Backfeed in a 4-pair context v103

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Backfeed requirement

"When any voltage in the range of 0 V to V_{Port_PD-2P} max is applied across the PI at either polarity specified on the conductors of either Mode A or Mode B according to Table 145–20, the voltage measured across the PI for the other Mode with a 100 kΩ load resistor connected across that other Mode shall not exceed V_{bfd} as defined in Table 145–29."

0 to 57 V (+ / −)   Mode A

must be less than 2.8 V over this R

100 kΩ   Mode B

PD

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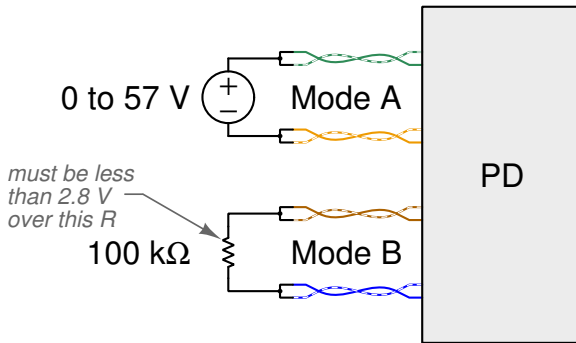
Purpose of backfeed specification

The purpose of the backfeed specification historically is to prevent a PD, powered in 2-pair mode, from producing a voltage / power level on the unpowered Mode, which is also connected to the PSE and potentially damaging the PSE.

But how does the backfeed specification translate to 3-pair and 4-pair situations ?

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4-pair backfeed

A 4-pair capable PSE typically ties the positive lines together at the PSE end. Even in "2-pair" mode, there are two pairs connected to the positive V_{PSE}. **Does the backfeed requirement still apply? Should it?**

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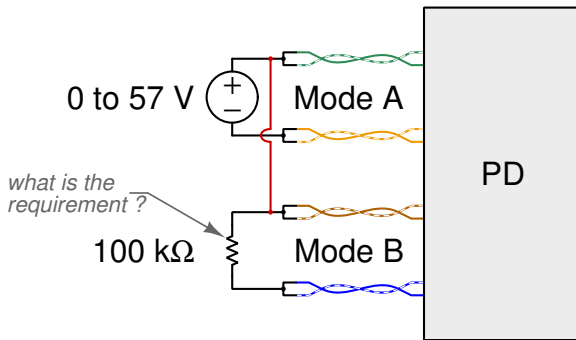
Ambiguity current text

The current text is ambiguous as to whether the condition of two positive pairs is one where backfeeding is limited to V_{bfd}. The intent of the text did not anticipate more than 2 pairs being powered (as this is old text), but it does not clearly exclude it, since connecting one pair of a Mode to a supply rail does not constitute "applying a voltage".

We must choose to either include or exclude this configuration from the backfeed spec and change the requirement accordingly.

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Reasons to **include** $2\times$ positive in backfeed

- ► How sure are we there are no issues with allowing 3P backfeed?
- ► Prevent rectifier designs that are OK for single-signature but are incompatible with dual-signature (confusion, design fails)

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Reasons to **exclude** $2 \times$ positive in backfeed

- ► Severely complicates active bridge design
- ► Existing devices already exhibit backfeeding under these conditions, PSEs will need to deal with it anyway
- ► Backfeed is only possible under 3-pair conditions, which means a PD connected to a 4-pair PSE which is capable of handling the backfeed

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Text change for **inclusion**

Change 145.3.8.8 as follows:

When any voltage in the range of 0 V to V_{Port_PD-2P} max is applied ~~across the PI at either polarity specified on the conductors of either Mode A or Mode B according to Table 145–20~~ per any of the valid 2-pair configurations listed in Table 145–20, the voltage measured ~~across the PI for~~ on the other Mode with ~~a~~ any ~~100 kΩ load resistor~~ resistance of 0 to 100 kΩ connected across that other Mode shall not exceed V_{bfd} and I_{bfd} as defined in Table 145–29.

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Text change for **exclusion**

Change 145.3.8.8 as follows:

When any voltage in the range of 0 V to V_{Port_PD-2P} max is applied ~~across the PI at either polarity specified on the conductors of either Mode A or Mode B according to Table 145–20~~ per any of the valid 2-pair configurations with one and only one pair connected to positive V_{PSE} listed in Table 145–20, the voltage measured ~~across the PI for~~ on the other Mode with ~~a~~ any ~~100 kΩ load resistor~~ resistance of 0 to 100 kΩ connected across that other Mode shall not exceed V_{bfd} and I_{bfd} as defined in Table 145–29.

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I_{bfd} text

Add new item to Table 145–16 as follows:

Parameter: Backfeed current

Symbol: I_{bfd}

Unit: μA

Min: —

Max: 28

Add. inf: See 145.3.8.8

Limiting the backfeed current prevents a PD from backfeeding large amounts of current into low resistances on the "other Mode".

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Recommendation

Without strong indication of technical issues caused by 3-pair backfeeding, there is no reason to impose a hard to meet requirement on the PD. As such, we should adopt the "exclusion" baseline on slide 9 and 10.

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