

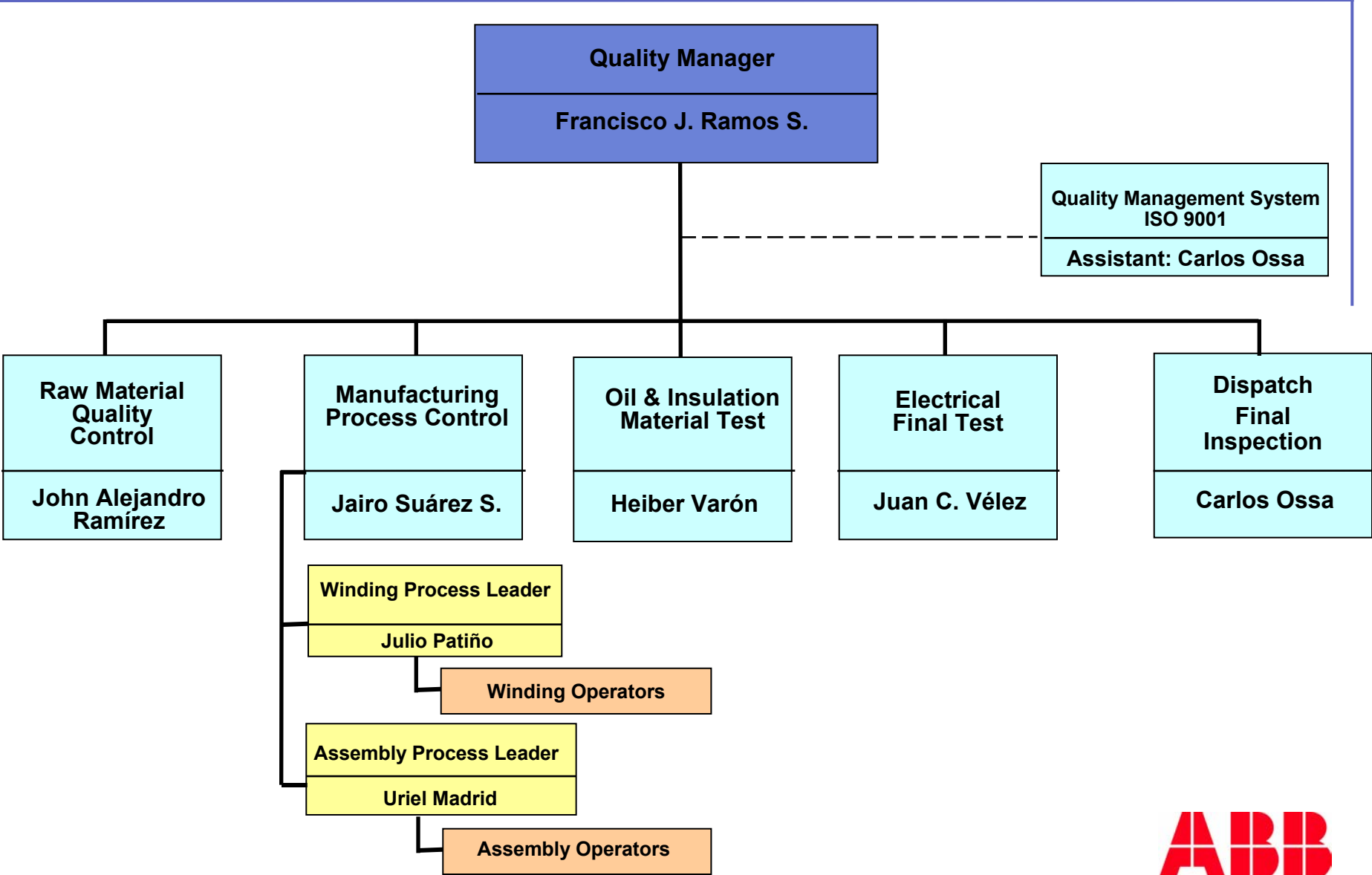
Process Tests & Control Points for Power Transformers



