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Endeavour
Energy



Revision History

This standard replaces amendment 4 of SMI116.

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Document Control

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1 Purpose and scope

The purpose of this instruction is to provide minimum requirements for the process to be followed for the identification of overloaded distribution transformers up to and including 1.5MVA installed on the network and associated actions required to mitigate overloading.

This instruction addresses the following:

- load estimator reports for initial overload identification;
- data verification to ensure validity of load estimator report;
- thermal analysis for identification of thermally overloaded transformers;
- actions to mitigate overloads and if required installation of DSUB monitor; and
- DSUB monitor data analysis and if required transformer uprate submission.

Annexures for this document provide additional information on the Thermal Analysis Application (App) used to verify thermal overloading of a transformer, installation of DSUB monitors, load limits of various distribution transformers and accessing Historian data.

2 References

External Regulations

Electricity Supply Act 1995 (NSW)

Electricity Supply (Safety and Network Management) Regulation 2014

Work Health and Safety Act 2011

Work Health and Safety Regulation 2017

External Standards

ENA National Electricity Network Safety Code (Doc 01-2008)

ENA Specification for polemounting distribution transformers (NENS 007-2006)

AS/NZS 60076.7:2013 - Power transformer Part 7 - Loading guide for oil immersed power transformers

Company Policies and Procedures

Company Policy 9.2.1 – Network Planning

Company Policy 9.2.5 – Network Asset Design

Company Policy 9.2.10 – Network Asset Ratings

Company Policy 9.9.1 – Network Asset Maintenance

Company Standards

ETS 0066 – Pole Substation Distribution Transformers

ETS 0070 – 11kV and 22kV Padmount and Indoor Distribution Transformers

SMI 116 – Identification of overloaded distribution transformers

Company Standards

SAD 0008 – White Sheets

SMI 101 – Minimum requirements for maintenance of distribution equipment

SMI 124 – Maintenance data entry and defect prioritisation

3 Definitions and Abbreviations

Abbreviation	Meaning
ASP	Accredited Service Provider
GIS	Geographical Information System
LV	Low Voltage
SWMS	Safety Work Method Statement

Term	Definition
Data Logger	The Data Logger provides the same capabilities as the DSUB Monitor however on a more granular level and does not have remote monitoring capabilities. The Data Logger is outside the scope of this document.
DSUB Monitor	A monitoring device installed on substations to enable remote monitoring of substation load, and other power quality quantities. Data from DSUB monitors is automatically stored in Historian.
Ellipse	Endeavour Energy's asset management database
Historian	Endeavour Energy's network data repository system
Load Estimator	An online tool used to estimate the load profile of individual distribution substations based on smart meter data and GIS LV connections data.
MDI	Maximum Demand Indicators installed on LV switchgear – manual MDI readings are no longer required to be measured.
Smart Meter	An electronic power meter which can be installed for residential, commercial and industrial loads. The meter has the capability to record energy consumption data and communicate the information at regular intervals.
Summer	Nominally inclusive of 1 October to 30 April in accordance with Company Policy 9.2.10
Thermal Application	An online tool developed in-house to determine the thermal overloading of a particular distribution transformer in the network.
White sheet	A white sheet must be submitted in order to make alterations to the GIS system when GIS data does not match the actual network status.
Winter	1 May to 30 September winter load season, as in Company Policy 9.2.10

- **4 General Requirements**

All distribution substations (pole mount, pad mount, indoor, cottage, kiosk and ground mount) must be included in the process for identifying overloaded transformers. The process to be followed is described in the flowchart of Figure 1.

