

IEEE Power & Energy Society
Switchgear Committee
C37.20.7 Working Group Report
01-May-2012

The working group met on Tuesday, May 1, at 8:00AM.

Patents:

Those registered had to acknowledge the IEEE-SA rules on Patents, and therefore, review in this meeting is not required. The participants were reminded that anti-competitive issues are never allowed for discussions.

The minutes from the Fall, 2011 meeting were approved as distributed.

General:

The PAR for this project was approved by the IEEE-SA Standards Board on November 9, 2011.

Members introduced themselves, identified their company and their affiliation. Attendance included 22 working group members (of 28), with 1 absent and 5 excused, plus 43 guests. Attendance is as shown below:

Members	Members	Members	Guests	Guests	Guests
C. Ball (P)	K. Flowers (P)	A. Morse (P)	B. Anderson (P)	L. Grahor (P)	D. Moser (P)
P. Barnhart (P)	J. Giacetti (E)	T. Olsen (P)	C. Befus (P)	T. Hawkins (P)	P. Novak (P)
J. Baskin (A)	R. Hartzel (P)	M. Orosz (E)	J. M. Biasse (P)	J. Hidaka (P)	R. Pawar (P)
R. Bugaris (P)	C. Kennedy (P)	A. Patel (P)	J. Bowen (P)	D. Hrcir (P)	E. Peters (P)
E. Byron (P)	M. Lafond (E)	C. Schneider (P)	R. Boyce (P)	R. Hubbard (P)	R. Puckett (E)
J. Earl (P)	D. Lemmerman (E)	J. Smith (P)	M. Cannady (P)	S. Hutchinson (P)	A. Rowell (P)
D. Edwards (P)	F. Mayle (P)	P. Sullivan (E)	C. Carne (P)	A. Jivanani (P)	T. Schiazza (P)
D. Gohil (P)	D. Mazumdar (P)	C. Tailor (P)	R. Cohn (P)	J. Joseph (P)	G. Schoonenberg (P)
M. Flack (P)	D. Mohla (P)	M. Wactor (P)	M. Crooks (P)	H. Josten (P)	E. Seiler (P)
		J. Zawadzki (P)	D. Dunne (P)	A. Jur (P)	J. Shullaw (P)
			D. Elliott (P)	P. Leufkens (P)	M. Valdes (P)
			L. Farr (P)	A. Livshitz (P)	R. Warren (P)
			P. Gingrich (P)	S. Meiners (P)	M. Williford (P)
			M. Glinkowski (P)	R. Morris (P)	

P = present, E = excused, A = absent

Minutes for the Fall 2011 meeting were approved as published.

Draft 2 of the document was previously distributed. This draft is intended to cover these types of equipment:

- LV Metal-Enclosed Switchgear (C37.20.1)
- MV Metal-Clad Switchgear (C37.20.2)
- MV Metal-Enclosed Interrupter Switchgear (C37.20.3)
- Metal-Enclosed Bus (C37.23)
- MV Motor Controllers (UL 347)
- LV Motor Controllers (UL 845)
- LV Switchboard (UL 891)

Other equipment types, such as transformers, large motor drives, and others, have been suggested for inclusion. For the time being, we will focus on the types above.

In previous meetings, we had agreed that we would put the special requirements germane to a particular type of equipment in a specific normative annex for that type of equipment. To encompass other types of equipment, we have re-titled the document from covering "metal-enclosed switchgear" to "switchgear", with corresponding changes throughout the document. This was discussed and it was agreed that the generic term "switchgear" can be used.

It was questioned whether the technical committees responsible for LV MCCs and switchboards have requested to be included, which we thought was true. K. Flowers forwarded a copy of the E-Mail from NEMA of February 14, 2011, submitted for the NEMA 11S SC12 Technical subcommittee (MCCs), so the request for MCCs is validated. Carl Schneider will check this as relates to switchboards.

Considerable discussion occurred on 4.3, and particularly about the minimum durations suggested in the last paragraph (0.05 s for LV MCCs, 0.1 s for other types).

Suggested minimum test voltage (60%) in 5.2.3 was discussed. Laboratories were asked if they test equipment with higher rated voltages (e.g., 15kV or 38kV) and used a test voltage below 60%, and whether they have trouble with pre-mature arc extinction. The general response was that lower voltages are used when laboratory constraints dictate, and pre-mature arc extinction is not an issue. It is noted that reduced voltage testing is not allowed for equipment rated below 5kV.

The general issues in the sections of the document up to the annexes were discussed. Following this, discussion of annexes began, starting with Annex C.

Annex C (LV Switchgear)

- J. Bowen will propose a new definition of solid insulation for LV equipment.
- Discussion occurred relative to type B accessibility, and whether it is more appropriate to test with door open and indicators 100mm from the opening (as in draft), or with door closed with indicators 100mm from interior walls.

Annex D (MV MC Switchgear)

- No specific discussions.

Annex E (MV MEI Switchgear)

- No specific discussions.

