



Survey User’s Manual

CIGRE Working Group A3.29 Ageing of High Voltage Equipment

1 Background

Managing an ageing high voltage asset population is a key task for utilities and other asset owners. Effective management of these assets delivers the best value both to asset owners and utility customers. In the current environment, as many high voltage equipment assets are coming of age, the affordability, access and deliverability constraints continue to challenge asset managers. A recent CIGRE investigation on reliability showed that ageing is the single largest contributing factor on major and minor failures of high voltage equipment. Knowledge of asset ageing phenomenon and possible mitigation techniques will assist asset owners to effectively and efficiently manage their assets.

Definitive guidance and recommendations in the area of management of ageing high voltage equipment is not readily available. CIGRE has established a working group (Working Group A3.29) with an objective to provide industry experience on ageing of high voltage equipment, factors that influence ageing, and possible techniques for detection and mitigation of ageing. This will include guidance on life time assessment and life extension techniques. The outcome of the working group will be a technical publication in the form of a comprehensive CIGRE brochure.

2 The Survey Objective

For each of the equipment items being evaluated, the Working Group has developed “Ageing Tables” which describe possible ageing phenomena and their consequences, stress factors, detection techniques, and possible mitigation techniques. As a part of its work, the working group is undertaking a comprehensive review (this survey) of the field experience regarding equipment ageing and associated management practices. The survey will assist in providing a view of actual experience in the field to be used in conjunction with the above “Ageing Tables”. The survey is focused on equipment $\geq 60\text{kV}$ and includes circuit breakers, disconnectors/ earth switches, instrument transformers, surge arrestors, capacitors and post insulators. It has two focus areas – general questions on practices and more detailed questions on ageing phenomenon of the high voltage equipment.

The survey will provide user and manufacturer experience in:


- ageing phenomenon of various high voltage equipment, associated impacts and consequences
- management practices in managing these ageing high voltage equipment

This will help to identify the most common ageing components and factors, which will enable us to provide "informed" advice to the utilities on the ageing phenomenon and practices to manage ageing assets.

The survey pack is a zip file and includes:

1. The survey questionnaire (xls file); and
2. This user manual (to assist in responding to the survey).

The survey questionnaire has been designed to ease the data collection process and perform a limited number of validation processes resulting in a high degree of data integrity.

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3 Quick Start – STEP by STEP

The survey tool has an intuitive design and, for many users, minimal instruction. The users only need to be familiar with Microsoft Excel™. Below is a “quick guide”. For detailed instructions see further sections in this user manual.

Step 1-Unzip provided ZIP file

Unzip the provided ZIP file to a working directory on your computer.

Step 2-Open template

Go to your working directory with Windows Explorer. Open the “CIGRE_A3.29_Survey_ENGLISH.xls”.

Step 3-Organisation Information

Complete the Organisation Information on the first screen. This information will be used to generate file names for your response.

Step 4-General Information Card

Access the General Information Card from the Main Menu sheet.

Complete the General Information card about your practices for management of ageing high voltage equipment. Save the file using the button “Extract and Save”. The file name will be self-generated by the tool.

Step 4-E-mailing General Information Card

E-mail the General Information Card to cigrewga329@conedify.com

Step 5-Ageing Cards – For each high voltage equipment class

Access the High Voltage Equipment Ageing Card from the Main Menu. Each ageing card has an example line filled up for your benefit.

Complete the Ageing card for each high voltage equipment. Save a file **for each high voltage equipment** using the button “Extract and Save”. The file name will be self-generated by the tool.

Step 6-E-mailing Ageing Cards

E-mail completed Ageing Cards to cigrewga329@conedify.com

DETAILED GUIDE FOR USING THE SURVEY TOOL

4 Hardware and Software Requirements

The survey tool can be run on any IBM compatible computer that contains the following software packages:

- Windows 98 or Newer
- Excel 97 or newer

It is recommended that at least 100 Mbytes of free space be available.

5 Installation of the survey tool

The survey tool provided is a self-extracting compressed or zip file. By double clicking on the file with your mouse, it will automatically inflate and install in a directory of your choice on your computer. It is suggested that you use the proposed folder structure and store this tool, all general information, and ageing files in this folder for easy access.

The software tool is a Microsoft Excel™ Template named “CIGRE_A3.29_Survey_ENGLISH.xls”. The template contains preferred formatting, standardized text such as page headers and row and column labels, formulas, Visual Basic for Applications Macros, and custom toolbars.

6 Use of Macros

The software tool has been programmed with numerous macros that ease the data entry process. These macros have been tested by the Working Group members and do not compromise your computers security or data protection schemes. It is suggested that the when the tool is opened, the user selects the option to Enable Macros.

