



Study Committee A3
“High Voltage Equipment”

Action Plan

October 2011

CIGRE Study Committee A3 - “High Voltage Equipment”

Action Plan

1 Content

1	Content.....	2
2	Purpose of the Action Plan.....	3
3	Activities of Study Committee A3.....	3
3.1	Technical work.....	3
3.1.1	Reliability of high voltage equipment, WG A3.06.....	3
3.1.2	Non conventional instrument transformers, WG A3.15	4
3.1.3	Surge arresters, WG A3.17	4
3.1.4	Application of HV apparatus with composite insulators, WG A3.21	4
3.1.5	Techn. Requirements for Substation Equipment > 800 kV, WG A3.22	5
3.1.6	Guidelines and selection of Fault-Current-Limiters, WG A3.23	5
3.1.7	Tools for Simulating Internal Arc, WG A3.24	5
3.1.8	MO varistors and surge arresters for emerging system conditions, WG A3.25	6
3.1.9	Influence of shunt capacitor banks on cb fault interruption, WG A3.26.....	6
3.1.10	High-Voltage Vacuum switchgear, WG A3.27	6
3.1.11	UHV phenomena and requirements, WG A3.28.....	6
3.1.12	Management of aging substation equipment, WG A3.29	7
3.1.13	Managing of overstressing of substation equipment, WG A3.30.....	7
3.1.14	Instrument transformers with digital output, WG A3.31	7
3.2	Administrative Work.....	8
3.2.1	Strategic Planning, AG A3.01	8
3.2.2	IEC and IEEE Coordination, AG A3.2/3.....	8
3.2.3	Tutorials, AG A3.04	8
3.2.4	Cooperation with other Working Bodies	8
4	Time Schedule of WG Activities.....	8
5	Annex: Time Table of WG Activities.....	9

Note of Secretary:

Revised and updated October 2011

2 Purpose of the Action Plan

The purpose of the Study Committee A3 Action Plan is to describe the short-to-mid term activities of the Study Committee in order to inform other CIGRE Study Committees and external organizations.

The Action Plan will be reviewed annually and is based on the Strategic Plan which gives the mid-to-long term directions and goals of the Study Committee. The goals of Study Committee A3 are defined as:

- Become the primary international organization for providing unbiased High Voltage Equipment information
- Be recognized as a truly global committee addressing the High Voltage Equipment needs of developing, newly industrialized, and industrialized countries
- Bridge the gap between the various organizations and segments of the Electric Power Industry interested in High Voltage Equipment
- Be recognized as a progressive committee promoting sustainable solutions to High Voltage Equipment issues
- Be the organization that conducts the preparatory work for High Voltage Equipment standards developed by standardization organizations

3 Activities of Study Committee A3

Within the structure of the Study Committee the activities are going on in the Working Groups for the technical work and in Advisory Groups for administrative purpose. Short descriptions of the tasks (for more see the Terms of Reference) are given as well as rough dates concerning the Working Group activities like start/end of work, reports and publications. A time schedule presents the actual state and planned progress of work of each group according to the annual Activity Reports.

3.1 Technical work

3.1.1 Reliability of high voltage equipment, WG A3.06

Work based on:

Enquiries on circuit breaker reliability, published in 1981 and 1994 and instrument transformer reliability published in 1990

Subject of Studies:

Study of high-voltage circuit-breaker, disconnecter, earthing switch, and instrument transformer failures and defects in service in the voltage range of 72,5 kV up to and including 800 kV. The aim is to determine reliability data and trends, based on a worldwide enquiry. The results of the enquiry will be compared to the results of previous Cigré studies.

Time Schedule

Start of work	2002
Presentation A3-Session	2004
Colloquium Tokyo	2005

Colloquium Rio	2007
Colloquium Vienna	2011
Tutorials	2006/2008/2011
Final Report	2011
Publication and end of work	2012

3.1.2 Non conventional instrument transformers, WG A3.15

Subject of Studies:

The technological progress in the last decade in Information Technology and Electronics has led to important changes in substation layout:

- substations are tending to become increasingly compact
- data transmission is becoming digital.

Non conventional current and voltage transformers with compact dimensions and digital outputs are naturally finding a place in these new substation architectures. The Working Group should study two different aspects with respect to NCITs: Primary sensors and Communication.

Time Schedule:

Start of work	2004
Tutorial	2008
Draft Report	2010
Publication and end of work	2012

3.1.3 Surge arresters, WG A3.17

Work based on:

Technical Brochure No 60, 1990 and work and experience of former Cigre SC 33

Subject of Studies:

In the Surge Arrester community an ongoing discussion can be observed addressing mechanical tests, climatic tests, short circuit tests, impulse current tests, d.c. tests, and long duration tests. Recommendations will be worked out regarding improved, commonly applicable test procedures for Surge Arresters, both as a stand alone apparatus and as an integral part of other equipment.