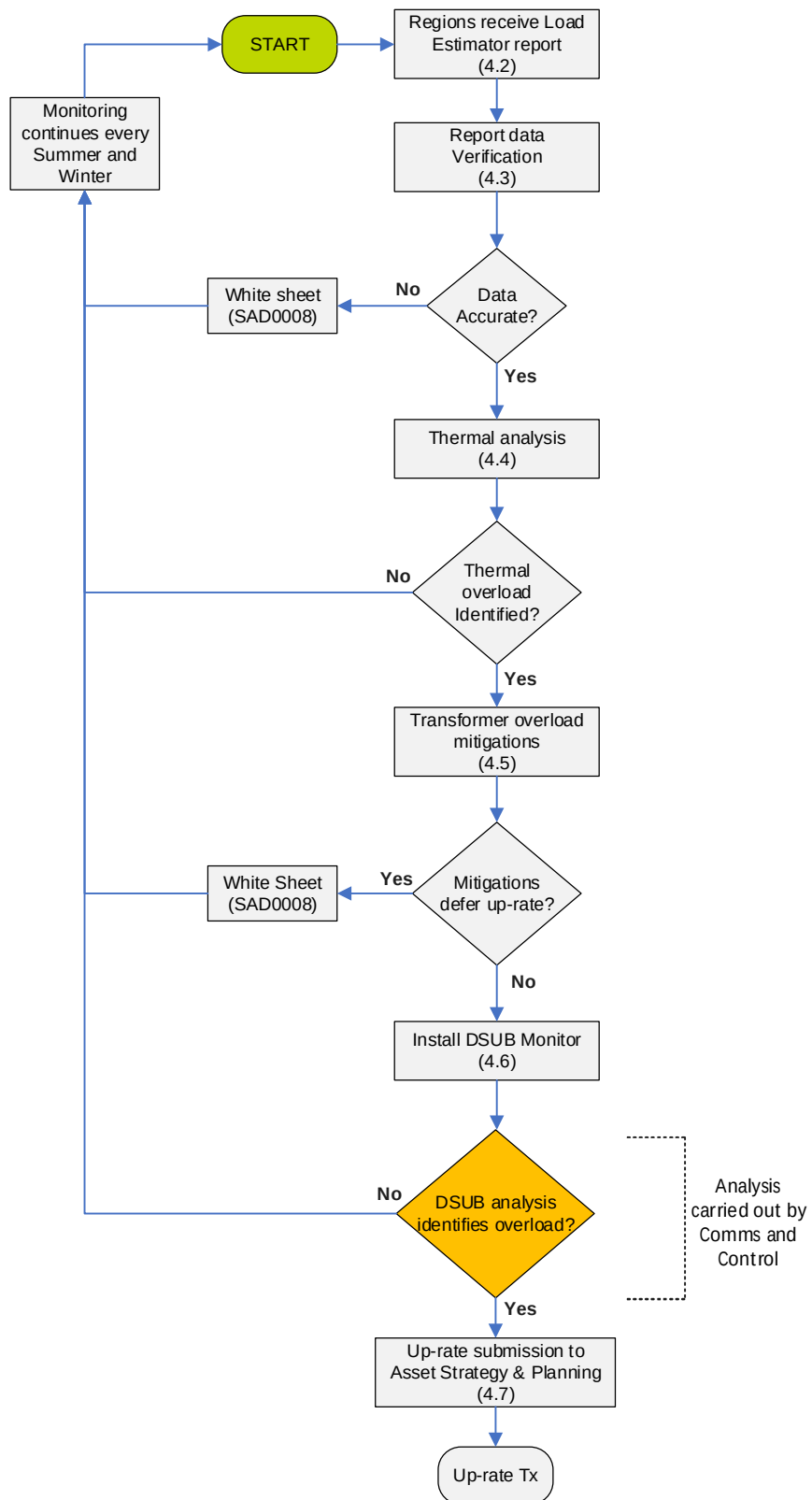
Traditional manual MDI reading processes are no longer part of distribution substation inspections. Potentially overloaded transformers will be identified using the automated Load Estimator program. The Load Estimator is an automated program which estimates the load of individual distribution transformers using smart meter data, GIS data as well as other dynamic parameters and stores the results in Historian in a reportable format.

Once identified, the transformers will have to go through an iterative process to determine whether an uprate is required. The determination will be based upon data validation, examination of thermal overloading, carrying out overload mitigation actions, installation & analysis of DSUB monitor data and finally submission to Asset Strategy and Planning.

4.1 Process Flowchart for Transformer uprate

The process of identifying overloaded transformers and undertaking follow up actions to mitigate overloading are outlined in the flowchart in Figure 1. Each process or decision step within the flowchart is described in further detail within the specified section of this document.

Figure 1 – Process flowchart for transformer uprate



4.2 Load Estimator Report

The Load Estimator Report contains a list of substations with potentially overloaded transformers based on the load estimates calculated by the automated Load Estimator program.

The Load Estimator report will be distributed to Regional Services Managers for action in an automated manner from Historian via email at the end of every summer and winter period.

The criteria used by the program for determining overload is if 95% of summer cyclic rating of the transformer is exceeded for a minimum of two hours (Refer to Annexure 3 for load limits of transformers).

4.3 Load Estimator Report – data verification

With the receipt of the Load Estimator report, analysis must be undertaken by Regional Services Managers to validate the data. Data validation involves ensuring the GIS data used by the Load Estimator program matches the actual network status. This is necessary to confirm transformer loading and possible misleading instances that may lead to possible errors in estimated loads.

