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NPS/003/023 – Technical Specification for 33kV, 66kV and 132kV Post CTs

1. Purpose

This document is the technical specification for 33kV, 66kV and 132kV outdoor post type current transformers (post CT) for use on the Northern Powergrid networks.

This document supersedes the following documents, all copies of which should be destroyed;

Document Reference	Document Title	Version	Published Date
NPS/003/023	Technical Specification for 33kV, 66kV and 132kV Post CTs	4.0	Nov 2022

2. Scope

This specification details the requirements for 33kV, 66kV and 132kV post CT for use in open terminal substations on the Northern Powergrid distribution network. This specification shall be used in conjunction with any project specific requirements detailed in Appendix 5, Addendum to Supplier Requirements.

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3. Technical Requirements

3.1. General Design Requirements

3.1.1. Current Transformers

Post Type CTs shall fully comply with the requirements of BS EN 61869-1 'Instrument transformers Part 1: General requirements' and BS EN 61869-2 'Instrument transformers Part 2: Additional requirements for current transformers' as well as the Electromagnetic Compatibility EMC regulations. Where the standards provide alternative options, Northern Powergrid's specific requirements stated within this specification shall also be met.

The CT support/housing shall be of a composite construction. Composite post insulators shall be manufactured from grey silicon rubber hollow core composite insulators that have been tested in accordance with IEC 61462 and IEC 62217

Post type current transformers shall be supplied with the option of up to five secondary cores, with a thermal rating equivalent to the rated primary current.

Class X type CTs used for the protection of feeders and transformers shall comply with the additional requirements stated in BS EN 61869-2 clause 5.6.202.4 "Class PX and class PXR protective current transformers".

Dedicated Measurement type CTs shall provide Class 1, 0.5S or 0.2S measurement performance, depending on the project requirements, from 10% to 120% of the rated current (or higher if an extended primary current is specified). CTs of this type shall comply with the additional requirements stated in BS EN 61869-2 for measuring devices. These will be specified on a project to project basis.

Protection type CTs shall provide class 5P protection performance in the overcurrent range. CTs of this type shall comply with the additional requirements stated in BS EN 61869-2 clause 5.6.202.2 for "Protective current transformers". The Protection Type CT's will provide Class 1 measurement performance from 10% to 120% of the rated current (or higher if an extended primary current is specified)

Post CTs shall preferably have been assessed by the Energy Networks Association (ENA) and been awarded an ENA Notice of Conformance.

Appendix 1 contains a schedule of electrical requirements for the CTs

Appendices 2 & 3 contain a declaration of performance which must be completed for each CT type offered.

Appendix 4 contains a self-certification declaration which must be completed for each CT type offered.

Appendix 5 contains an Addendum to Supplier Requirements which lists any project specific requirements.

Appendix 6 contains an addendum of Logistical Requirements which must be completed for each CT type offered.

Appendix 7 contains an Addendum of Pre-commission testing, Routine Inspection and Maintenance recommended by the equipment manufacturer throughout the design life of the product.

All products shall meet the standards stated above and the relevant requirements stated in Appendix 1 of this specification.

3.1.2. Material Requirements Associated with Silicon Rubber Elastomeric Housings

Hollow composite insulators consist of an insulating tube manufactured from high strength glass fibre reinforced plastic bearing the mechanical load which is protected by an elastomeric housing.

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Silicon rubber is a very generic term with many formulations. Variations in the composition of this material can adversely affect its long term performance to provide the following very important properties:-

- UV resistance
- Tracking Resistance
- Hydrophobicity

As a result a range of good practice characteristic values have been included within this specification

Material Composition	Minimum % per weight
Silicone Polymer (Polydimethylsiloxane) (PDMS)	30 %
Filler (ATH Aluminium tri hydrate and fumed silica)	64 %
Additional parts (pigments, crosslinkers)	1 %

Where manufacturers differ from this characteristic composition, they shall provide supporting evidence about the long term experience of their product formulation.

The following table provides a list of characteristic properties that result from the above formulation. Manufacturers shall provide details of their characteristic properties for consideration.