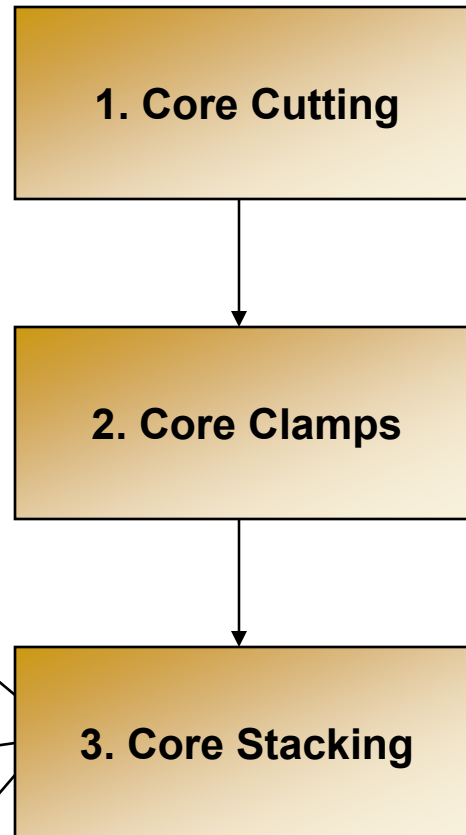
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Integral Quality Manager



PRODUCT QUALITY CONTROL STRUCTURE



1. Core Manufacture



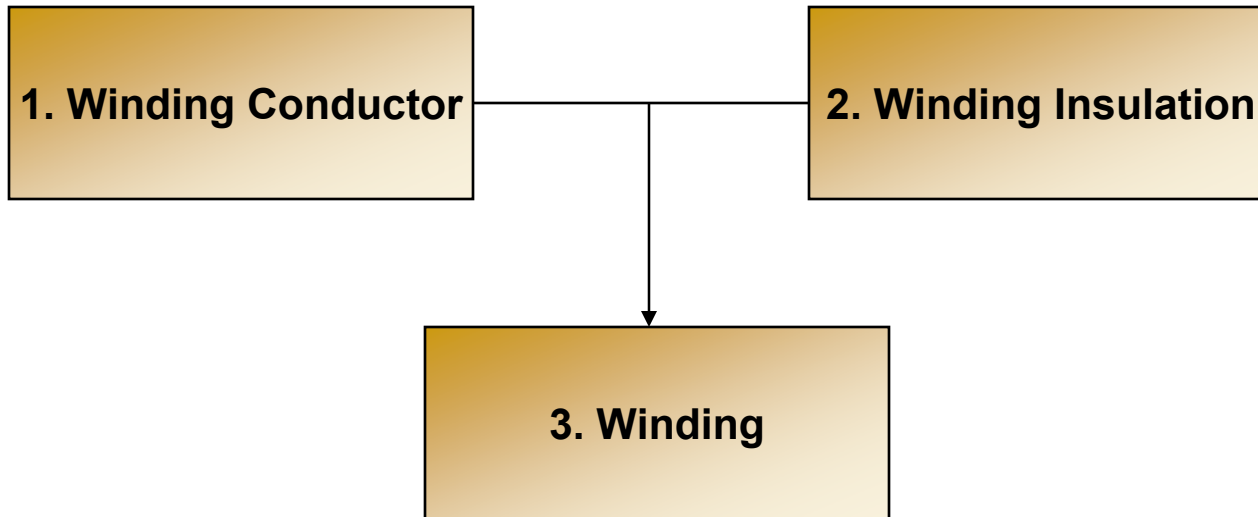
TESTS

T1. After raising the core but before glue or a second is applied, an insulation test is carried out
1ZBA 461 003-5