Misleading instances that must be considered are:

- do the number of connected customer points (CCPs) in GIS match the physical CCPs of the substation? – the Load Estimator may produce poor estimates if GIS is inaccurate;
- LV parallel/s may be in place; and
- if multiple transformers exist for a substation (see 4.3.1 below).

If a misleading instance exists, actions must be undertaken to amend these. Instances that require amendment of GIS data are to be rectified through the process described in SAD0008 – White Sheets.

Overloading due to abnormal activities like switching or emergency loading must be excluded from the analysis.

4.3.1 Multiple transformer substations

For multiple transformer substation configurations, the Load Estimator may produce inaccurate estimates for individual transformer loading. As a result, during the data verification stage, these substations must be additionally investigated to determine if individual transformers are overloaded.

There are two possible scenarios that can occur:

- the transformers in the substation are approximately evenly loaded; and
- the transformers in the substation are unevenly loaded, producing both overloaded and underloaded transformers.

For even transformer loading, the remainder of the process outlined in this document must be followed.

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For uneven loading a DSUB Monitor must be installed on the overloaded transformer during the verification stage. After collecting the required data, the remainder of the process must be followed.

4.4 Transformer thermal analysis

After data accuracy has been verified, thermal overloading of the transformer must be verified by Regional Services Managers using the thermal modelling app. The thermal modelling app, based on AS/NZS 60076.7:2016, uses loading data, ambient temperature data (correction factor for temperature due to enclosure is applied in accordance with AS/NZS 60076.7) and transformer specific thermal parameters based on substation type and nameplate rating to calculate maximum top oil and hot spot temperatures.

If the thermal modelling app does not show any temperature readings exceeding the maximum top oil and/or hot spot temperatures (refer to 4.4.1 for uprate criteria used by the app), the transformer is deemed to be not thermally overloaded. In this instance, no action is required, and the transformer returns to being monitored by the Load Estimator program.

Refer to Annexure 1 for further details relating to the use of the Thermal Modelling App.

4.4.1 Uprate criteria used by thermal modelling app

The criteria used for determination on and uprate of the transformer at a substation must satisfy **either** of the following thermal conditions¹:

- the maximum top oil temperature is greater than 105 deg. C.
- the maximum hot spot temperature is greater than 135 deg. C.

4.5 Transformer overload mitigations

Following confirmation of thermal overload and prior to transformer uprate, the following actions must be considered to mitigate the overloading:

- transfer of load; and
- (phase) load balancing.

Where mitigations are employed and/or data validation has found that there are discrepancies in GIS data, changes must be recorded in accordance with company standard SAD0008 – White Sheets. After the submission of a White Sheet, the substation returns to being monitored by the Load Estimator program to assess if the changes have rectified the overload.

4.6 Use of DSUB monitors

Where mitigations as described above fail to alter the loading of the transformer, a DSUB monitor must be installed by regional field staff at the substation in question. DSUB monitors are allocated within the scope of LV005. LV005 –

¹ Derived from AS/NZS 60076.7:2013 – Table 4 – Current and temperature limits applicable to loading beyond nameplate rating.

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DSUB Monitoring & LV Feeder Monitoring for Solar PV is a capital program which budgets for the installation of DSUB monitors.

Once installed, the DSUB monitor must capture loading data for a full summer period. The data from the DSUB monitor is automatically stored in Historian. Stock codes for DSUB monitors are as follows:

- DSUB monitor for pole substation (Stock code: 1566504)
- DSUB monitor for padmount substation (Stock code: 1566512)

Refer to Annexure 2 for instructions on installation of DSUB monitors. Data from DSUB monitors (stored in Historian) will be analysed by the Senior Engineer – Communications and Control to identify if summer cyclic loadings are exceeded. A list of transformers with loadings above their 95% summer cyclic loadings will be distributed to Regional Services Managers at the end of the summer period for further actioning in accordance with the flowchart of Figure 1.

4.7 Transformer uprate submission

Following analysis of DSUB monitor data, if a transformer is required to be uprated, a submission must be made to Manager Asset Strategy & Planning in the form of a change request. The submission process for transformer uprates is to be performed strictly on the condition that the process in this document has been followed and mitigations fail to rectify transformer overloading.

The replacement transformer size must be decided based on:

- cyclic loading of the transformer;
- load growth information obtained from Capacity Planning Manage; and
- standard transformer sizes in accordance with ETS 0066 and ETS 0070.

4.8 Process timeframes

Load Estimator reports are distributed to the relevant Regional Service Manager. Upon receipt, Regional Service Managers must action the overloaded transformers within the timeframes set out in Table 1.

