

Blue Etch Anodize – Indication Types

Blue etch anodize (BEA) is used on titanium parts to detect various forms of flaw conditions. Examples of these conditions are discussed below. Note that BEA indications in many cases look the same to the untrained eye. An experienced Level II or III inspector is necessary to make the correct call.

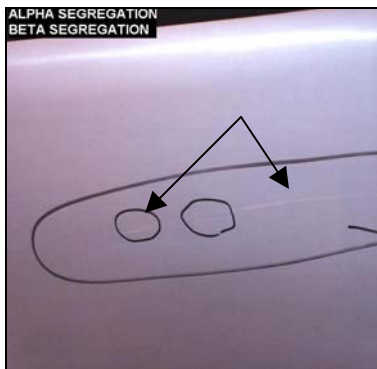
Alpha Case – This type of indication is a thin Alpha enriched layer caused by exposure to oxygen during heat treating conditions. It typically shows up as a non-linear cluster (i.e., a spot). In severe situations it looks like a burned surface overall.

Alpha Segregation – (a.k.a., Aluminum Stabilized Alpha Segregation) This type of flaw condition is seen as a dark line or area on the part's surface. Unlike Alpha Case, it can be the "tip of the iceberg" being a small indication of a much more widespread condition within the volume of the part.



Alpha Segregation on Disk

Beta Segregation – (a.k.a., Vanadium Stabilized Beta Segregation); This type of flaw is seen as a white line or area on the part's surface.



Beta Segregation (white line)

Note that it is also not unusual to see Beta Segregations in close proximity to Alpha Segregations as they are opposite conditions (i.e., Alpha poor and rich, respectively).



Severe Alpha Segregation on Blade

Overheat Condition - Shows up as an overall clustered, crystallized area on the part.

Grinding or Polishing Burn – A localized situation of overheating.



Burn on Blade Root

Inclusions – A foreign material in the part. To be seen by BEA, it must be exposed to the part's surface.



Inclusion on Blade Leading Edge

Lap – (a.k.a., Forge Lap) This type of indication normally follows a geometry of the part. As a result, laps are typically linear.

Spark Impingement – A secondary defect condition caused during machining or grinding. It occurs when a chip or particle comes off the part but inadvertently bounces back onto the part and re-melts to its surface.

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