

11/22kV padmount autotransformer

Product approval and audit form

Endeavour Energy use only:

Product approval officer:..... Date received:.....

Application ID no:..... Approval no:.....

Manufacturer:

Contact person and details:

.....

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Manufacturer's signature: Date:

Note to applicant: This form is to be submitted with the corresponding Product approval application form.

It shall be the responsibility of the person/organisation requesting the approval for a particular type of product to be used in Endeavour Energy's network, to have this form completed by the manufacturer and returned to Endeavour Energy for examination. This form shall contain measured values and page numbers as found on the product test reports. The information provided may be used for future audit purposes.

11/22kV padmount autotransformer specification to ETS 0073	Test results (actual values)	Page no.
1. Manufacturer details		
Manufacturer		
Plant address		
Reference drawings		
Manufacturer's design no.		
Generic description		

11/22kV padmount autotransformer specification to ETS 0073	Test results (actual values)	Page no.
2. Guaranteed performance		
Rated power (kVA)		
Number of phases		
Rated voltage:		
i. HV winding (22kV winding) (V)		
ii. LV winding (11kV tapping) (V)		
Vector group symbol		
Impedance voltage @ rated current on principal tap:		
i. Resistance (% rated voltage)		
ii. Reactance (% rated voltage)		
Regulation:		
i. Unity p.f. (%)		
ii. 0.8 p.f. (%)		
Harmonics in secondary voltage at no-load sinusoidal HV applied:		
i. 3rd Harmonics (%)		
ii. 5th Harmonics (%)		
iii. 7th Harmonics (%)		
Temperature rise limits (1.0 x normal rating) in Endeavour Energy padmount cubicle:		
i. Top oil (deg. C)		
ii. HV winding - by resistance (deg. C)		
iii. LV winding - by resistance (deg. C)		
Temperature rise limits (1.5 x normal rating) in Endeavour Energy padmount cubicle:		
i. Top oil (deg. C)		
ii. HV winding - by resistance (deg. C)		
iii. LV winding - by resistance (deg. C)		
Tapping		
i. Quantity		
ii. Range +% to -% (%)		
iii. Step (%)		
iv. Switching On-line / Off-line		
Sound power level (dBA)		
Losses on principal tap @ 75 deg. C:		
i. Load (W)		
ii. No load (W)		

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Minimum insulation resistance @ 20 deg. C - 1kV test after one (1) minute:		
i. HV winding (mega ohms)		
ii. LV winding (mega ohms)		
iii. Core (mega ohms)		
Continuous permissible over voltage at any tap (%)		
Radio interference level (micro volts)		
K – capitalised cost of transformer (to ETS 0073 formula $K = C + LSi \times Wi + LSc \times Wc$)		
3. Guaranteed performance – all items		
Offered equipment fully complies with specification ETS 0073 If No, state all non compliances.	Yes ☐ No ☐	
Manufacturer quality assurance system		
Insulating oil:		
i. Type		
ii. Method of filling adopted (provide details as in clause 5.9 of ETS 0073)		
iii. Brand of oil used		
iv. Complies with ETS 0010 / ETS 0032	Yes ☐ No ☐	
<i>Physical and chemical properties of insulating oil</i>		
i. Appearance		
ii. Colour		
iii. Density (kg/dm ³ @ 20 deg. C)		
iv. Viscosity (mm ² /s @ 40 deg. C)		
v. Flashpoint (deg. C)		
vi. Pour point (deg.C)		
vii. Water content mg/kgm (ppm)		
viii. Neutralisation value (mg KOH/g)		
ix. Interfacial tension (mN/m)		
x. Corrosive sulphur		
xi. Total sulphur content		
xii. DBDS (dibenzyl disulphide) content		
xiii. Furan content (2-FAL) (2-furfural)		
xiv. PCA (polycyclic aromatic) content		
xv. PCB (Polychlorinated biphenyls) screening		
xvi. Gassing tendency		