Table 1: SMI116 Process timeframes

Activity	Action time	Responsibility
Load Estimator report released to Regional Services Managers	Released after every summer and winter period	Senior Engineer – Communications and Control
Data verification of all potentially overloaded transformers in report	2 months	Regional Services Managers
Thermal analysis using App	2 months	Regional Services Managers
Undertake overload mitigations	6 months	Regional Services Managers
Install DSUB monitor	3 months	Regional Services Managers

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DSUB monitor analysis and release report	At end of summer period	Senior Engineer – Communications and Control
Replace transformers that were identified for uprate (after AS&P approval)	6 months	Regional Services Managers

4.9 Limits on loading of distribution transformers

The limits of loading for distribution transformers are outlined in Annexure 3. These limits are utilised as one of the parameters by the Load Estimator and Thermal Analysis App to make a determination whether a transformer is overloaded.

5 Authorities and Responsibilities

Manager Asset Standards & Design has the authority and responsibility for:

- approving this standard in accordance with GAM0001

Manager Asset Strategy & Planning has the authority and responsibility for:

- approving the funding for transformer uprate submission

Substations Assets Manager has the authority and responsibility for:

- endorsing the content of this standard in accordance with company policies and procedures

Senior Engineer – Distribution Substation Assets has the authority and responsibility for:

- revising and updating the content of this standard in accordance with company policies and procedures

Senior Engineer – Communications and Control Development has the responsibility for:

- releasing Load Estimator reports after every summer and winter period to the appropriate Regional Services Managers;
- carrying out analysis of DSUB monitor data to determine if transformers require uprate and distributing report to Regional Services Managers after each summer period; and
- ongoing management of Historian, DSUB Monitor asset information and tools/applications relating to this instruction

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Regional Services Managers have the authority and responsibility for:

- carrying out activities in accordance with this standard to verify overloaded transformers, undertake mitigations for overloading and if required, uprating transformers in a timely manner; and
- delegate tasks to regional field staff as required to complete activities in accordance with this standard

Capacity Planning Manager has the authority and responsibility for:

- providing load growth information to Regional Services Manager when a transformer is to be uprated

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Annexure 1 – Thermal Modelling App

The Thermal Modelling Application (App) is a resource to assist Regional Services in determining the thermal overloading of a select distribution substation. The App can be found in the following location:

<\\hwns03pp\general\SHARE\LoadEstimatorThermalModelApp\Application>

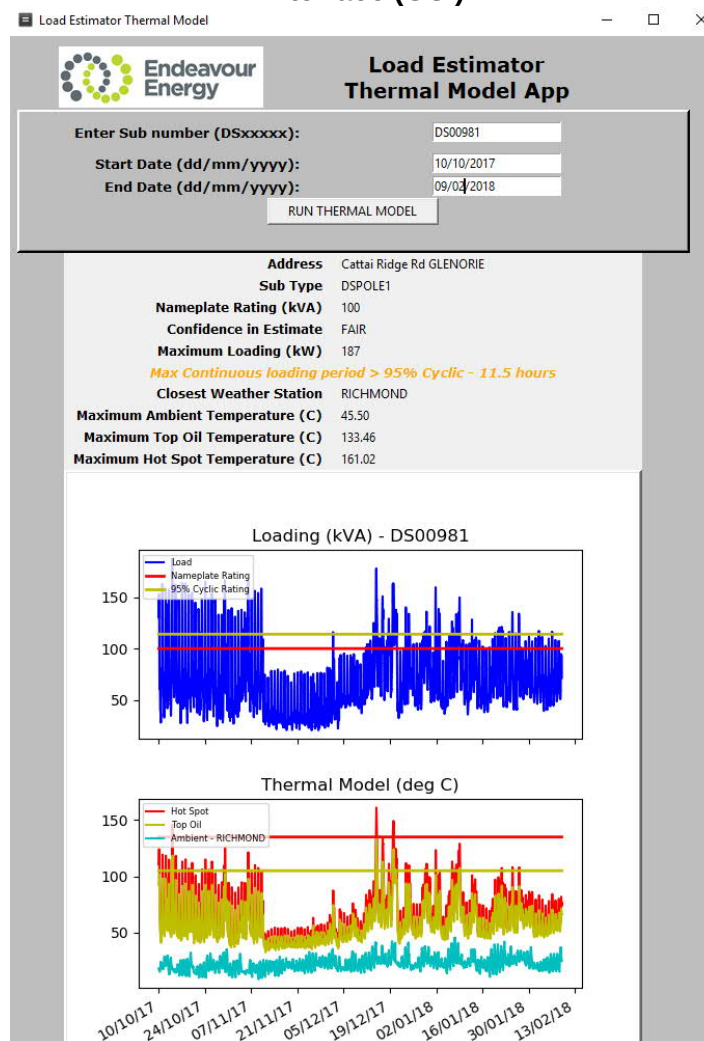
The file shown below, in Figure 1, is titled 'DSUBThermalModelApp.exe'. This file MUST be copied to the reviewer's PC prior to use to assist in the protection of the original application. After use the application should be deleted and recopied when accessed again, to ensure the latest version is utilised.

