

ANSI/ESD S20.20-2014 – Explanation of Technical Revisions

By EOS/ESD Association

A five-year review of ANSI/ESD S20.20 was recently completed and the 2014 version was published in September 2014. The technical revisions are highlighted in this article. For a complimentary PDF copy of the new standard, and a comparison table of the 2007 version to the 2014 version, please go to www.esda.org.

The 2014 document scope now includes devices with withstand voltages greater than 100 volts HBM (no change), 200 volts Charge Device Model (CDM), and 35 volts on isolated conductors. Changes in the standard were made to support these additions to the scope. The 200 volts for CDM is for the induced CDM event by insulators. While some CDM control has always been implied in ANSI/ESD S20.20, the standard now explicitly states it in the scope. Changes in insulator control support the scope with the addition of controls within 1 inch of an ESD sensitive item. The 35 volts on isolated conductors acknowledges that all conductors may not be able to be grounded. There is a section added in ANSI/ESD S20.20 on the requirements for isolated conductors and what needs to be evaluated.

The tailoring section of the document, Section 6.3, has been clarified to address misconceptions that tailoring was required if anything changed from the requirements of ANSI/ESD S20.20. This was not the intention. The section now clearly states that tailoring is needed only if the requirements are deleted or revised to exceed the limits in ANSI/ESD S20.20. For example, the worksurface requirement of 0 to 1.0×10^9 ohms for point to point resistance does not need a tailoring statement if a company's internal control program document requires a point to point resistance between 1.0×10^5 to 1.0×10^9 ohms; these stated limits are within the ANSI/ESD S20.20 limits. If however, the point to point resistance in a company's internal control program document is between 1.0×10^5 and 1.0×10^{10} ohms, a tailoring statement is required because 1.0×10^{10} ohms is beyond the limit in ANSI/ESD S20.20.

A section on product qualification, Section 7.3, was added ANSI/ESD S20.20-2014 to emphasize the product qualification of ESD control items. The requirement to have ESD control items qualified was in the 2007 version but it was only in Tables 2 and 3. Product qualification is an important part of ANSI/ESD S20.20 because all ESD control items need to be qualified to the ESD standards that are listed in Tables 2 and 3. Typically, product qualification requires ESD control items to work in low humidity conditions. All qualification testing or testing done at environmental conditions that do not meet the referenced standards must be technically justified with a tailoring statement.

In the 2014 version a change was made to the qualification of flooring/footwear systems for grounding personnel. The 2007 version allowed for qualification based only on resistance if the total resistance was less than 3.5×10^7 ohms from a person's hand to ground. A walking test was required for resistance greater than 3.5×10^7 ohms and less than 1.0×10^9 ohms. The resistance method (Method 1) has been eliminated and the requirement is now both a resistance and walking test. There has been data presented at

various symposia that even with a total system resistance of 3.5×10^7 ohms, a person walking on the floor can generate sufficient voltage to exceed the 100 volt requirement. For comparison, both the 2007 and 2014 tables for personnel grounding are shown below.

2007 Personnel Grounding Table

Personnel Grounding Technical Requirement	Product Qualification ¹		Compliance Verification	
	Test Method	Required Limit(s)	Test Method	Required Limit(s)
Wrist Strap System ²	ANSI/ESD S1.1 (Section 5.11)	$< 3.5 \times 10^7$ ohms	ESD TR53 Wrist Strap Section	$< 3.5 \times 10^7$ ohms
Flooring / Footwear System – Method 1	ANSI/ESD STM97.1	$< 3.5 \times 10^7$ ohms	ESD TR53 Flooring Section	$< 3.5 \times 10^7$ ohms
			ESD TR53 Footwear Section	$< 3.5 \times 10^7$ ohms
Flooring / Footwear System – Method 2 (both required)	ANSI/ESD STM97.1	$< 10^9$ ohms	ESD TR53 Flooring Section	$< 1.0 \times 10^9$ ohms
	ANSI/ESD STM97.2	< 100 volts	ESD TR53 Footwear Section	$< 1.0 \times 10^9$ ohms

2014 Personnel Grounding Table

Technical Requirement	Product Qualification ⁽⁴⁾		Compliance Verification	
	Test Method(s)	Required Limit(s)	Test Method(s)	Required Limit(s)
Wrist Strap System	ANSI/ESD S1.1 (Section 6.11)	$< 3.5 \times 10^7$ ohms	ESD TR53 Wrist Strap Section	$< 3.5 \times 10^7$ ohms
Footwear / Flooring System ⁽⁵⁾ – (Both limits must be met)	ANSI/ESD STM97.1	$< 1.0 \times 10^9$ ohms	ESD TR53 Footwear Section	$< 1.0 \times 10^9$ ohms ⁽⁶⁾
	ANSI/ESD STM97.2	< 100 volts Peak	ESD TR53 Flooring Section	$< 1.0 \times 10^9$ ohms ⁽⁶⁾

In the 2007 version of ANSI/ESD S20.20 the requirement for process required insulators within 30 cm (12 in) of an ESD sensitive device is a field of no more than 2000 volts/in. In the 2014 version of the standard, there is a new requirement that process required insulators within 2.5 cm (1 in) of an ESD sensitive device have a field of no more than 125 volts/in. The change supports the addition of 200 volts CDM in the scope.

The 2007 version of ANSI/ESD S20.20 did not allow for any isolated conductors in an ESD control program and therefore, no requirements on isolated conductors was included in the document. There are situations where an isolated conductor must be in the ESD protected area (EPA). In the 2014 version of ANSI/ESD S20.20, isolated conductors are in the EPA cannot have more than 35 volts on the conductor. The measurement of isolated conductors requires either an electrostatic non-contacting voltmeter or a high impedance contacting voltmeter. A field meter alone cannot make this measurement on

very small conductors. This only applies to isolated conductors that are in the EPA and is a qualification requirement only.

Changes to Table 3 in the 2014 version include the following:

Ionization now has one offset limit instead of the two requirements in the 2007 version. The 2007 version has separate limits for room ionization and local ionization. The 2014 version now has only one limit. The intent of room ionization is mainly for cleanliness rather than ESD control. As such, it is not necessary to include room ionization in the ESD control plan unless it is expressly configured for ESD mitigation.

Electrical soldering/desoldering hand tools were also added as a requirement to Table 3. This is new to the 2014 version and was not in the 2007 version. Revisions have also been included in ANSI/ESD S13.1 and ESD TR53 to support the additions to the table.

Another addition to Table 3 is the requirement to check the wrist strap connection for non-continuous monitored wrist straps. This is the connection from where the wrist strap is plugged in to ground.

The requirements on packaging materials has not changed but there have been accounts of packaging materials used as worksurfaces, such as placing ESD sensitive parts on top of static shielding bags or static dissipative pink foams. A note has been added to the packaging section which says, "When ESDS items are placed on packaging materials and the ESDS items have work being performed on them, then the packaging materials become worksurfaces. The worksurface requirements for resistance to ground apply." This allows the use of packaging materials as long as they meet the requirements for worksurfaces and are tested as part of compliance verification.

The updates to ANSI/ESD S20.20 will be reflected in the requirements for facility certification. There is a transition period to give process owners time to understand the new requirements and to update internal ESD control processes. For 2015, facilities may be certified to either the 2007 version or the 2014 version of ANSI/ESD S20.20. For this reason, both standards will remain on the ESD Association web site for 2015. In 2016, facilities will only be certified to the 2014 version of ANSI/ESD S20.20.

For additional information, please visit the ESD Association web site at www.esda.org.