

Document No: SDI 534

Amendment No: 4

Substation Design Instruction

Manuals, Test Reports & Photographs

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SUBSTATION DESIGN INSTRUCTION

ASSET STANDARDS & DESIGN

Document No	:	SDI 534
Amendment No	:	4
Approved By	:	MASD
Approval Date	:	17/03/16
Review Date	:	17/03/19

SDI 534 MANUALS, TEST REPORTS & PHOTOGRAPHS

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1.0 PURPOSE

To define the requirements for distribution and storage of equipment manuals, factory test reports, and photographs to be taken, as a record of equipment in transmission/zone substations and switching stations.

2.0 SCOPE

This instruction is to be read in conjunction with SDI 505. Equipment manuals are required to provide written instructions on installing, operating, testing, maintaining and disposing of the equipment, while factory test reports are required to prove their integrity, quality and compliance. Factory test reports are also used for benchmarking and calibration of equipment.

Photographs are taken so that equipment can be viewed without the need to attend the site. This is beneficial for minor augmentation and investigation work.

3.0 REFERENCES

- *Company Policy 9.5.1 Network Asset Information*
- *Company Policy 13.4 Information Asset Classification*
- *Company Policy 13.8 Information Security Management System*
- *Substation Design Instruction SDI 505 - Minimum design and construction requirements for transmission and zone substations and switching stations*
- *Network Management Plan 2011-2013*
- *ENA National Electricity Network Safety Code (Doc. 01-2008)*

4.0 DEFINITIONS AND ABBREVIATIONS

AFIC

Audio Frequency Injection Control

Equipment manual

Includes installation, operation, testing, and maintenance and disposal documentation pertaining to particular equipment.

Factory test report

Manufacturer's authentic documents by which compliance of performance of their equipment to an appropriate standard and ratings are claimed.

MSDS

Material Safety Data Sheet

SFU

Static Frequency Unit

SDI

Substation Design Instruction

5.0 ACTIONS

5.1 General

On completion of each project, within either an existing or a new substation, the Project Manager shall obtain one (1) physical and an electronic **copy** of equipment manuals and factory test reports for all new equipment supplied under that project.

Equipment manuals and factory test reports are required for each item of equipment. However for example, for two (2) sister power transformers the same equipment manual can be used provided that the serial numbers of the equipment along with any differences such as test reports can be clearly identified.

Where identical equipment is supplied in large quantities, for example 30 current transformers, the **Network Substations Manager** may be asked to decide on the number of manuals required.

The Project Manager is also responsible for obtaining the relevant photographs of the completed work, as specified in section 5.3 of this Standard, within one (1) month of practical completion of the project.

The Project Manager shall distribute copies of equipment manuals, factory test reports and photographs to the Regional Transmission Manager **and upload electronic copies to content server as specified in 5.5.**

5.2 Equipment manuals

Equipment manuals shall be of high quality with clear and precise instructions on installing, operating, testing, maintaining and disposing of the particular equipment. Drawings, diagrams and pictures may also form part of the manual to reinforce the subject.

On the cover page, the equipment manual shall include very brief description of the equipment, substation name for which the equipment was supplied, Endeavour Energy's contract number, and the manufacturer's order number.

Where primary equipment is fitted with secondary equipment from a different manufacturer, for example, tap changer on a power transformer, the manufacturer of the primary equipment shall provide all equipment manuals including those from the secondary equipment manufacturer.

Equipment manuals shall include the quantity and the manufacturer's part number for equipment spares.

Equipment manuals shall include the MSDS of all hazardous or flammable material used in the equipment.

5.2.1 *Hard copy manuals*

Hard copy manuals shall be professionally presented in ring-binder files.

If the equipment manual is divided into parts, each file must state volume number, for example, volume one (1) of three (3).

Literature of items that are not part of the equipment supplied shall not be included in the equipment manual.

5.2.2 *Electronic copy manuals*

The electronic copy of manuals and factory test reports shall be provided to Endeavour Energy in a systematic order.

The preferred file format for equipment manuals is PDF (Portable Document Format), and for drawings is AutoCAD. The PDFs shall be fully searchable, having screen reading capability, indexed with book marks and processed using Optical Character Recognition. The document directory structure shall be arranged in a systematic order. A typical example is shown below:

- 📁 **Manuals**
 - 📁 Circuit breakers
 - 📁 132kV CBs
 - 📁 33kV CBs
 - 📁 Power transformers
 - 📁 T1
 - 📁 T2
- 📁 **Photographs**
 - 📁 Circuit breakers
 - 📁 132kV CBs
 - 📁 33kV CBs
 - 📁 Power transformers
 - 📁 T1
 - 📁 T2
 - 📁 Site elevations
 - 📁 Site overall plan view
- 📁 **Factory test reports**
 - 📁 Power transformers
 - 📁 T1
 - 📁 T2
 - 📁 Voltage transformers
 - 📁 132kV VTs
 - 📁 33kV VTs

5.3 Factory test reports

Factory test reports shall comprise all routine, type and special test reports. These reports must indicate type of test performed (for example heat run test on a transformer); test date; manufacturer's model and serial number of the equipment tested; and, name and signature of the testing officer.