Figure 1 - DSUB Thermal Modelling App.exe

Name	Date modified	Type	Size
DSUBThermalModelApp.exe	24/01/2019 8:50 AM	Application	27,371 KB

Once the App is opened, the interface shown in Figure 2 will be displayed.

Figure 2 - Thermal Modelling App Interface (GUI)



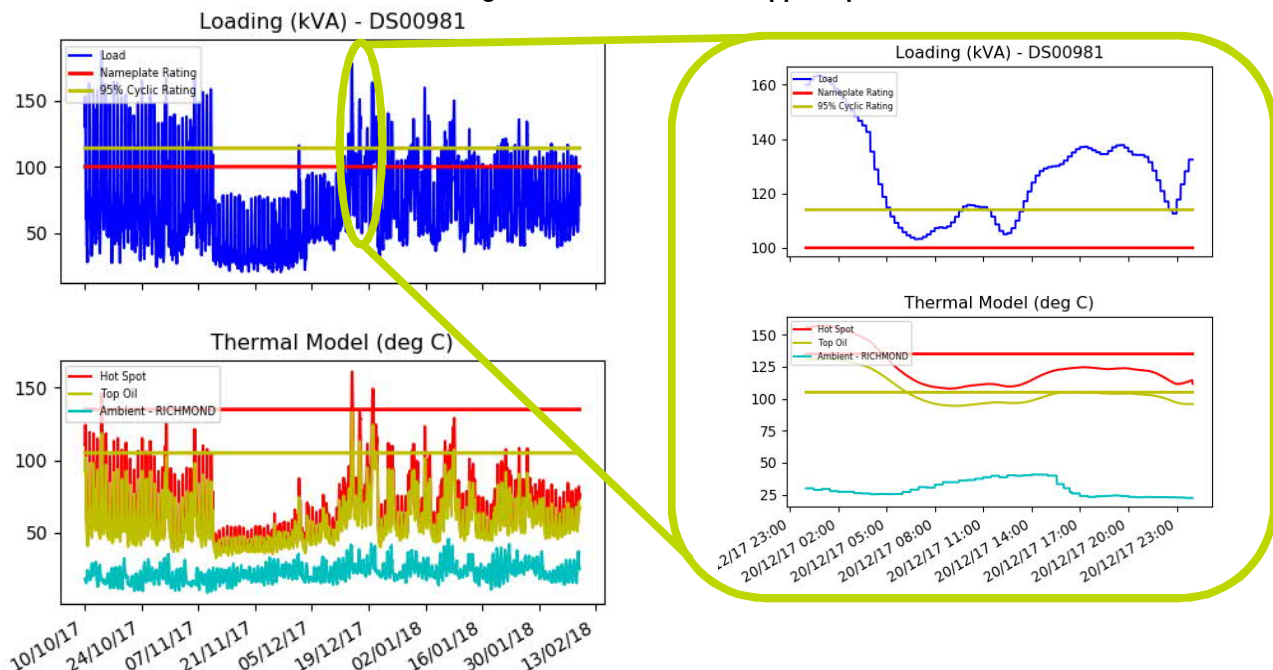
SMI 116 – Identification of overloaded distribution transformers

The Graphical User Interface (GUI) is features input boxes for the substation number (in the format 'DSxxxxx') and the start and end dates of the required interval. Below the date input is the 'RUN THERMAL MODEL' button to produce the loading/thermal graphs. It is important to note that the intervals may not always have data up to present as the Load Estimator data export to Historian is a scheduled event, pending receipt of metering data.

Additional data will be found below the data entry box displaying general information first followed by data information (confidence, max and weather station) and lastly temperatures. Further definitions are as follows:

- *'Confidence in Estimate'*: Description of the accuracy of the Load Estimator smart meter penetration.
- *'Maximum Loading'*: The maximum loading within the selected period.
- *'Max Continuous Loading'*: Provides the period of time the loading was above the max Summer/Winter cyclic rating.
- *'Closest Weather Station'*: Weather station utilised to determine the temperature of the area where the substation is located, for calculations in the thermal model.
- *'Maximum Ambient Temperature (C)'*: The maximum ambient temp outside the 'enclosure', i.e. the maximum observed temperature from the nearest Weather Station.
- *'Maximum Top Oil Temperature (C)'*: calculated max top oil temperature.
- *'Maximum Hot Spot Temperature (C)'*: calculated max top hot spot temperature.