Minimum acceptable values are detailed below.

Property	Minimum Value
Density	1.5g/cm
Passing Voltage Level of IEC 60587	4.5kV
Flammability Class of IEC 60695-11-10 of 3mm specimen	VO
Tensile Strength (Din 53504-S1)	6 N/mm2
Break Elongation (Din 53504-S1)	300%
UV resistance @ 300nm the energy of UV wavelength that equates to a molecular energy breakdown level of 398 kJ/mole *	445 kJ/Mole

* assumed wavelength of UV light (sun) 290 – 350nm

All silicon rubber insulators shall be manufactured using the HTV (high temperature vulcanising) and shall ensure that the interface between the housing and the core is chemically bonded.

Flash or mould lines shall not exceed 1mm in height.

All glass fibre re-enforced plastic tubes shall be covered by an even concentric layer of silicon rubber that has a minimum insulation thickness of 3mm over the tube.

3.1.3. End Fittings

The end fittings transfer the mechanical load to the hollow tube core. The interface between the end fittings and the hollow tube shall be sealed by an elastomer with permanent elasticity. The sealing bond shall adhere to the surface of the metal fittings as well as the housing. Sealing by compression only is not acceptable.

3.1.4. Secondary Wiring Enclosure

The CT shall incorporate a waterproof Secondary Terminal Enclosure with a removable lid. This enclosure shall as a minimum comply with IP 65 in accordance with IEC 60529 Edition 2.2.

All fixings used to secure the lid to the enclosure shall be captive.

The enclosure shall provide a means of terminating up to 4 armoured protection cables using M20/M25 cable glands.

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3.1.5. Design Life

Post insulator type CTs shall be designed to provide a minimum design life of 40 years in normal outdoor service conditions as defined by IEC 62217:2013 clause 5, Table 1.

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4. References

The products described within this specification shall comply with all current versions of the relevant International Standards, British Standard Specifications and all relevant Energy Networks Association Technical Specifications (ENATS) current at the time of supply.

4.1. External Documentation

Reference	Title
BS 3297-2:1993	Characteristics of indoor and outdoor post insulators for systems with nominal voltages greater than 1000V
BS EN 61869-1:2012	Instrument transformers Part 1: General requirements
BS EN 61869-2:2012	Instrument transformers Part 2: Additional requirements for current transformers
Din 53504	Determination of tensile strength at break, tensile stress at yield, elongation at break and stress values of rubber in a tensile test
IEC 60529 Edition 2.2:2013	Degrees of protection provided by enclosures (IP code)
BS EN 60587:2022	Electrical Insulating materials used under severe ambient conditions – test methods for evaluating resistance to tracking and erosion
BS EN 60695-11-10:2013	Fire hazard testing - Part 11-10: Test flames - 50 W horizontal and vertical flame test methods
BS EN 61462:2007	Composite hollow insulators – pressurised and un-pressurised insulators for use in electrical equipment with rated voltage greater than 1000V – Definitions, test methods, acceptance criteria and design recommendations
BS EN 62217:2013	Polymeric Insulators for indoor and outdoor use with a nominal voltage >1000V – general definitions, test methods and acceptance criteria.
BS EN 62231:2007	Composite Station Post insulators for substations with a.c. voltages >1000V up to 245kV – general definitions, test methods and acceptance criteria.

4.2. Internal Documentation

Reference	Title
n/a	

4.3. Amendments from Previous Version

Reference	Title
Whole document	Option for and references to ceramic post insulators removed.
3.1.1	Clarification on the type of CTs which may be included
3.1.4	Clarification of number of cables which will require to be accommodated
4.1	Document references updated

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5. Definitions

Term	Definition
Class PX	A transformer of low leakage reactance for which knowledge of the transformer secondary exiting characteristic, secondary wiring resistance, secondary burden resistance and turns ratio is sufficient to assess its performance in relation to the protective relay system with which it is to be used.

All other definitions shall be as detailed in the definitions listed within BS EN 61869-1.and BS EN 61869-2.