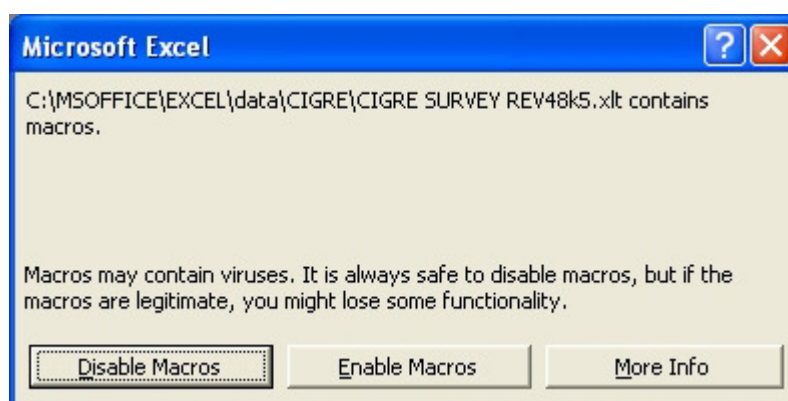


Figure 1 Macro Dialog

We recognise that the spread of viruses through macros is troublesome to many companies and may disallow or reduce the ease of using this tool. If your company cannot use this tool, data can be submitted to the Cigré working group in the form of a fixed format data file (see appendix 1).



7 Definitions

For the survey to be of high value it is extremely important that users use a strict set of standard definitions. On the survey tool, the user will find numerous buttons with an embedded question mark. These buttons take you to the standard definition applicable to the question being filled out. It is very important that the respondent follow these definitions.



8 Process Overview

8.1 General

All information from utilities will pass directly to the WG A3.29 Database Manager. (Figure 2).

8.2 Confidentiality

The basic principle is that results are open within the Cigré Working Group on a need-to-know basis, and kept confidential to the outside world.

8.3 General Information and Ageing Cards

The general information card provides the information of the data collection process within a specific group regarding ageing. Thereby, it identifies the information sources, covers the utilized evaluation techniques, as well as the strategic decision making process followed.

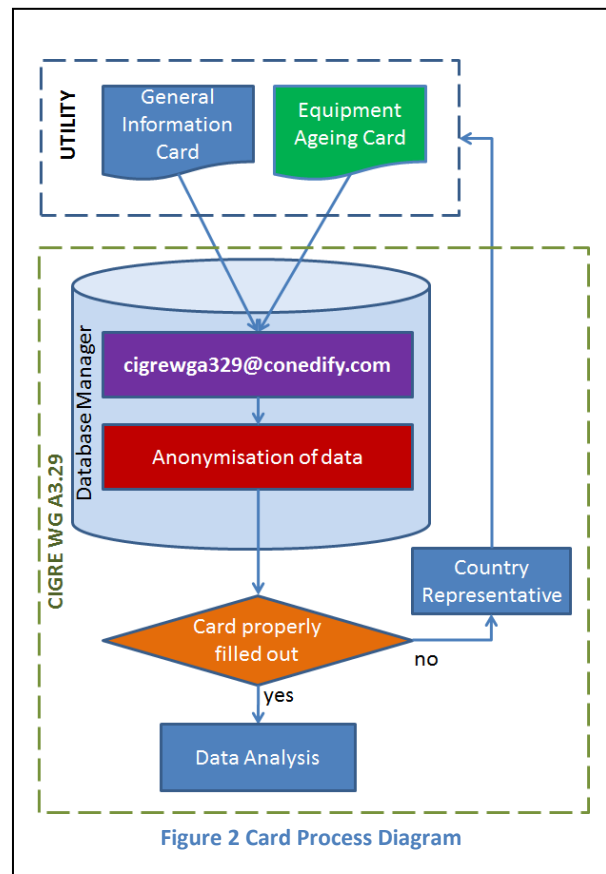


Figure 2 Card Process Diagram

CIGRE recognises that management practices may differ for equipment to equipment. On this general card we want you to respond to what best represents your management practice for the equipment covered under the survey.

The completed ageing card and general information card should be sent directly to the WG A3.29 Database Manager. The card can be sent to the e-mail address given in Chapter 3.

The A3.29 Working Group Database Manager will review each card for accuracy and completeness. After the review of the cards, the data will be added to the ageing analysis study database.

9 Completing of survey

9.1 Organisation information

The organisation information section should be completed by the main organisation contact. The information entered here will be re-used by the general information and ageing cards and, therefore, should be saved as soon as it is complete to avoid having to re-enter the data at a later time.



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This questionnaire applies to high voltage equipment with rated voltages of 60 kV and above.