Figure 3 - Thermal Model App Graphs



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Within the electrical loading line graph the data presented is indicated in the legend:

- Blue: The Load Estimator substation loading, sourced from Historian;
- Red horizontal line: name Plate rating limit; and
- Tan horizontal line: 95% max Summer/Winter cyclic rating.

Within the thermal model line graph the data presented is indicated in the legend:

- Red: calculated hot spot temperatures;
- Tan: calculated top oil temperatures;
- Teal: ambient air temperatures (of the surrounding area); and
- Red and Tan horizontal lines: indicate the hot spot and top oil maximum temperatures.

From these graphs the severity of the overload can be determined and whether the electrical overload translates to a significant thermal overload. The smallest period the Thermal Modelling App can display is 24 hours (i.e. 20/12/17 till the 21/12/17) with 3-hour increments. This provides enough precision necessary to confirm whether a 95% (maximum summer cyclic) overload prolonged for a period of greater than two hours results in oil temperatures that breaches the maximum top oil and hot spot temperatures.

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- **SMI 116 – Identification of overloaded distribution transformers**
- **Annexure 2 – Installation of DSUB Monitor**

The DSUB Monitor installation is outlined in the 'Installation of EDM I Meter for Substation Monitoring' guide. The guide provides a step-by-step explanation of how to install and commission the DSUB Monitor. The guide provides information for both ground and pole-mounted substations.

The guide is stored in the location below:

\\hwns03pp\General\SHARE\DSUBMonitorkm\06 Manuals\Installation Guide\

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Annexure 3 – Limits of loading for distribution transformers

For oil-immersed distribution transformers, the maximum allowable two (2) hour short time emergency rating, and maximum summer cyclic rating is outlined in tables below for transformers manufactured before and after 2013 respectively. The two-hour short time emergency rating and summer peak cyclic ratings have been calculated from the data provided in manufacturer test reports. These tables are applicable for transformer contracts prior to 2019.

Table 1: Emergency and maximum Summer/Winter cyclic rating for oil-immersed distribution transformers (manufactured before 2013)

Category	kVA ≤ 500	500 < kVA < 1500	kVA ≥ 1500
Type of substation with oil immersed distribution TX	Two (2) hour short time emergency rating or Summer/Winter maximum cyclic rating (% of nameplate rating)		
Single pole substation - 1 Tx	120	N/A	N/A
Single pole substation - 2 Tx	120	N/A	N/A
Double pole substation - 1 Tx	120	N/A	N/A
Padmount substation - 1 Tx	115	100	85**
Padmount substation - 2 Tx*	115	100	85**
Padmount substation - 3 Tx*	115	100	85**
Cottage substation - 1 Tx	125	115	110
Cottage substation - 2 Tx	125	110	95
Indoor substation - 1 Tx	125	115	100
Indoor substation - 2 Tx	125	110	95
Indoor substation - 3 Tx	120	105	90
Indoor substation - 4 Tx	120	105	90
Indoor substation - 5 Tx	120	105	90
Indoor substation - 6 Tx	120	105	90
Indoor substation - 7 Tx	120	105	90
Ground substation - 1 Tx	140	130	110
Ground substation - 2 Tx	140	130	110
Ground substation - 3 Tx	140	130	110
Kiosk substation - 1 Tx	120	105	90
Private substation/HVC	120	N/A	N/A
Regulating substation	120	N/A	N/A
SWER isolating substation	120	N/A	N/A

* Multiple padmount installations adjacent to each other.

** These derating factors are calculated in accordance with IEC 60076 - 7 loading guide for oil-immersed power transformers, which takes into account the transformer's heat run type test reports and service conditions.

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Table 2: Emergency or maximum Summer/Winter cyclic rating for oil immersed distribution transformers (manufactured 2013 onwards)