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6. Authority for Issue

6.1. CDS Assurance

I sign to confirm that I have completed and checked this document and I am satisfied with its content and submit it for approval and authorisation.

		Date
Liz Beat	Governance Administrator	06/06/2023

6.2. Author

I sign to confirm that I have completed and checked this document and I am satisfied with its content and submit it for approval and authorisation.

Review Period - This document should be reviewed within the following time period;

Standard CDS review of 3 years?	Non Standard Review Period & Reason	
No	Period: 5 Years	Update will be dictated by contract renewal date or any significant changes in the specification or documents referenced.
Should this document be displayed on the Northern Powergrid external website?		Yes
		Date
Paul McAdoo	Senior Policy and Standards Engineer	07/06/2023

6.3. Technical Assurance

I sign to confirm that I am satisfied with all aspects of the content and preparation of this document and submit it for approval and authorisation.

		Date
Michael Crowe	Technical Services Manager (North)	07/06/2023

6.4. Authorisation

Authorisation is granted for publication of this document.

		Date
Paul Black	Head of System Engineering	21/06/2023

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Appendix 1a - Electrical Ratings for 33kV Post CTs

CT Requirements	Reference BS EN 61869-2	Specified Value
Nominal System Voltage		33kV
Highest Voltage for Equipment U_m (rms)		36kV
Rated Frequency		50Hz
Design		Outdoor Post Type Current Transformer, Horizontal Mounting, Bar Primary
Ambient air temperature range	7.2.2.202	-25/40 °C
Service Conditions	7.2.2.204	Outdoor
System earthing		Solidly Earthed Neutral System.
Rated primary current	5.201	2000A or Project specific
Rated values of secondary currents	5.202	Project specific
Rated continuous thermal current	5.203	Shall equal the rated primary current
Rated output current	5.5.201	Project specific
Rated short-time thermal current (I_{th})	5.204.1	Minimum 25kA for 3Secs, but in any case rated current to be no less than that of associated HV switchgear.
Rated Dynamic current (I_{dyn})	5.204.2	2.5 times rated short-time thermal current
Limits of Temperature Rise <i>To be limited by the lowest class of insulation either of the winding or the surrounding medium – manufactures to specify</i>	6.4.1	In accordance with 6.4.1 or manufactures data for specific material types
Partial Discharge – permissible levels (PD levels in Pc)	7.3.1	Values associated with earthed neutral systems
Insulation requirements for secondary windings	5.3.5	5 or 3kV (r.m.s) for 60 secs dependent upon E_k Value
Inter-turn insulation requirements	5.3.201	In accordance with the requirements of 5.3.201
CT ratios, class, rated continuous thermal current, output burdens.		As specified in section 5 and tables 202 & 203
Post Insulator Support Requirements		
Insulation Type		Composite Insulation
Rated insulation levels of the primary winding – (Wet 1min PF Withstand)	5.3.2	70 kV
Rated insulation levels of the primary winding - (peak) – Dry Impulse	5.3.5	170 kV
Length of Post Insulators (min)	BS3297-2 (table 4)	445mm +/- 1mm
Minimum phase to earth creepage distance	BS3297-2 (table 4)	850mm
External Insulation Requirements: Pollution level – creepage distance		Level 3: 25mm/kV (Heavy)
Mechanical Requirement of CT	7.2.201	Load class II: Static withstand load 2.5 kN
Mechanical requirement for support insulator	BS3297 clause 4 (type D)	Strength class 4 (4kN)

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CT Requirements	Reference BS EN 61869-2	Specified Value
Insulator Base Fixing Arrangement		<p>Pitch circle diameter: 76mm Bolt Hole (tapped hole): 4 x M12 Metal Fittings: External</p> <p>Where the base of the CT support insulator mounted directly onto support steelwork the PCD shall be as stated. (Where an additional under base is used, the fixings shall be agreed with the purchaser)</p>

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Appendix 1b - Electrical Ratings for 66kV Post CTs

