Suggested Remedy for comment #183 and 184

Changes from the original Draft0.9 text are marked with RED color.
Deletions are marked with ~~Strikethrough.~~
Notes to the group or to the Editor are Italic

Make the following changes at the subclasses below:

1. Table 33-12 Item 1

Change Item 1 to be:

Item	Parameter	Symbol	Unit	Min	Max	Applicable PD Type	Additional Information
1	Input Voltage during overload per item 4	Vport	Vdc	36	57	1	See 33.3.5.1
1a	Input Voltage during normal load per item 5			37	57	1	
1b	Input Voltage during PD overload per item 4			39.713	57	2	
1c	Input Voltage during PSE voltage transient per Table 33-5 item 2a			36	57	2	
1d	Input Voltage during normal load per item 5			41	57	2	

2. Table 33-12 item 4: Change symbol from "Iport" to "Iport_peak"
3. Table 33-12 item 4: Replace TBD for Type 2 PD with "0.823" *(Scan all "0.82" and replace with "0.823" (=0.4/0.35) or leave "0.82" and change ration to 1.139 instead of 1.143 for Class 4 only)*
(See below that 33.3.5.4 was updated to reflect the dependence of Ipeak with Pclass and Vport.)

4. Make the following changes in 33.3.5.4 Peak operating current.

"At any operating condition the peak current shall not exceed ~~PPort max/VPort~~ Iport_peak as defined by Table 33-12 item 4 for more than 50ms max and 5% duty cycle max.

Iport_peak is defined by $Iport\_peak = Ki_{class} \cdot Iport \cdot = \frac{Iport\_peak\_\max}{Iport\_avg\_\max} \cdot Iport$

Iport is the average value of the port current during normal operation.

$Ki_{class} = \frac{Iport\_peak\_\max}{Iport\_avg\_\max}$ which is a constant for each classification power range.

Iport_peak_max is defined by Table 33-12 item 4.

Iport_avg_max is approximated by $Iport\_avg\_\max = \frac{Vpse\_\min - (Vpse\_\min^2 - 4 \cdot Ppd_{class\_\max} \cdot Rc)}{2 \cdot Rc}$

Vpse_min is the PSE port voltage, Vport, as defined by Table 33-5 item 1
Ppd_class_max is the upper value of the classification range as defined by Table 33-10.
Rc is the maximum channel loop resistance as defined in 33.3.5.2.

Iport_peak for any Pd power and PSE output voltage is approximated by $Iport\_peak = Ki_{class} \cdot \left[\frac{Vpse - (Vpse^2 - 4 \cdot Ppd_{class} \cdot Rc)}{2 \cdot Rc} \right]$

Ppd_class is any PD power level indicated by layer 1 or layer 2 classification method.
Table 33-12 item 4 defines Iport_peak max. for maximum class power at minimum PSE port voltage.
Iport_avg for any PSE port voltage specified in table 33-5 and any PD power level indicated by layer 1 or layer 2 classification method is approximated by $Iport\_avg = \frac{Vpse - (Vpse^2 - 4 \cdot Ppd_{class} \cdot Rc)}{2 \cdot Rc}$

The PD input voltage during normal operation as defined by Table 33-12 items 1a and 1d is approximated by

$Vport = \frac{Vpse + (Vpse^2 - 4 \cdot Ppd_{class} \cdot Rc)}{2}$ Or by $Vport = \frac{Ppd_{class}}{Iport\_avg}$

Informative Notes:

1. The values of Ipeak are determined by the specification according to design constrains such cable maximum current, design accuracy, PD dynamic load changes, PSE power supply costs and others. Once Ipeak is selected, Ki_class can be set and as a result, Iport_peak and Iport_avg for any PSE port voltage and PD power.
2. PD peak input power is defined by $Ppd\_peak = (Vpse - Iport\_peak \cdot Rc) \cdot Iport\_peak$

Modified Table 33-10

Class	Usage	Range of maximum average power used by the PD,	$Ki_{\_CLASS}$
0	Default, Type 1	0.44W to 12.95W	1.143
1	Type 1	0.44W to 3.84W	1.318
2	Type 1	3.84W to 6.49W	1.321
3	Type 1	6.49W to 12.95W	1.143
4	Type 2	12.95W to 29.5W	1.143

(Note for the group: Ki may be the same number for all classes i.e. 1.143=0.4/0.35 but in this case which is simplifying the specification a bit we need to allow higher average current than permitted by Iport_avg equation for class 1 and 2 for compensating the low efficiency of this cases. See presentation that explains it.

In this option the specification became simpler:

1. ***Ki is constant for any power level.***
2. ***The additional column in Table 33-10 can be removed.***
3. ***We need to allow ~1.321/1.143 more DC current at classes 1, 2 which is OK and not violating legacy devices. In addition this is actually what happens. In lower power the dc current is abit higher then predicted by the equation of Iport_avg due too low efficiency of the PD DC/DC.)***

4.1 Make the additional changes to 33.3.5.4 as follows:

Lines 8-13: Replace with:

The maximum IPort_dc and IPort_rms values for all operating VPort range shall be defined for Type 1 and Type 2 PDs by the Iport_avg equation above. *(Editor: To assign reference numbers for the equations e.g. Eq-1 , Eq-2 ETC.)*
~~the following equation: IPort_max [mA] =12950/VPort.~~

4.2 Delete lines 11 to 26.

5. Table 33-5 Item 8, Icut_max: Replace TBD with 0.82.
(See below that 33.2.8.6 was updated to reflect the dependence of Ipeak with Pclass and Vport.)

6. Change 33.2.8.4 to be:

33.2.8.4 Type 1 PSE max output current in normal powering mode at min output voltage

For VPort > 44 V, the minimum value for IPort_max in Table 33–5 shall be 15.4 W/VPort.

The current IPort_max ensures 15.4 W minimum output power for Class 0 and 3. For Iport_max at Class 1 and 2 see equations in 33.3.5.4.

The PSE shall support the following AC current waveform parameters:

~~a)~~ For Vport=44V: Ipeak = 0.4A minimum for 50ms minimum and 5% duty cycle minimum.

~~b)~~ For VPort > 44V:~~Ipeak=17.6W/Vport~~ Ipeak_max is defined by 33.3.5.4.

7. Change 33.2.8.4a to be:

Insert section 33.2.8.4a:

33.2.8.4a Type 2 PSE max output current in normal powering mode at min output voltage

For VPort > 50 V, the minimum value for IPort_max in Table 33–5 shall be 36 W/VPort.

The current IPort_max ensures 36 W min output power for Class 4. For Iport_max at lower power as a result of L2 PSE-PD negotiation or other additional information, see equations in 33.3.5.4.

The PSE shall support the following AC current waveform parameters:

~~a)~~ For Vport=50V: Ipeak = 0.82A minimum for 50ms minimum and 5% duty cycle minimum.

~~b)~~ For VPort > 50V:~~Ipeak=TBD W/Vport~~ Ipeak_max is defined by 33.3.5.4.

8. Change 33.2.8.6 to be:

33.2.8.6 Overload current detection range

If IPort in Table 33–5 exceeds ICUT for longer than Tovld, the PSE shall remove power from the PI. See Figure 33C.6.

In a PSE that supports a classification function (33.2.7 and/or 33.6.4), the minimum value of ICUT may optionally be as described by Ipeak_max equation in 33.3.5.4.

~~(P_class*1000/Vportmin,~~

~~where~~
~~*P_class* is the minimum power level at the output of the PSE (as specified by Table 33–3)~~

~~*Vportmin* is VPort min in Table 33–5~~