Time Schedule:

Start of work	2003
Colloquium Tokyo	2005
Colloquium Rio	2007
UHV-Symposium Beijing	2007
Tutorials	2005/2009/2011
Draft Report	2011
Publication and end of work	2012

3.1.4 Application of HV apparatus with composite insulators, WG A3.21

Work based on:

Worldwide application of polymeric insulators for high-voltage equipment

Subject of Studies:

The active parts inside electrical apparatus interact with the insulating housing (especially if made of non-ceramic materials) and may influence the behavior of the equipment. The work shall cover all the major aspects of this interaction: i.e. thermal, mechanical, electrical and environmental.

Time Schedule:

Start of work	2006
Draft Report	07.2010
Publication and end of work	04.2011
Disbanded	09.2011

3.1.5 Techn. Requirements for Substation Equipment > 800 kV, WG A3.22

Work based on:

Future application of high transmission voltages and the lack of standardization in this range

Subject of Studies:

The technical requirements for equipment exceeding 800kV have largely been developed by individual users/manufacturers such that there is limited worldwide standardization. This WG will review the present state-of-the-art of project specific and (inter)national technical specifications for all equipment within the scope of A3 at voltages of 765kV and above. The review will identify areas of commonality and of divergence. The technical background of all aspects of the available specifications will be analyzed with the intention of identifying and reporting current “best practice”.

Time Schedule:

Start of work	2007
UHV-Symposium Beijing	2007
First TB	12.2008
UHV-Symposium Delhi	2009
Draft second TB	01.2010
Publication second TB and end of work	04.2011
Disbanded	09.2011

3.1.6 Guidelines and selection of Fault-Current-Limiters, WG A3.23

Work based on:

Follow-up of WG A3.16

Subject of Studies:

This WG will build upon the previous work of WG A3.10 and WG A3.16 with regard to the application of fault current limiters from a technical point of view. Different types of FCL, the experience from pilot projects and the feasibility of application will be investigated. The gathering of customer system requirements and acceptance issues will give hints concerning the potential economical savings.

Time Schedule:

Start of work	2008
Tutorial	2011
Draft Report	08.2011
Publication and end of work	2012

3.1.7 Tools for Simulating Internal Arc, WG A3.24

Work based on:

Follow-up of WG A3.20

Subject of Studies:

The WG will continue the analysis of the use of simulation as verification tools with a specific focus on internal arc testing of SF6 filled equipment.

Time Schedule:

Start of work	2008
---------------	------

Draft Report	2012
Create Tutorial	2013
Publication and end of work	2013

3.1.8 MO varistors and surge arresters for emerging system conditions, WG A3.25

Work based on:

Follow-up of WG A3.17

Subject of Studies:

The working will review and report on the main topics UHV arresters, increasing field strength and axial temperature distribution. The running research project of WG A3.17 concerning energy handling capability of MO varistors will be continued and ageing test under abnormal conditions and theory of ageing will be investigated.

Time Schedule:

Start of work	2009
Tutorial	2011
Draft Report	2012
Publication and end of work	2013

3.1.9 Influence of shunt capacitor banks on cb fault interruption, WG A3.26

Work based on:

Upcoming questions from service experience

Subject of Studies:

The task of this WG is the investigation of the influence of both earthed and unearthed shunt capacitor banks on line breaker fault interruption and the effect of series reactors on fault interruption with capacitor switching circuit breakers.

Time Schedule:

Start of work	2009
Draft Report	2012
Publication and end of work	2013

3.1.10 High-Voltage Vacuum switchgear, WG A3.27

Work based on:

Upcoming questions upon new field of application

Subject of Studies:

An enquiry by the Current Zero Club has revealed that more than 4000 vacuum circuit breakers (VCB) are in service at voltage levels between 72.5 and 170 kV, mostly in Japan and China. Given this result, and the fact that VCBs up to a rated voltage of 245 kV are under development, there is a need to study the impact of application of vacuum switching technology at voltages above 52 kV.

Time Schedule:

Start of work	2009
Tutorial	2011
Draft Report	2012
Publication and end of work	2013

3.1.11 UHV phenomena and requirements, WG A3.28

Work based on:

Follow up of WG A3.22

Subject of Studies:

The Working Group will address specific aspects of UHV switching phenomena, equipment & testing in greater depth. The theoretical aspects and simulation of specific phenomena will be explored and correlated with service experience from existing systems and from early UHV projects as this becomes available.