Annex F (Outdoor equipment)

- No specific discussions.

Annex G (LV MCCs)

- Preferred duration of arcing. The suggested duration from the task force is 0.05 s, corresponding to the short-circuit duration for MCCs. It was suggested that 0.05 s might be the minimum duration, with a recommended duration that is longer.
- Considerable discussion ensued on this issue. For historical purposes, the following is excerpted from the Fall 2011 minutes:

Preferred duration - this is 0.5 seconds for most equipment but for LV motor control, it is 0.050 seconds to correspond to the short-time rating of LV motor control. This suggests that UL 845 needs a test for the main bus for a short-time current duration to match equipment to which it may be connected (e.g., LV metal-enclosed switchgear). This is outside the scope of C37.20.7.
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It was also suggested that a reasonable recommended duration based on the clearing time of upstream protective device (the backup protection) be used. This approach might be used for other equipment types (and in fact, this was the basis of the original 0.5 s duration for medium voltage equipment. H. Josten (LVS), E. Peters (C37.23), A. Morse (MVC), J. Earl (MV MC), C. Ball (MV MEI), K. Flowers (MCCs), C. Schneider (Switchboards) will look at this issue.

Annex H (MV MVCs)

- No specific discussions.

Annex I (LV Switchboards)

- See earlier discussion – C. Schneider to validate that a technical committee responsible for switchboards did actually ask that switchboards be included in our document.

Annex J (Metal-Enclosed Bus)

- No specific discussions.

General

- Accessibility type D has been deleted.
- Accessibility type C – it was questioned if accessibility type C should be deleted, inasmuch as CSA chose to create their own document (CSA C22.2 no. 0.22-2011). For the present, it will remain in the document for the metal-clad equipment (Annex D). L. Farr moved to eliminate accessibility type C, and P. Barnhart seconded. The motion passed 16 to 6 among WG members. A vote of all present was 33 to 20. The major issue discussed is that accessibility type C does not provide significant additional protection for persons, and that existence of this type adds to the perception of users that type C allows working on energized equipment. It was suggested this issue be revisited at the next meeting and that those who might feel strongly that type C should be maintained should prepare support for their position for the next meeting. J. Bowen will query API for their views.
- It was also suggested that UL 857 low-impedance busways be included. This will be discussed with the NEMA low voltage busways

Grounding discussion

For historical purposes, the following material is excerpted from the Fall 2011 minutes:

(Excerpted from Fall 2011 minutes)

Effect of neutral grounding:

Mr. Wactor discussed test results from recent testing concerning grounding. For reference, the following is an excerpt from the Spring 2011 minutes discussing data presented by Mr. Schoonenberg:

IEC limits current to ground to 100A or less during arcing tests. IEEE requires that the enclosure be connected to the source in such a manner that there is no significant limitation on ground current. Significant discussion occurred relative to which testing arrangement produces the most onerous conditions. Several report that testing with solid grounding produces more dramatic results during testing. Others report that testing with limited ground current forces the arcing to remain as three-phase arcing and produces the highest pressure on the enclosure

Gerard Schoonenberg presented some information relative to the grounding issue, from the view of IEC. Recently, KEMA-Chalfont conducted tests at 64kA and about 10% of the current appeared in the ground connection. KEMA-Arnhem conducted tests in February 2011 to explore differences with grounded neutral and tests with neutral floating with test current of 18kA. These were tests with a custom test enclosure that could be reused, not like an ordinary test specimen to C37.20.7. A metal bracket was arranged relatively close to the phase electrodes, so that it was readily involved in the arcing. Whether this was representative of a real test unit is open to question. Arc voltages were of the order of 300 volts.

Pressures measured were relatively in the same area for each test voltage. The arcing energies were also in the same range. Tests were conducted for 0.3 seconds with test voltages of 6kV and 24kV, with neutral grounded and with neutral floating.

Mr. Schoonenberg will request permission to make the material presented available to the participants, and if so, the material will be provided with the minutes.

Mr. Wactor did some testing at a laboratory familiar with IEC testing practices, and had discussions with Dr. Smeets of KEMA. These discussions suggested that the severity of the test has less to do with the grounding than it does with the balance of currents between the phases. Mr. Glinkowski showed some summary data (same as presented in Spring, 2011) which shows ground current ranging from about 2% up to about 10% of the phase current. Mietek proposed that this issue be raised at STL, and that the laboratories investigate the effect of grounding (and unbalance) with a view towards determining the "right way" to conduct tests, to resolve the disagreement between IEEE (test grounded) and IEC (test with limited ground current).

Participants are requested to provide comments on draft 2 to the chair by July 1. Further, participants are requested to provide information on the effects of grounding on test results are asked to provide data to the chair. If needed, such data can be provided to P. Barnhart who will sanitize any reference to source from the data before forwarding to the chair.

The meeting adjourned at 11:55AM.

Report submitted by: M. Wactor, WG Chair