T2. Core resistance measured
1ZBA 4521 -102

T3. Insulation test at 3.5 KV DC
1ZBA 461 003-5

2. Winding Manufacture



TESTS

T4. Insulation test with DC Megger - 1ZBA 101001-6

T5. Electrical continuity test with a buzzer or indicator light

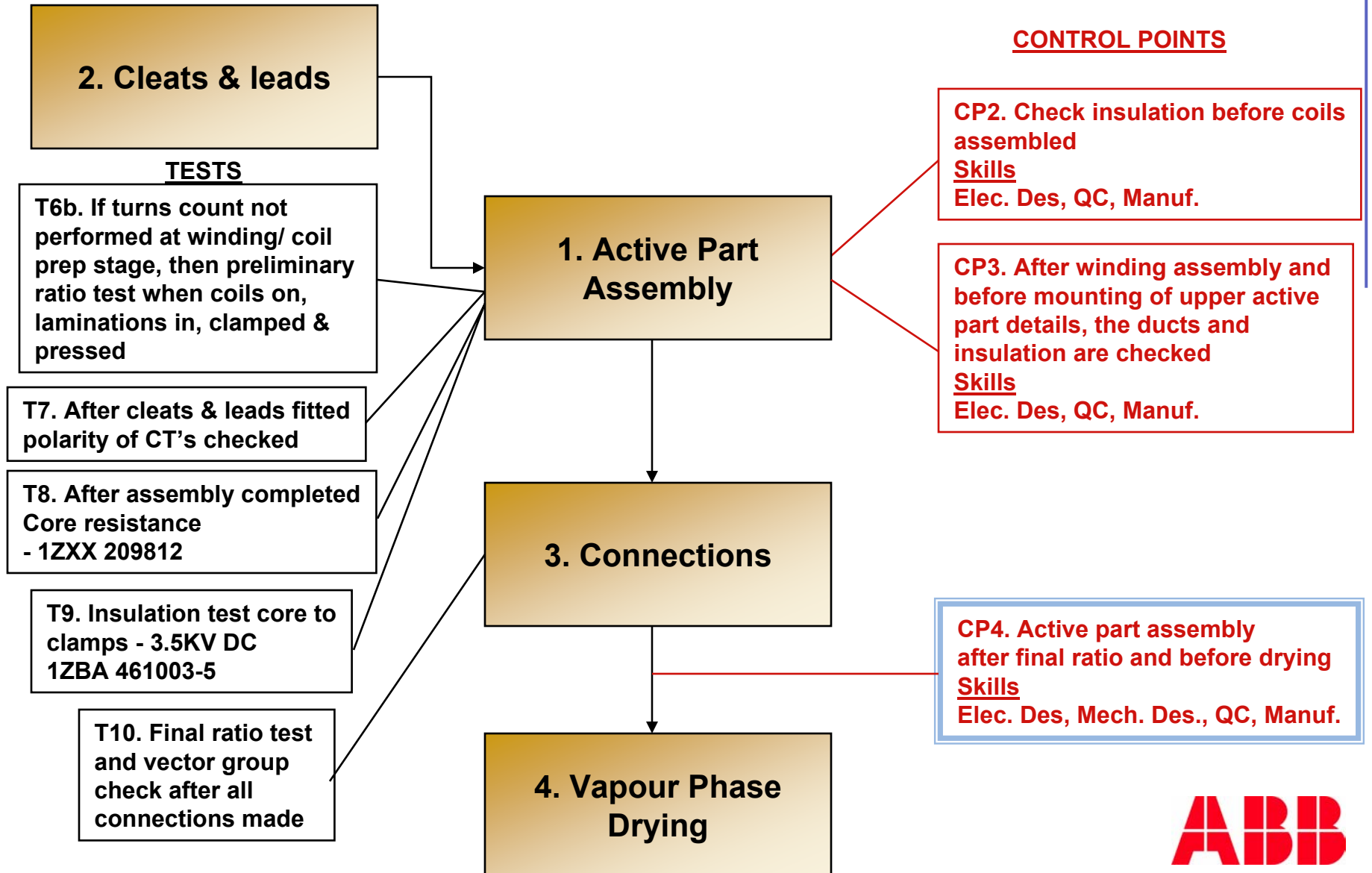
T6a. If a test core is available, perform turns count on each coil - otherwise T6b

4. Coil Preparation / Winding Block Assembly

CONTROL POINTS

CP1. Inspection of coils prior to fitting outer wraps - for category 3 units and above, or as appropriate
Skills
Elec. Des, Mech.Des, QC, Manuf.

