

## **Chiarimenti (Clarifications)**

### **Lista (List) #3**

**Tutti i chiarimenti sono riferiti al Lotto 2**

**(All the clarifications refer to Lot 2)**

### **Chiarimento (Clarification) #3.1**

#### **Domande (Questions):**

To define the DC capacitor bank, we need a design reference scenario of the kind: 'n' inverters (from a total of 3) with certain shape of current (sine, triangular), with a certain current peak value at a certain frequency, during a certain time.

We request the current wave form definition to be considered for the design of the protection coils.

#### **Risposta (Answer):**

According to Table 2, the required waveforms (scenarios) are arbitrary.

However, from Section 5.1 assumed conditions are:

The input power and the power ratings of the components shall be optimized to allow the simultaneous operation of all the output converters generating the 90% of their maximum current for the nominal duration of the PS operations. The maximum current shall be calculated for every possible interesting frequency, also considering the equivalent inductances and resistances and the scaling factors in Figure 4.

So, for the capacitor bank:

The reference scenarios are all the 3 "inverters" are producing 90% of their maximum current. This shall be analyzed producing a DC current and/or a sinewave at every possible frequency up to 10 Hz. For higher frequencies, the reductions in Figure 4 can be used for DIV1 and DIV3.

For the protection coils:

The functions of a single converter should be considered. The reference scenarios are:

1. 5000 A DC continuous.
2. A sinewave at maximum current at every possible frequency up to 10 Hz. For higher frequencies, the reductions in Figure 4 can be used for DIV1 and DIV3.

### **Chiarimento (Clarification) #3.2**

**Domanda (Question):**

Please confirm that the transformer type test in 12.6 (Short circuit, Temperature rise, Dielectric, harmonic detection, and noise measurement) are in the base scope of supply.

**Risposta (Answer):**

It is confirmed.

### **Chiarimento (Clarification) #3.3**

#### **Domanda (Question):**

The proposed topology by DTT includes one crowbar per inverter. According to the preliminary dimensions of figure 13, each inverter cabinet will have the crowbar inside it. Please confirm that one seismic test on one inverter cabinet is acceptable.

#### **Risposta (Answer):**

Only the crowbar (and its cabinet) is safety relevant and shall be tested for seismic qualification. In practice, this is a type test, so it shall be performed on a single unit if the other units are identical.

### **Chiarimento (Clarification) #3.4**

#### **Domanda (Question):**

Output voltage

According to our preliminary simulations, it seems that +/- 600 maximum output voltage is not sufficient for correctly following the 5 Hz sinusoidal current references for DiV3. The load values of L and R are :  $L=2.97\text{mH}$ ,  $R=28\text{m}\Omega$  + Inductance of the protection coil 1.6 mH ...

#### **Risposta (Answer):**

Some data you are using are different from those reported in the Technical Specifications.

Moreover:

1. The inductances in Figure 3 already include the inductance of the protection coil.
2. The resistive and inductive parts have a phase displacement.

### **Chiarimento (Clarification) #3.5**

#### **Domanda (Question):**

DiV1 inductance

The value of DIV inductance of table 2, 0.5mH doesn't match with the figure 3 (from 1.92 mH to 1.84 mH depending on the frequency). Please clarify.

#### **Risposta (Answer):**

Table 2 reports 3 different inductance values for the 3 coils, also reported in the table below.

As explained in Section 4.2:

1. Figure 3 includes the equivalent inductance and resistance of the load coils and the inductance of the protection coil in series.
2. The inductance and resistance values reported in Table 2 are the stand-alone values.

So, the values in Figure 3 for each coil are the sum of the values, as also summarized in the table below.

As explained in Section 4.2, the values at very low frequency (DC) slightly differ from the stand-alone values due to the coupling effects.

	DIV1	DIV2	DIV3
Load	0.5 mH	1.2 mH	1.7 mH
Protection coils	1.5 mH	0.6 mH	1.6 mH
Total	2 mH	1.8 mH	3.3 mH

### Chiarimento (Clarification) #3.6

#### Domanda (Question):

Layout.

#### Risposta (Answer):

The layout in Page 49 and in Figure 14 refers to NAS PS system (Lot 3). Do not consider them for DIV PS system.

For completeness, the below image shows the 3D view of the preliminary layout of the DIV PS system (expected in Figure 14).