Substation type	Transformer type	Voltage (kV)	Manufacturer	Summer/Winter maximum cyclic rating (% of nameplate rating)		
Pole Sub	25kVA - 3 phase	22	PLP	155%	155%	N/A
	25kVA - 1 phase	11	PLP	130%	130%	N/A
	25kVA - 3 phase	11	PLP	160%	160%	N/A
	25kVA - 1 phase	22	PLP	145%	145%	N/A
	50kVA - 1 phase	22	PLP	130%	130%	N/A
	63kVA - 3 phase	11	PLP	135%	135%	N/A
	200kVA - 3 phase	22	PLP	135%	135%	N/A
	25kVA - SWER	12.7	PLP	145%	145%	N/A
	100kVA – SWER Isolating Tx	11	PLP	145%	145%	N/A
	100kVA – SWER Isolating Tx	22	PLP	150%	150%	N/A
	50kVA - 1 phase	11	Tyree	115%	115%	N/A
	100kVA - 3 phase	11	Tyree	155%	155%	N/A
	100kVA - 3 phase	22	Tyree	135%	135%	N/A
	200kVA - 3 phase	11	Tyree	115%	115%	N/A
	315kVA - 3 phase	11	Tyree	115%	115%	N/A
	315kVA - 3 phase	22	Tyree	125%	125%	N/A
	400kVA – 3 phase	22	Tyree	115%	115%	N/A
Padmount Sub	315kVA - 3 phase	11	Tyree	120%	120%	120%
	315kVA - 3 phase	22	Tyree	125%	125%	125%
	1000kVA - 3 phase	11	Tyree	85%	85%	85%
	1500kVA - 3 phase	11	Tyree	85%	85%	85%
	500kVA - 3 phase	11	Wilson	135%	135%	135%
	1000kVA - 3 phase	11	Wilson	90%	90%	90%
	1000kVA - 3 phase	22	Wilson	95%	95%	95%
Cottage sub	315kVA - 3 phase	11	Tyree	135%	130%	N/A
	315kVA - 3 phase	22	Tyree	140%	140%	N/A
	1000kVA - 3 phase	11	Tyree	110%	110%	N/A
	1500kVA - 3 phase	11	Tyree	110%	110%	N/A
	500kVA - 3 phase	11	Wilson	150%	150%	N/A
	1000kVA - 3 phase	11	Wilson	125%	120%	N/A
	1000kVA - 3 phase	22	Wilson	130%	125%	N/A
Indoor sub	315kVA - 3 phase	11	Tyree	135%	130%	125%
	315kVA - 3 phase	22	Tyree	140%	140%	135%
	1000kVA - 3 phase	11	Tyree	110%	110%	100%

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Substation type	Transformer type	Voltage (kV)	Manufacturer	Summer/Winter maximum cyclic rating (% of nameplate rating)		
Ground sub	1500kVA - 3 phase	11	Tyree	110%	110%	100%
	500kVA - 3 phase	11	Wilson	150%	150%	145%
	1000kVA - 3 phase	11	Wilson	125%	120%	115%
	1000kVA - 3 phase	22	Wilson	130%	125%	120%
	315kVA - 3 phase	11	Tyree	140%	140%	140%
	315kVA - 3 phase	22	Tyree	145%	145%	145%
	1000kVA - 3 phase	11	Tyree	115%	115%	115%
	1500kVA - 3 phase	11	Tyree	120%	120%	120%
	500kVA - 3 phase	11	Wilson	155%	165%	155%
	1000kVA - 3 phase	11	Wilson	130%	130%	130%
	1000kVA - 3 phase	22	Wilson	135%	135%	135%

Table 3: Look up table for pole and padmount installations (installed before 2013)

Type of substation with oil immersed distribution transformers	Nameplate rating	Summer maximum cyclic rating	95% of cyclic rating
Pole substation transformers, all sizes	50	60	57
	58	70	66
	63	76	72
	75	90	86
	100	120	114
	110	132	125
	150	180	171
	160	192	182
	200	240	228
	250	300	285
	260	312	296
	300	360	342
	315	378	359
	400	480	456
Padmount transformers ≤ 500 kVA	100	115	109
	110	127	120
	150	173	164
	160	184	175
	200	230	219
	250	288	273

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Type of substation with oil immersed distribution transformers	Nameplate rating	Summer maximum cyclic rating	95% of cyclic rating
	260	299	284
	300	345	328
	315	362	344
	400	460	437
	500	575	546
Padmount transformers 500 < kVA < 1500	600	600	570
	750	750	713
	800	800	760
	1000	1000	950
Padmount transformers 1500 kVA	1500	1275	1211

