

# Recommendation for dealing with „Non functional pads“ (Implementation subject to customer/supplier agreement)

## Objective:

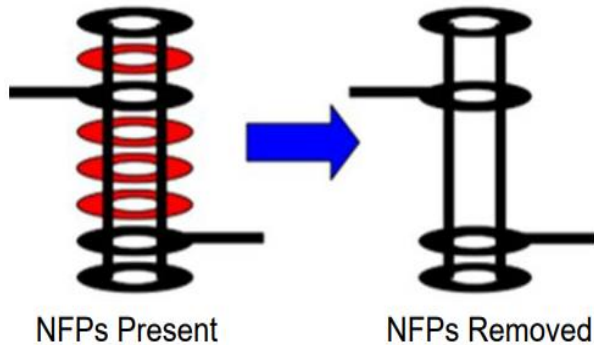
- Decision support for removing or not removing or adding non-functional pads.

## Methods:

- Technical explanations for background
- Identify the advantages and disadvantages of each course of action

## What are non-functional-pads?

- Definition: Annular rings on inner layers without connection or function



(Source: AK QuLP)

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## Recommendation:

- From a technical point of view, there are both advantages and disadvantages to the existence of NFP.
- Removal of NFP must be agreed between customer and supplier (AABUS)

<b>Pro</b> Removal of non functional pads	<b>Contra</b> Removal of non functional pads
Lower wear of tools due to less drilled copper.	Less anchoring/ stabilization of the copper barrel, lower via pull strength (especially with rigid-flex LP).
More space in high density interconnect design.	Reduced heat dissipation from the copper barrel
Avoids break-out of too small designed annular rings	Inhomogeneous Cu distribution for inner layer structuring, lamination process and electro plating of the via.
Avoids impedance reflections at radar signals	

- **The decision to remove/partially remove or add Non Functional Pads can not be given in a blanket manner, but also depends on:**
  - **Layer count**
  - **Copper thickness of the inner layers**
  - **Application of the PCBA**
  - **Following process steps like e.g. via plugging**

(see also „IPC-222x Series Design Recommendations“)