3. Active Part Assembly



4. Control Systems

TESTS

T11. 500V DC Megger test
before separate source
withstand test

T12. 2000V AC test for
1 minute

T13. 500V DC Megger test
after separate source
withstand test

1. Control Systems

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graph LR; T11[T11. 500V DC Megger test before separate source withstand test] --- CS[1. Control Systems]; T12[T12. 2000V AC test for 1 minute] --- CS; T13[T13. 500V DC Megger test after separate source withstand test] --- CS;
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5. Fabrication & Painting

CONTROL POINTS

1. Fabrication & Painting

CP 5. All items have been checked in the assembled position for correct fit, spacing, position & angle
Skills
Mech. Des, QC, Manuf.

6. Finishing Assembly & Test

TESTS

T14. Earthing of bolts, flitch plates, end supports, feet, brackets & holders checked with a bell

T15. In tank ratio test & vector group check

T16. Pressure tests & tightness tests

T17. Bushings & instrument transformers grounded & checked with a bell

T18. Function test of fittings & accessories where appropriate

T19. Formal dielectric & performance tests

1. Re-tightening & tanking

2. Evacuation & oil filling

3. Finishing Assembly

4. Test

CONTROL POINTS

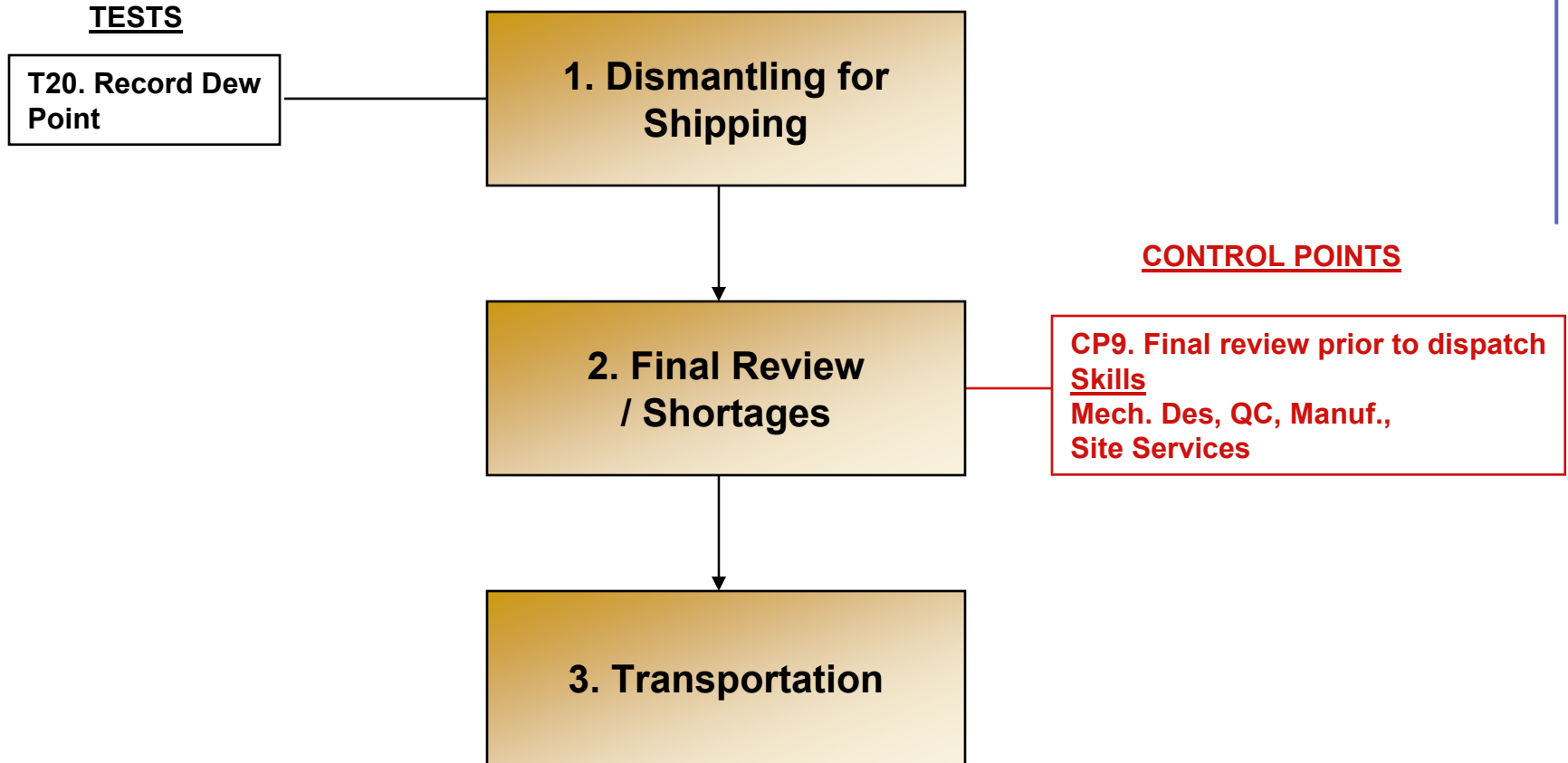
CP6. Final inspection prior to tanking
Skills
Mech. Des, QC, Manuf.