Time Schedule:

Start of work	2010
Symposium Bologna	2011
Draft Report	2012
Publication and end of work	2012

3.1.12 Management of aging substation equipment, WG A3.29

Work based on:

Key task for utilities and other asset owners

Subject of Studies:

Managing an ageing high voltage asset population is a key task for utilities and other asset owners. Definitive guidance and recommendation in this field is not readily available. In order to enhance the available guidance in this area SC A3 proposes to undertake a comprehensive review of experiences in the fields of degradation processes, lifetime assessment & life extension techniques, and the role of condition monitoring, refurbishment and re-verification.

Time Schedule:

Start of work	2011
Draft Report	2013
Publication and end of work	2014

3.1.13 Managing of overstressing of substation equipment, WG A3.30

Work based on:

Specific aspect of lifetime management

Subject of Studies:

In addition to classical, condition based, end of life considerations, a specific aspect of lifetime management is the possibility that, during its operational lifetime, equipment becomes subject to system conditions which exceed its (proven) capabilities; often termed (potential) overstressing. The proposed Working Group will review this aspect concerning end of life decision making as it applies to high voltage substation equipment.

Time Schedule:

Start of work	2011
Draft Report	2013
Publication and end of work	2014

3.1.14 Instrument transformers with digital output, WG A3.31

Work based on:

Follow up of WG A3.15

Subject of Studies:

The use of digital output for ITs (magnetic or electronic) requires development & adaptation of the accuracy testing procedures and the development of appropriate methods for infactory and on-site calibration which may become more frequent with the deregulation of electric power companies. The redundancy of various equipment and links will also need to be

considered to achieve the high reliability and availability levels required for a modern electrical network. This accuracy testing & calibration activity is the main focus of this Working Group.

Time Schedule:

Start of work	2012
Draft Report	2014
Publication and end of work	2015

3.2 Administrative Work

3.2.1 Strategic Planning, AG A3.01

The main tasks of the Strategic Planning Group are the monitoring of technical trends, giving guidance and support for establishing new working groups and discuss the Preferential Subjects for Sessions and Colloquia.

3.2.2 IEC and IEEE Coordination, AG A3.2/3

The IEC and IEEE Coordination Advisory Groups advise the Study Committee on common issues with relevant committees of the standardization organizations. A major role of the Study Committee is to perform preparatory work for international standards.

Due to manifold personal contacts a good relation to the standardizing bodies is given, so that this Group is not officially active.

3.2.3 Tutorials, AG A3.04

The Advisory Group Tutorials disseminates technical knowledge concerning HV equipment mainly by offering tutorials. Based on the fields of knowledge of the Working Groups possibilities for offering tutorials (mostly in connection to international conferences and expositions) will be looked for and there arrangement supported.

3.2.4 Cooperation with other Working Bodies

A permanent close cooperation with other Working bodies is given due to the representatives taking part in the activities of the Study Committee. The following bodies are included:

- Study Committee B3
- IEC SC 17A
- Current Zero Club
- CIREN

4 Time Schedule of WG Activities

Rough time schedules for the Working Groups are given in a table, showing the key points and highlights of the near past and the planned future of some years to give an overview of the Study Committee activities and events (see Annex: Time Table).

5 Annex: Time Table of WG Activities

AREA OF ACTIITY		ACTIONS PLANNED				
		2010	2011	2012	2013	2014
WG A3.06	Reliability of high voltage equipment	OS	DR T / PB	TB Ex		
WG A3.15	Non conventional instrument transformers	DR		TB Ex		
WG A3.17	Surge arresters	OS	DR T	TB Ex		
WG A3.21	Composite insulators	DR	PB Ex			
WG A3.22	UHV Equipment	DR PB	2. TB Ex			
WG A3.23	Guidelines and Selection of FCL	OS	DR T	TB Ex		
WG A3.24	Simulation tools	OS	OS	DR	TB T	
WG A3.25	SA for emerging system conditions		ST T	DR	TB	
WG A3.26	Capacitor bank switching		ST	DR	TB	
WG A3.27	High-Voltage Vacuum switchgear	OS	OS T	DR	TB	
WG A3.28	UHV phenomena and requirements	ST	OS T / PB	DR TB		
WG A3.29	Management of aging substation equipment		ST	OS	DR	TB
WG A3.30	Managing of overstressing of subst.-equipment		ST	OS	DR	TB
WG A3.31	Instrument transformers with digital output			ST	OS	DR
AG A3.04	Tutorials		Vienna			
SC A3	Colloquium		Vienna			

Type of Action:

ST	Start of work	TB	Technical Brochure published
OS	Ongoing Studies	PB	other Publications
DR	Draft Report for SC	Ex	Scheduled end of work
T	Tutorial		