

		LOVAG DECISION SHEET (LDS)		N°[LDS193]
				Pag. 1 /1]
References	Standard(s) (incl. year)	[IEC 60947-3:2008+AMD1:2012+AMD2:2015]		Subclause(s): 8.5.1
	Subject	[Special test of mechanical durability	Submitted by: Lovato Electric S.p.a.	Date: [2017/09/18]
Question	<p>Which verifications are necessary at the end of the test of mechanical durability to verify the integrity of the product according to EN / IEC 60947-3?</p> <p>Reading the standard, we can derive two interpretations:</p> <p>a) the special mechanical durability test, contrary to what usually happens, shall be considered inside the sequence II, changing the number of mechanical operations stated by the standard and modifying the value of the leakage current (6 mA)</p> <p>b) we can consider the durability test as disconnected from the sequence, but in this case it is not clear which checks shall be carried out at the end of the test.</p>			
Analysis	<p>The standard requires the verifications in the conditions stated by the clause 8.3.4.1 of the sequence II. The annex to this sheet contains all the requirements and the activities that must be completed to respect them.</p>			
Decision	<p>All the conditions shall be respected and applied after the execution of the increased number of cycles (mechanical or electrical) according to the manufacturer's declaration.</p>			
Date:	2017/09/22	Prepared by:	S.Manganaro (ACAE)	Approved by: ACAE Technical Commission of 2017/09/22

Annex to LDS193

<p>EN60947-3 §8.5.1 Mechanical durability The mechanical durability test (see 7.2.4.3 and 8.1.5), where required, is made in accordance with the appropriate requirements of 8.3.4.1, except that for equipment suitable for isolation, the maximum value of leakage current shall not exceed 6 mA per pole for all utilization categories. The total number of operating cycles shall be as declared by the manufacturer.</p>	<p>7.2.4.3 Mechanical durability Subclause 7.2.4.3.1 of IEC 60947-1 applies. Test conditions are specified in 8.5.1.</p>	<p>EN60947-1 §7.2.4.3.1 Mechanical durability With respect to its resistance to mechanical wear, an equipment is characterized by the number, stated in the relevant product standard, of no-load operating cycles</p>	
	<p>8.1.5 Special tests Special tests (see 2.6.4 of IEC 60947-1) are specified in 8.5.</p>	<p>§8.5.1 EN60947-1 §2.6.4 special test Ttest, additional to type tests and routine tests, made either at the discretion of the manufacturer or according to an agreement between manufacturer and user EN60947-3 §8.5 Special tests Resistance to mechanical and/or electrical wear is demonstrated by the operational performance test detailed in 8.3.4.1. Where abnormal service conditions are expected (see also note to 7.2.4.3 of IEC 60947-1), the following tests may be necessary.</p>	<p>EN60947-1 § 7.2.4.3 Durability NOTE - The term "durability" has been chosen, instead of "endurance" in order to express the expectancy of the number of operating cycles which can be performed by the equipment before repair or replacement of parts. Moreover the term "endurance" is also commonly used to cover operational performance as defined in 7.2.4.2 and it was deemed necessary not to use the term "endurance" in this standard in order to avoid confusion between the two concepts.</p>
	<p>8.3.4.1 Operational performance test</p>	<p>EN60947-3 § 8.3.4.1.1 Test values and conditions EN60947-3 § 8.3.4.1.2 Test circuit EN60947-3 § 8.3.4.1.3 Transient recovery voltage EN60947-3 § 8.3.4.1.4 Switching overvoltages EN60947-3 § 8.3.4.1.5 Behaviour of the equipment during the operational performance test EN60947-3 § 8.3.4.1.6 Condition of the equipment after the operational performance test It shall be demonstrated immediately after the test that the equipment will close and open satisfactorily during a no-load close/open operation. The force required for opening shall not be greater than the test force of 8.2.5.2 and Table 8. A closing operation is considered satisfactory when normal operation of the handle through its full stroke will close the contacts sufficiently for the equipment to be able to carry its rated operational current. After the tests and without maintenance the equipment shall comply with the requirements of 8.3.4.2. The contacts shall be in a suitable condition to carry the rated operational current without maintenance and shall comply with the temperature-rise verification of 8.3.4.4. If the equipment is suitable for isolation, it shall comply with 8.3.4.3.</p>	<p>EN60947-3 § 8.2.5.2 Method of test 8.2.5.2.1 Dependent and independent manual operation The force necessary to operate the device to the open position shall be measured at the extremity of the actuator. The measured force F shall be equal to the average value of maximum force obtained from three consecutive operations, with the device in a clean and new condition. This force F shall then be used for the establishment of the test force in Table 17. With the equipment in the closed position, the fixed and moving contacts of the pole for which the test is deemed to be the most severe shall be fixed together, for example, by welding. The actuator shall be submitted to a test force of 3F but which, however, shall not be less than the minimum nor more than the maximum values given in Table 17, corresponding to the type of actuator.</p> <p>EN60947-3 §8.3.4.2 Dielectric verification</p> <p>EN60947-3 §8.3.4.4 Temperature-rise verification</p> <p>EN60947-3 §8.3.4.3 Leakage current</p>