CT Requirements	Reference BS EN 61869-2	Specified Value
Nominal System Voltage		66kV
Highest Voltage for Equipment U_m (rms)		72.5V
Rated Frequency		50Hz
Design		Outdoor Post Type Current Transformer, Horizontal Mounting, Bar Primary
Ambient air temperature range	7.2.2.202	-25/40 °C
Service Conditions	7.2.2.204	Outdoor
System earthing		Solidly Earthed Neutral System.
Rated primary current	5.201	2000A or Project specific – See Appendix 5
Rated values of secondary currents	5.202	Project specific – See Appendix 5
Rated continuous thermal current	5.203	Shall equal the rated primary current
Rated output current	5.5.201	Project specific – See Appendix 5
Rated short-time thermal current (I_{th})	5.204.1	Minimum 25kA for 3Secs, but in any case rated current to be no less than that of associated HV switchgear.
Rated Dynamic current (I_{dyn})	5.204.2	2.5 times rated short-time thermal current
Limits of Temperature Rise <i>To be limited by the lowest class of insulation either of the winding or the surrounding medium – manufactures to specify</i>	6.4.1	In accordance with Table 2 or manufactures data for specific material types
Partial Discharge – permissible levels (PD levels in Pc)	7.3.1	Values associated with earthed neutral systems
Insulation requirements for secondary windings	5.3.5	5 or 3kV (r.m.s) for 60 secs dependent upon E_k Value
Inter-turn insulation requirements	5.3.201	In accordance with the requirements of 14.2.2
CT ratios, class, rated continuous thermal current, output burdens.		As specified in Appendix 5
<u>Post Insulator Support Requirements</u>		
Insulation Type		Composite Insulation
Internal arc fault protection requirements	BS EN 61869-1 6.9	Arc fault current $\geq 31kA$ and duration 0.2 seconds undertaken as stated in BS EN 61869-1 clause 7.4.6. Following the 0.2 second test there shall be no observable external effect other than the operation of the pressure relief device.
Rated insulation levels of the primary winding – (Wet 1min PF Withstand)	BS EN 61869-2 5.3.2	140 kV
Rated insulation levels of the primary winding - (peak) – Dry Impulse	5.3.5	325 kV
Length of Post Insulators (min)	BS3297-2 (table 4)	770mm +/- 1mm
Minimum phase to earth creepage distance $D_m < 300mm$	BS3297-2 (table 4)	1600mm
External Insulation Requirements: Pollution level – creepage distance		Level 3: 25mm/kV (Heavy)
Mechanical Requirement for CT	7.2.201	Load class II: Static withstand load 2.5kN
Mechanical requirement for support insulator	BS3297 clause 4 (type D)	Strength class 4 (4kN)

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CT Requirements	Reference BS EN 61869-2	Specified Value
Insulator Base Fixing Arrangement Pitch circle diameter (mm) Bolt Hole (tapped hole) Metal Fittings (internal/external)		Pitch circle diameter: 76mm Bolt Hole (tapped hole): 4 x M12 Metal Fittings: External Where the base of the CT support insulator mounted directly onto support steelwork the PCD shall be as stated. (Where an additional under base is used, the fixings shall be agreed with the purchaser)

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Appendix 1c - Electrical Ratings for 132kV Post CTs