In addition, test reports must clearly state the appropriate Australian Standard and year version to which the equipment has been tested, for example current transformers tested to AS 60044.1:2003. In the absence of an Australian Standard, an equivalent Standard may be applied with the approval of the Network Substations Manager.

If hand-written, test report data must be legible. Where applicable, graphs (for example, circuit breaker travel curve) shall be submitted together with the test data.

Factory test reports shall be part of the equipment manual and shall not be supplied separately.

5.4 Photographs

Digital cameras shall be pre-set to stamp the correct date on the photograph to display when it was taken.

All photographs must be in colour and saved onto the same disk as the manuals and factory test reports, provided disk capacity permits.

Photographs must show all sections of the substation and include the following:

- The overall site plan view, showing all buildings and equipment.
- General layout, showing substation primary layout, including transformer, feeder bay arrangements and the like.
- Site elevations (minimum of four [4]) showing building, outdoor switchyard and transformers).
- Inside of switchroom, showing switchgear location and the like.
- Nameplate details of power transformer, tap changer, circuit breaker, isolator/earth switch, voltage, current and auxiliary transformers, auxiliary switchgear and battery charger.

Where applicable photographs shall also show:

- Nameplate details of AFIC/SFU, auto transformer and regulating transformers, auto recloser and power-factor correction capacitor.

All photographs must be clear, bright and capable of showing detail. Photographs of all nameplates must clearly show the serial number and other details that are normally stamped onto the nameplate. For nameplates, close up photographs are required so that small print on the nameplate can be read easily from the photograph. Unreadable and blurred photographs are not acceptable. For this reason, the digital camera's resolution should be set at medium or higher.

In some cases, to capture more details, photographs may be taken with the camera rotated 90 degrees to a north-south position. However, when saving photographs to the disk, all photographs shall illustrate equipment/objects in their correct installed orientation. End users shall not be required to rotate photographs on their PC to view the correct orientation of the equipment.

To allow quick search for photographs, filenames for each photograph shall be meaningful, and not those generated by the digital-camera.

To save on computer memory, all photographs shall be saved in JPEG format (filename: JPG).

5.5 Storing in Content Server

To make equipment manuals, factory test reports and photographs available to other Endeavour Energy users, data files from the disk shall be transferred to Content Server.

5.5.1 Storage location

As there will be different users of these data files, each user may perform a different type of search to gain access to the same file.

Manuals, test reports and photographs are to be stored in Network Management / Manuals & Commissioning Tests/ *Substation name*.

Where a substation does not have a folder in content server yet, the Project Manager will send an email to records@endeavourenergy.com.au to have one created.

5.5.2 Naming conventions

For consistency purposes, when saving data files to the Records Management System, the following method is recommended:

Title field	Endeavour Energy's contract number, MVA rating (for power transformers only), manufacturer, type of equipment (for example, circuit breaker, transformer, AFIC equipment), manufacturer's serial number of the equipment and the site where the equipment is installed.
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5.5.3 Folder and file structure

The folder structure for the substation is as follows:

- Manuals & Test Reports
- Photographs

Documents are to be stored under each of these headings. Metadata will automatically be applied to the documents as per the folder they are placed in.

For example, a transformer manual placed in 'Manuals & Test Reports' will be searchable on the document type 'manual and test report' field and by substation name in Content Server.

5.5.4 Data type

When adding a file to the Content Server it is mandatory to select an item type for metadata from the list below:

- Power Transformers
- Switchgear and Circuit Breakers
- Instrument Transformers
- Capacitor Banks
- Control Building and Civils
- Cables
- Batteries and DC equipment
- Auxiliaries and AFIC
- Other

5.5.5 Entering documents to Content Server

Documents may be entered into Content Server via the web browser or desktop version. When uploading multiple documents or photos at once they must all be of the same item type as per 5.5.4, so that the metadata can be appropriately attributed to the items.

6.0 AUTHORITIES AND RESPONSIBILITIES

Manager Asset Standards & Design has the authority and responsibility for making recommendations to the **General Manager Asset Management** in respect to this instruction.

Network Substations Manager is responsible for maintaining the content of this instruction up to date.

Procurement and Logistics Manager is responsible for procuring equipment in accordance with the requirements of this instruction.

Project Managers are responsible for:

- Meeting the requirements of this instruction within their area of responsibility; and
- Verifying that photographs, equipment manuals and factory test reports are provided for all new equipment supplied under the project.

7.0 DOCUMENT CONTROL

Documentation content coordinator: Network Substations Manager

Documentation process coordinator: Branch Process Coordinator