Utility Information	
Country	<input type="text"/>
Utility name	<input type="text"/>
Short utility name (max. 7 char.)	<input type="text"/>
Ownership	<input type="text" value="Other"/>
Utility type	<input type="text" value="Other"/>
Mailing address	<input type="text"/>
Contact name	<input type="text"/>
Telephone	<input type="text"/>
Fax	<input type="text"/>
E-mail	<input type="text"/>

Figure 3 Organisation Information Screen

9.2 Main Menu

Below the organisation information section is the main navigation menu for the survey tool. The Main Menu performs the following functions:

- Navigates to a General Information card
- Navigates to a selected Ageing card
- Identifies cards that have been fully completed
- Provides definitions by clicking on the question mark

How to navigate ?		Main Menu	
<p><i>Please, fill the general information card.</i></p>			
General information about asset management of high voltage equipment	?	Go to	empty
<p><i>Please, fill the following cards on equipment ageing.</i></p>			
Ageing card for Gas Circuit Breakers	?	Go to	empty
Ageing card for Oil Circuit Breakers	?	Go to	empty
Ageing card for Airblast Circuit Breakers	?	Go to	empty
Ageing card for Disconnectors and Earthing Switches	?	Go to	empty
Ageing card for Capacitive Voltage Transformer	?	Go to	empty
Ageing Card for Magnetic Voltage Transformers and Current Transformers	?	Go to	empty
Ageing Card for Combined Current and Voltage Transformers	?	Go to	empty
Ageing card for Surge Arrester	?	Go to	empty
Ageing card for Shunt Capacitors	?	Go to	empty
Ageing card for Post Insulators	?	Go to	empty

Figure 4 Main Menu

9.3 General Information Card

By pressing one of the appropriate “Go to” buttons on the Main Menu, the selected general information card appears.



Please give your responses only in the cells with white background. Depending on your response, some other cells may be activated (white background) for more detailed information.

Multiple Choice questions can be answered by clicking on the particular answer cell. Within the activated cell, the user can select one of the proposed answers from the drop down menu. Since some cells have dependencies, only cells marked with white background need to be filled in.

For answers in free text form, it should be noted that it will generally take several lines to fully identify the requested information. In that case the size of the designed cell should not be modified due to overlong descriptions.

The completed card should be saved using "Extract and Save". The function implemented will generate a specific file name, so that your previous files will not be overwritten. E-mail the General Information Card to cigrewga329@conedify.com

9.4 Ageing Cards

By pressing one of the appropriate "Go to" buttons on the Main Menu the selected Ageing Card appears. Each ageing card has an example line filled up for your benefit.

Filling the aging card requires several steps which can be explained as follows:

1.	Select the components for which you would like to share your experience by choosing "yes" in Column B.
2.	Filter your selection by applying the filter in Cell B2 (upside-down triangle). Select only "yes". You will have to repeat this every time you have changed the selection.
3.	Choose only one ageing phenomenon out of the list and write in the cell the code (e.g. A1) If you do not know exactly what the phenomenon was, you may also choose the main group one level higher (e.g. A0, B0, etc.)
3a.	If you would like to add more than one phenomenon to the component, please select the cell with the component you would like to duplicate, press the button "Add row". Now you can fill out the second ageing phenomenon
3b.	In order to remove the added row, choose the row and press button "Delete Row". NOTE: you may remove rows, which were only added by yourself.



Choice	Component	Subcomponent	Optional subcomponent
eg	Component at service voltage	Making and breaking units	Main contact
no	Component at service voltage	Making and breaking units	
no	Component at service voltage	Making and breaking units	
no	Component at service voltage	Making and breaking units	Main contact

Figure 5 Ageing Card Menu


4.	Fill out the column which consists of "factors influencing the ageing". You may simply write down the codes out of the list given in cell "G1" or type your own text. You may choose multiple factors.
5.	Fill out the column which consists of "failure mode". You may simply write down the codes out of the list given in cell "H1" or type your own text. You may choose multiple modes.
6.	Fill out the column which consists of "detection techniques". You may simply write down the codes out of the list given in cell "I1" or type your own text. You may choose multiple techniques.
7.	Fill out the column which consists of "mitigation techniques". You may simply write down the codes out of the list given in cell "J1" or type your own text. You may choose multiple techniques.
8.	Answer the questions in cell "K1" by typing free text
9.	Choose at what age, according to your experience, the component fails.

The completed card should be saved using "Extract and Save". The function implemented will generate a specific file name, so that your previous files will not be overwritten. E-mail each equipment Ageing Card to cigrewga329@conedify.com

10 Saving Your Data

"Extract and Save" will save the entire file to the selected directory. The given file name indicates which card is going to be used for further analysis.

The "Extract and Save" feature eases the information collection process by adding the name of the presently edited card to the file name. This allows several utility experts within the organization to contribute to the survey in an orderly manner.

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11 Printed Survey

A pdf copy of the survey is included in the sheets below. This is to assist the user in viewing a paper copy of the survey.