CT Requirements	Reference BS EN 61869-2	Specified Value
Nominal System Voltage		132kV
Highest Voltage for Equipment U_m (rms)		145V
Rated Frequency		50Hz
Design		Outdoor Post Type Current Transformer, Horizontal Mounting, Bar Primary
Ambient air temperature range	7.2.2.202	-25/40 °C
Service Conditions	7.2.2.204	Outdoor
System earthing		Solidly Earthed Neutral System.
Rated primary current	5.201	2000A or Project specific – See Appendix 5
Rated values of secondary currents	5.202	Project specific – See Appendix 5
Rated continuous thermal current	5.203	Shall equal the rated primary current
Rated output current	5.5.201	Project specific – See Appendix 5
Rated short-time thermal current (I_{th})	5.204.1	Minimum 31.5kA for 3Secs, but in any case rated current to be no less than that of associated HV switchgear.
Rated Dynamic current (I_{dyn})	5.204.2	2.5 times rated short-time thermal current
Limits of Temperature Rise <i>To be limited by the lowest class of insulation either of the winding or the surrounding medium – manufactures to specify</i>	6.4.1	In accordance with Table 2 or manufactures data for specific material types
Partial Discharge – permissible levels (PD levels in Pc)	7.3.1	Values associated with earthed neutral systems
Insulation requirements for secondary windings	5.3.5	5 or 3kV (r.m.s) for 60 secs dependent upon E_k Value
Inter-turn insulation requirements	5.3.201	In accordance with the requirements of 14.2.2
CT ratios, class, rated continuous thermal current, output burdens.		As specified in Appendix 5
Post Insulator Support Requirements		
Insulation Type		Composite Insulation
Internal arc fault protection requirements	BS EN 61869-1 6.9	Arc fault current $\geq 31kA$ and duration 0.2 seconds undertaken as stated in BS EN 61869-1 clause 7.4.6. Following the 0.2 second test there shall be no observable external effect other than the operation of the pressure relief device.
Rated insulation levels of the primary winding – (Wet 1min PF Withstand)	BS EN 61869-2 5.3.2	275 kV
Rated insulation levels of the primary winding - (peak) – Dry Impulse	5.3.5	650 kV
Length of Post Insulators (min)	BS3297-2 (table 4)	1500 +/- 2.5mm
Minimum phase to earth creepage distance	BS3297-2 (table 4)	3350mm
External Insulation Requirements: Pollution level – creepage distance		Level 3: 25mm/kV (Heavy)
Mechanical Requirement for CT	7.2.201	Load class II: Static withstand load 3kN
Mechanical requirement for support insulator	BS3297 clause 4 (type D)	Strength class 4 (4kN)
Insulator Base Fixing Arrangement		Pitch circle diameter: 76mm Bolt Hole (tapped hole): 4 x M12 Metal Fittings: External
Pitch circle diameter (mm)		

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Bolt Hole (Tapped Hole) Metal Fittings (internal/external)		Where the base of the CT support insulator mounted directly onto support steelwork the PCD shall be as stated. (Where an additional under base is used, the fixings shall be agreed with the purchaser)
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Appendix 2 - Declaration of Technical Performance of Post CTs

MANUFACTURER					
MANUFACTURERS TYPE REFERENCE					
	BS EN 61869:2012 Reference	Unit	33kV System Voltage	66kV System Voltage	132kV System Voltage
Equipment Design Voltage					
Rated Frequency		Hz			
Ambient Air Temperature Range	7.2.2.202	°C			
Service Conditions – Suitable for outdoor use?	7.2.2.204				
Suitable for solidly earthed system?					
CT ratios, class, rated continuous thermal current, output.			Please supply details on separate sheet	Please supply details on separate sheet	Please supply details on separate sheet
Rated primary current	5.201	A			
Rated short time thermal current	5.204.1	A			
Rated dynamic current	5.204.2	A			
Limits of Temperature Rise – and or Insulation class	6.4.1	°C			
Rated insulation levels of the primary winding (Wet Withstand)	5.3.2	kV			
Rated insulation levels of the primary winding (Peak – Dry Impulse)	5.3.2	kV			
External Insulation Requirements: Pollution level		Class / KV/mm			
HV Insulator creepage distance		mm			
HV Insulator minimum arcing distance		mm			
Length of Insulator		mm			
Typical PD Values	7.3.1	Pc			
Winding insulation medium					
Is a Buchholz relay fitted?					
Static mechanical withstand load	7.2.201	N			
Insulation material on CT					

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HV Post Insulator material					
Bolt sizes for connection (HV & LV)		mm			
Weight of complete Unit		kg			
Details of mounting arrangements Flange mounting plate PCD details					
Diameter of Bar CT		mm			
End to end length of primary bar CT		mm			
Has the equipment been type tested in compliance with the requirements of BS EN 60044-1? Please provide reference number of test certificate.					
Has the equipment been awarded an ENA certificate of performance? Please provide reference number.					