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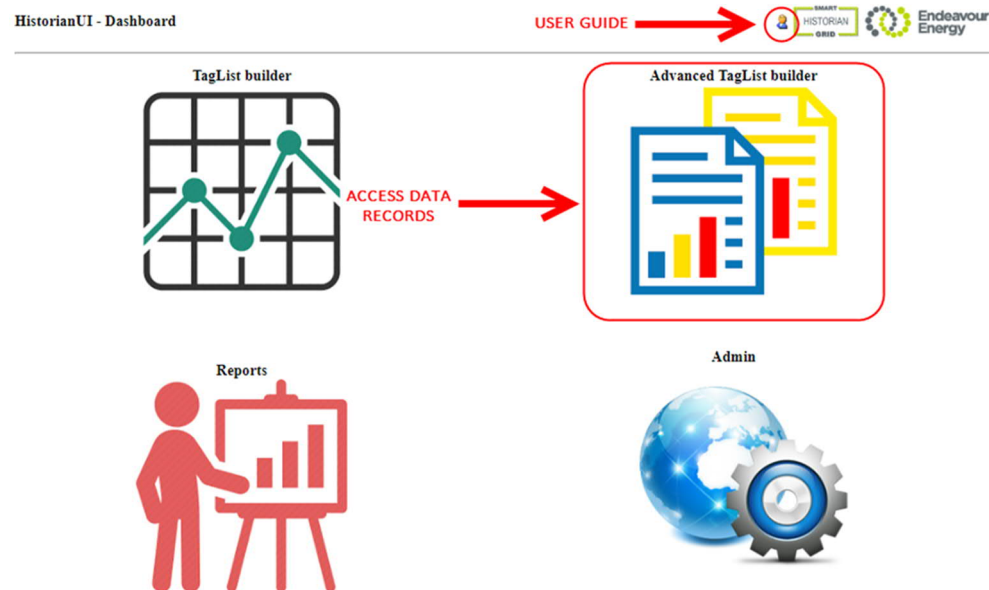
Annexure 4 – Historian Access

Historian stores all MDI data automatically from the Load Estimator and DSUB Monitors. The Historian User Interface (UI) presents the data in an intuitive manner which is easy to use. Access to historian is via a web portal:

<http://ot.eeaus.com/HistorianUI/>

The Dashboard of the portal is shown in Figure 1. Historian has a user guide that explains in depth how to access data records. This can be accessed by clicking the  icon on the top right-hand side of the Dashboard. The TagList builder is used to access data records including Load Estimator Report data.

Figure 1: Historian Web Portal



Shown within the Historian user guide, under section 3.3-3.6, is the explanation of the Historian UI and Advanced TagList builder. This guide should be referred to for a more comprehensive explanation of access. For quick reference a summarised version is shown below.

Quick Guide – MDI Data Access

Once selecting the Advanced TagList builder the UI shown below in Figure 2 is displayed. To access MEL data the following steps, need to be taken:

1. Under Asset ID, enter the substation number with the prefix “DS”, i.e. “DS12345”;
2. Select the kW measurement;
3. Add measurement to measurement list (it is possible to add multiple items to a measurement list);
4. Select the desired measurement; and
5. Select Plot.

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Figure 2: Advanced TagList builder UI

Asset ID: DS12345 Search OR **1 - ENTER SUBSTATION - "DSxxxxx"**

Source:

Location:

List of available raw measurements

Asset Type	AssetNo	OpNo	Measuremer	Phase	Voltage	ReadingType	Quality	UOM	Oldest Samp	Latest Samp
DSUB	DS12345	DS12345	kW	3P	LV	Estimate - Active Energy - E	POOR	kW	14-Aug-2017	12-Feb-2019

2 - SELECT DATA

3 - ADD TO MEASUREMENT LIST

15Min Interval Add Toggle Search Clear Search View 1 - 1 of 1

List of selected measurements

Description	Color	Summar	Formula

Add Multiply Avg Min Max

15Min Interval Add Toggle Search Clear Search View 1 - 1 of 1

List of selected measurements

Description	Color	Summar	Formula
kW 3P DSUB-DS12345 at MENANGLE (15Min Interval)	Orange	View	View

4 - SELECT CHANNEL TO PLOT

5-PLOT DATA - EXPORT FROM PLOT

Add Multiply Avg Min Max
Divide Subtract S.Avg S.Min S.Max
15min
Remove

Sqrt CubeRt Cos Sin Tan
Squared Cubed Acos Asin Atan
Exp Log Ln Abs
Operand:

Category: Miscellaneous
Save Description: List of tags
Plot

Once the plot has been loaded the screen shown in Figure 3 will display the plot in addition to the legend details and the time window control. The window control circled in Figure 4 provides the ability to reduce or expand the time periods. The From/To Dates the ability to select periods and refine data using key start and end dates. Once making changes to the options the Re-Plot button must be selected to plot the changes. For instances where there are multiple items plotted on the plot, items can be 'turned off' or 'turned on' by clicking the legend titles.

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Figure 3: Plotting screen



In addition to a host of other functions presented on the plotting screen is the Export Button. Upon clicking this the plotted data will be exported to a .csv file for those who wish to utilise Excel for data analysis.

Produced by Asset Standards and Design Branch

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