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xvii. Synthetic inhibitor concentration		
<i>Electrical Properties</i>		
i. Dielectric dissipation factor mrad @ 90 deg. C and 40 Hz to 60 Hz		
ii. Dielectric breakdown voltage (kV)		
<i>Oxidation stability for inhibited oil (test duration after 500 hours)</i>		
i. Sludge (%)		
ii. Neutralisation no. (mg KOH/g)		
iii. Dielectric dissipation factor @ 90 deg. C		
4. Transformer details		
Overall dimensions:		
i. Length (mm)		
ii. Width (mm)		
iii. Height (mm)		
Mass:		
i. Total - complete all fittings, filled with oil, ready for service (kg)		
ii. Core and windings (kg)		
Insulating oil (to fill to correct level of 15 deg. C):		
i. Mass (kg)		
ii. Volume (litre)		
HV bushings:		
i. Make		
ii. Type (bushing well/other - nominate)		
iii. Australian Standard with which they comply		
iv. Current rating (A)		
LV bushings:		
i. Make		
ii. Type (bushing well/other - nominate)		
iii. Australian Standard with which they comply		
iv. Current rating (A)		

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Winding:		
i. Type		
ii. Material (Cu or Al)		
iii. Total mass of conductor (kg)		
iv. Shape of cross section of conductor		
v. Cross-section area of conductor (mm ²)		
vi. Number of effective turns - on principle tap		
vii. Number of effective turns - on maximum tap		
viii. Conductor insulation material		
ix. Current density (A/mm ²)		
x. Rated volts per turn (V/turn)		
Core:		
i. Type		
ii. Brand or trade name/grade of electrical steel		
iii. Country of supply		
iv. Total mass of electrical steel (kg)		
v. Flux density based on nett cross-sectional area with rated voltage applied at rated frequency:		
• Limbs (T)		
• Yokes (T)		
Degree of dryness expressed as dielectric loss angle @ 20 deg. C		
Tank design is sealed	Yes ☐ No ☐	
Maximum operating pressure of the sealing system @ maximum permissible overload (kPa absolute)		
Vacuum withstand capacity:		
i. Tank (kPa)		
ii. Radiators (kPa)		
Tank surface finish:		
i. External		
ii. Internal		
Radiator surface finish		
Location of CTs	Int. ☐ Ext. ☐	

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CT details:		
i. Class		
ii. Ratio		
iii. Burden (Ohms)		
iv. Output (VA)		
Permissible angle of tilt to the vertical during erection:		
i. Parallel to length (degrees)		
ii. Parallel to the width (degrees)		
All external bolted connections are stainless steel or hot dip gal.	Yes ☐ No ☐	
5. Detail of type or special tests supplied (provide specific type tests report no's)		
Type tests:		
i. Short circuit	Yes ☐ No ☐	
ii. Temperature rise test	Yes ☐ No ☐	
iii. Temperature rise test at 1.5 x normal rating	Yes ☐ No ☐	
iv. Impulse voltage withstand	Yes ☐ No ☐	
v. Impulse voltage withstand incl. chopped wave	Yes ☐ No ☐	
vi. Sound level	Yes ☐ No ☐	
vii. Pressure test on sealed transformer	Yes ☐ No ☐	
viii. Testing on the protective coating of the tank	Yes ☐ No ☐	
Special tests:		
i. Partial discharge test	Yes ☐ No ☐	
ii. Mass of transformer	Yes ☐ No ☐	
Routine tests:		
i. Measurement of winding resistance	Yes ☐ No ☐	
ii. Ratio and phase relationship checks	Yes ☐ No ☐	
iii. Measurement of short circuit impedance and load loss	Yes ☐ No ☐	
iv. Measurement of no load loss and current	Yes ☐ No ☐	
v. Induced over voltage withstand test	Yes ☐ No ☐	
vi. Separate source voltage withstand test	Yes ☐ No ☐	
vii. Insulation resistance	Yes ☐ No ☐	
viii. Tightness test		
ix. Oil test	Yes ☐ No ☐	
Where response is NO, state the expected guaranteed values		