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Appendix 3 - Declaration of Additional Requirements Specific to Class PX Protective Current Transformers

Description	BS EN 61869:2012 Reference	33 kV System Voltage	66 kV System Voltage	132kV System Voltage
Rated Primary Current (I_{pn})	5.6.202.4			
Rated Secondary Current (I_{sn})	5.6.202.4			
Rated turns ratio	6.13.202.5			
Rated knee point (E_k)	6.13.202.5			
Maximum exciting current at the knee point EMF and/or at a stated percentage thereof (I_e)	6.13.202.5			
Maximum resistance of the secondary winding at a temperature of 75°C (R_{ct})	6.13.202.5			
Rated Burden (R_b)	6.13.202.5			
Dimensioning factor (K_x)	6.13.202.5			

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Appendix 4 - Self Certification Conformance Declaration

33, 66 & 132kV Post CTs shall comply with the latest issues of the relevant national and international standards.

This check sheet identifies the clauses of **BS EN 61869-2:2012**, IEC 61462 and IEC 62217 relevant to 33, 66 & 132kV Post CTs for use on the Northern Powergrid distribution network.

The manufacturer shall declare conformance or otherwise, clause by clause, using the following levels of conformance declaration codes. A separate sheet shall be provided for each product being offered.

Conformance declaration codes

N/A = Clause is not applicable/ appropriate to the product

Cs1 = the product conforms fully with the requirements of this clause

Cs2 = the product conforms partially with the requirements of this clause

Cs3 = the product does not conform to the requirements of this clause

Cs4 = the product does not currently conform to the requirements of this clause, but the
Manufacturer proposes to modify and test the product in order to conform.

Instructions for completion

- When Cs1 code is entered no remark is necessary
- When any other code is entered the reason for non-conformance shall be entered
- Prefix each remark with the relevant 'BS EN' 'IEC' or 'ENATS' as appropriate.

Manufacturer:

Product Reference:

Name:

Signature:

Date:

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Appendix 4 - continued

Technical Specification for 33, 66 & 132V Post CTs

BS EN 61869-2:2012			
Clause/Sub-clause	Requirement	Conformance Code	Remarks
7.2.2.202	Ambient air temperature - -25/40		
	Other service conditions for outdoor CTs		
	System Earthing Requirements		
5.201	Rated Primary Current		
5.202	Rated Values of Secondary Current		
5.203	Rated Continuous thermal Current		
5.5.201	Rated Output Current		
5.204.1	Rated Short-time thermal current		
5.204.2	Rated Dynamic current		
6.4.1	Limits of temperature rise		
5.3.2	Rated Insulation levels – Wet Withstand		
5.3.5	Rated insulation levels – Dry Impulse		
5.3.5	Insulation requirements for secondary windings		
5.3.201	Inter-turn insulation requirements		
	External Insulation Creepage requirements		
7.2.201	CT Class		

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Appendix 4 - continued

BS EN 61869-2:2012 – Type test requirements			
Clause/Sub-clause	Requirement	Conformance Code	Remarks and or type test report numbers
7.2.201	Short-time current tests		
7.2.2	Temperature rise test		
7.2.3	Lightning impulse test		
7.2.3	Switching Impulse test		
7.2.4	Wet test for outdoor type transformers		
7.2.6	Determination of errors - type test for accuracy of measuring current transformers		
7.2	Type test for class PX protective current transformers		

BS EN 61869:2012 – Routine test requirements			
Clause/Sub-clause	Requirement	Conformance Code	Remarks and or type test report numbers
7.3.6	Verification of terminal markings		
7.3.1	Power- frequency withstand test on primary windings		
7.3.2	Partial Discharge measurement		
7.3.4	Power frequency withstand test on Sec winding		
7.3.204	Inter-turn overvoltage test		
7.3.5	Determination of errors - Routine test for accuracy of measuring current transformers		
7.3	Routine tests for class PX protective current transformers		

