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Protocollo B8016554

Data 07/08/2018

**ABB S.P.A.**

Department EP, EPPC, PCGBF

Via Italia, 58

23846 GARBAGNATE MONASTERO LC

Att.: Mr. Pierceleste Benedetti

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**Subject : End of seismic tests**

**Y/Ref : Order ABB No. 4501319130 of 11/04/2018 - 0070008473**

We undersign CESI, structural testing laboratory in Italy, declare that:

- Unit 1: System pro E power switchboard, Dimensions [mm]: 2008 x 816 x 2214 (height), was submitted to the vibration and seismic tests from July 31<sup>st</sup> to August 2<sup>nd</sup> 2018 in our LPS laboratory in Seriate (BG – Italy).

Specimen was subjected at resonance frequencies search tests and Tri-Axial Multifrequency Seismic Tests, Freq. Range 1,00 ÷ 50,00 Hz with the following peak accelerations:

Tri-axial seismic tests at the following Required Response Spectrum and levels:

- Required Response Spectrum adopted on ABB indication envelop following spectra with damping at 5%: IEC 60068-2-57, IEEE Std 693<sup>TM</sup> – 2005 and YATAY;
- Five pulses at Seismic Level S1 (OBE) with ZPA at 0,345 g on horizontal directions and vertical direction;
- One pulse at Seismic Level S2 (SSE) with ZPA at 0,690 g on horizontal directions and vertical direction.

Reference doc. and Standards:

- Standard accredited: IEC 60068-2-57 (2013-04), Par, 8,1, 8,2, 8,3, 8,5 "Environmental testing Part 2-57: Test Ff: Vibration – Time-history and sine beat method";

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- IEEE Std 693™ – 2005: "IEEE Recommended Practice for Seismic Design of Substations" – ed, 8, May 2006;
- REQUIRED RESPONSE SPECTRA applicable to "YATAY" and "DIKEY" sites.
- Standard IEC Publication 60068-3-3, 1998: "Environmental testing. Part 3: Guidance seismic test methods for equipment".

During seismic tests we obtained on five pulses at Seismic Level S1 and on single pulse with Seismic Level S2:

- the required ZPA,
- the strong part > 25 s;
- the complete envelop (or in tolerance) of RRS by TRS in X, Y and Z axes (represented in log-log scale);
- at a visual inspection, no damages have been detected on tested Unit.

Results of further checks on the tested equipment is of ABB responsibility.

The obtained results will be described in the following CESI Test Report: B8016556.

Best Regards

  
CESI S.p.A.  
Testing & Certification Division