the hole to datums A and B (not location). The bottom segment controls the size and form of the hole.

Notice that when verifying the middle segment, only the rotational degrees of freedom are constrained relative datums A and B. Simply put, the basic dimensions relative to the datums do not apply to the middle segment.

Each segment of the composite feature control frame represents a separate requirement of a multiple interrelated requirement. The actual surface of the part must be within each of the profile tolerance zones.