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Additional Tests for Products with Polymeric Insulation

IEC 61462 – Type tests			IEC 62217			Remarks
Clause / Sub-clause	Requirement	Conformance Code	Clause / Sub-clause	Requirement	Conformance Code	
7.2	<i>Tests on interfaces and connections of end fittings</i>		9.2	<i>Tests on interfaces and connections of end fittings</i>		
7.2.2	Reference dry power frequency test		9.2.4	Reference dry power frequency test		
7.2.3	Thermal Mechanical pre-stressing test		9.2.5	Product specific pre-stressing		
7.2.4	Water Immersion pre-stressing test		9.2.6	Water immersion pre-stressing		
7.2.5	Verification test		9.2.7	Verification test		
7.2.5.1	Visual Examination		9.2.7.1	Visual Examination		
7.2.5.2	Steep Front Impulse Test		9.2.7.3	Steep Front Impulse Test		
7.2.5.3	Dry Power Frequency Voltage Test		9.2.7.4	Dry Power Frequency Voltage Test		
7.3	<i>Tests on shed and housing material</i>		9.3	<i>Tests on shed and housing material</i>		
7.3.1	Hardness Test		9.3.1	Hardness Test		
7.3.2	Accelerated weathering test		9.3.2	Accelerated weathering test		
7.3.3	Tracking and erosion test		9.3.3	Tracking and erosion test		
			9.3.3	1000 hour salt fog test		
7.3.4	Flammability Test		9.3.4	Flammability Test		
7.4	<i>Tests on the tube material</i>		9.4	<i>Tests on the core material</i>		
7.4.1	Dye penetration test		9.4.1	Dye penetration test		
7.4.2	Water diffusion test		9.4.2	Water diffusion test		
			Annex A	Wheel test		
			Annex B	5000H - Test at Multiple stresses		

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IEC 61462 – Sample tests			IEC 62217			Remarks
Clause / Sub-clause	Requirement	Conform ance Code	Clause / Sub-clause	Requirement	Conform ance Code	
9.3	Verification of dimensions					
9.4	Mechanical tests					
9.5	Galvanising Test					
9.6	Check of the interface between end fittings and the housing					

IEC 61462 – Routine tests			IEC 62217			Remarks
Clause / Sub-clause	Requirement	Conform ance Code	Clause / Sub-clause	Requirement	Conform ance Code	
10.2	Visual examination					
10.4	Routine mechanical test					
10.5	Routine tightness test					
11.0	Documentation					

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Appendix 5 - Addendum to Supplier Requirements

Project-specific installation and protection requirements will be provided by Northern Powergrid Primary Engineering Projects for inclusion in this appendix.

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Appendix 6 - Packing for Shipment

The Contractor shall be responsible for the packing, loading and transport of the plant from the place of manufacture, whether this is at his own works or those of any supplier, to site including off-loading. All off-loading of equipment on site will be undertaken to the satisfaction of the Purchasers Representative.

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Appendix 7 - Pre-Commission Testing, Routine Inspection and Maintenance Requirements

Suppliers shall provide details of the recommended pre-commission testing and inspection required. They shall also provide information regarding periodic inspection and maintenance requirements to be undertaken during the lifetime of their product Logistical requirements

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Appendix 8 - Technical Information Check List

The following information shall be provided by the supplier for technical review by Northern Powergrid. Additional information shall be provided if requested.

Requirement	Provided (Y/N)
Full product descriptions and part number/reference, including a complete set of drawings for each variant	
Completed Appendix 1 - Electrical Ratings of the Post CTs	
Completed Appendix 2 - Declaration of technical performance of Post CTs	
Completed Appendix 3 - Declaration of additional requirements specific to class PX protective current transformers	
Appendix 4 – completed self-certification conformance declaration	
Completed Appendix 7 - Pre-commissioning testing/inspection requirements, including details on the end of life disposal of these units	
Supporting Type test evidence	
Details on Routine tests (example)	