CP7. Check after tanking
Clearances and condition of leads
Skills
Mech. Des, QC, Manuf.

CP8. Fully assembled unit after test
Skills
Mech. Des, QC, Manuf.



7. Dismantling for Shipping





TESTS ROOM PLANNING

CUSTOMER: SAMSUNG
POWER: 40/50 MVA
VOLTAGE: 66.0 / 12.0 kV
PROJECT NUMBER: 127010

Test's schedule for the transformers in reference.

First Day		References / Standards
1	Verification of voltage ratio and vector group or phase displacement.	IEC 60076-1, 2000-Clause 6 and 10.3, ANSI-IEEE Std C 57.12.90-1999-Clause 6 and 7.
2	Verification of ratio and polarity of current transformers.	
3	Measurement of dissipation factor of the insulation system capacitances	IEC 60076-1, 2000-Clause 10.1.3, ANSI-IEEE Std C 57.12.90-1999-Clause 10.10
4	Measurement of insulation resistance (10 min.)	IEC 60076-1, 2000-Clause 10.1.3, ANSI-IEEE Std C 57.12.90-1999-Clause 10.11
5	Measurement of winding resistance	IEC 60076-1, 2000-Clause 10.2, ANSI-IEEE Std C 57.12.90-1999-Clause 5

Second Day		References / Standards
6	Lightning Impulse	IEC 60060-1 1989, IEC 60060-2 1994, IEC 60060-3, IEC 60076-3 2000, ANSI-IEEE Std C 57.12.90-1999-Clause 10, ANSI-IEEE Std C 57.98-1993
7	Measuring of no-load loss and no-load current	IEC 60076-1, 2000-Clause 10.1-10.5, IEC 60076-8, 1997-Clause 10, ANSI-IEEE Std C 57.12.90-1999-Clause 8
8	Separate source AC withstand voltage test or Applied voltage test	IEC 60076, 2000-Clause 11, IANSI-IEEE Std C 57.12.90-1999-Clause 10.6, ANSI-IEEE Std C 57.12.00-2000-Clause 5.10

Third Day		References / Standards
9	Measuring the short-circuit voltage impedance and the load loss.	IEC 60076-1, 2000-Clause 10.1-10.4, IEC 60076-8, 1997-Clause 10, ANSI-IEEE Std C 57.12.90-1999-Clause 9
10	Induced voltage tests	IEC 60076, 2000 - Clause 7.3 and 12, ANSI-IEEE Std C57.12.00-2000-Clause 5.10. ANSI-IEEE Std C57.12.90-1999-Clause 10.7 y 10.8

Fourth Day		References / Standards
11	Verification of auxiliary equipment and control.	Internal Standard ABB

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