



भारत सरकार/ Government of India
विद्युत मंत्रालय/ Ministry of Power
केन्द्रीय विद्युत प्राधिकरण/ Central Electricity Authority
विद्युत प्रणाली अभियांत्रिकी एवं प्रौद्योगिकी विकास प्रभाग
Power System Engineering & Technology Development Division

Date: 13.11.2024

सेवा में,

All Stakeholders

विषय: Draft revised “Guidelines for the Periodicity of Type Tests for Major Equipment used in Electrical Power System” - invitation of comments.

Sir/ महोदय,

Central Electricity Authority had issued the “Guidelines for the Type Tests Validity for Major Equipment of Power Sector, 2022” with the objective to set uniformity in the periodicity of type tests in respect of various equipment. Thus, the Guidelines were aimed at provide guidance and a uniform approach in respect of type tests to all stakeholders which could be helpful in reducing the repetitiveness of type tests, wherever possible and to reduce burden on the testing facilities/Test Labs.

Of late, representations have been received by CEA citing non-uniformity of the periodicity of the type tests of the same equipment to be used in different segments of Power Sector viz., Generation, Transmission and Distribution. Thus, an exercise has been undertaken to comprehensively revise the “Guidelines for the Type Tests for major equipment of Power sector” with a view to harmonize and rationalize the periodicity of type tests and also to incorporate the provisions regarding the effective date of type test in respect of various equipment.

All the stakeholders are hereby requested to send their comments on the revised draft “**Guidelines for the Periodicity of Type Tests for Major Equipment used in Electrical Power System**” enclosed herewith to the Chief Engineer (PSE&TD), Sewa Bhawan (North Wing), 3rd Floor, R. K. Puram, New Delhi-110 066 through email ce-psetd@gov.in latest by **29-11-2024**.

This issues with the approval of Competent Authority.

Encl.:- As above,

भवदीय,

(पंकज कुमार वर्मा / Pankaj Kumar Verma)

उप-निदेशक/ Deputy Director

Draft Guidelines for Periodicity of Type Tests for Major Equipment used in Electrical Power System

1. Back ground:

Prior to commercialization of the equipment/ product, the equipment/ product passes through the product development stages. The equipment/ product must successfully pass the relevant tests as specified in the applicable standards, in an accredited laboratory such as the one accredited by National Accreditation Board for Testing and Calibration Laboratories (NABL) before the commercialization of the product/ equipment/material. One of such tests is a “type test” which is generally performed on any equipment conforming to relevant National/ International Standards to ‘validate the design’ and to demonstrate its functional requirement for meeting the intended application and reliable performance during its normal service life.

These tests are also called ‘Proof Tests’ or ‘Design Validation Tests’. Such tests are not required to be performed on each unit of the equipment but are performed on a representative design of the equipment. Type test is a design validation test, and the purchaser must satisfy itself by following an agreed quality assurance plan and special tests, if any, agreed between the buyer and the supplier/manufacturer. In general, the type test need not be repeated unless the product has undergone change in design, manufacturing process, or in case the relevant standard itself has undergone some major change. The utility shall not reject the product/ equipment for supply against the contract, if the type test was conducted on the subject product/ equipment as per relevant Standards (IS/ IEC/ASTM/ISO/IEEE etc.) and it has successfully passed the type tests.

Moreover, successfully type tested equipment does not guarantee that there will be no failure of the equipment at all, as the equipment is likely to encounter various electrical, mechanical, thermal and environmental stresses and abnormal conditions during its service life which may not match exactly with the conditions simulated during the ‘type test’.

The National/ International standards do not specify any “period of validity or expiry date” of type test results (i.e. there is no expiry certificate of the test. However, most of the utilities in India specify that the type test be repeated after certain years of issue of the test report in respect of equipment being tendered.

[Note:

1. *The word “equipment” used in this document refers to all items listed in the Tables in this document.*
2. *The type test is a design validation test and the purchaser must satisfy itself through following a mutually agreed quality assurance plan between the purchaser and the supplier. Unless there is a change in the design, manufacturing process or the change/amendment/revision in the relevant Standard, the type test need not be repeated in respect of the offered equipment. The Original Equipment manufacturer (OEM) must submit an undertaking to this effect.]*

The insistence on repetition of type tests by some utilities in India, even if the equipment has remained essentially the same (in terms of basic design, construction, material and manufacturing process etc) has become a matter of concern (as it involves cost, transportation to Testing Lab and time). The practice of repetition of type test varies from utility to utility. Some utilities do not accept type tests if not conducted on equipment of the same rating/ specifications and demand for repetition of type test(s). Sometimes testing time exceeds the entire production time e.g. over voltage cycling test for capacitors etc. Facilities for some of the type tests for some equipment are not available in India for which these equipment have to be sent abroad for testing.

In view of the representations and feedback received from manufacturers regarding type test requirements mandated by the utilities in their specifications, and considering the request of the manufacturers to make the periodicity of type tests in respect of a particular equipment uniform, the Guidelines for the Type Tests for Major Equipment in the Electric Power Sector were issued by CEA in the year 2022. The aim was also to mitigate the uncertainty among the manufacturers. These guidelines were formulated to avoid stress/burden on national resources, save time and money entailed in repetition of type tests, and to alleviate the associated burden of cost on the end consumers.

During the period of operation of these Guidelines, representations have been received from stakeholders for bringing uniformity in the periodicity of type test for the same/ similar class of equipment, irrespective of its application.

Ministry of Power also requested Central Electricity Authority (CEA) to consider extending the validity period of type test reports for some equipment.

Considering the above an exercise has been undertaken to revise these guidelines. The principles of rationality, uniformity across all domains of electric systems for a class of

equipment, reasonableness of the periodicity of type test life of the concerned equipment, variability in working environment conditions, working principles, supply chain of input material/ components, availability of the testing facilities, etc have been considered in the determination of the periodicity of type test in these guidelines.

2. Purpose of the Guidelines for the Periodicity of Type Test(s)

The purpose of publication of these guidelines is as below:

- a) **To set uniformity in the periodicity of type tests:** It has been observed that different practices are being followed regarding the periodicity of type tests (repetition of type test) for the equipment/ component. Therefore, setting uniformity in the periodicity of type tests on a broader scale would eliminate subjectivity in the acceptance of Type Test(s).
- b) **To reduce the repetitiveness of type tests, wherever possible:** The utilities sometimes insist upon repeat of type test on the equipment even when no major change has been introduced in the basic design/ technology/ material/ mechanical construction/ functionalities of the equipment/ performance characteristic/ manufacturing process of the equipment.

Specifying the periodicity of Type Test would ensure that the equipment is not subjected to test repetitively unless warranted due to the aforesaid reasons for type test. This would result in saving of cost as well as time and resources for all the stakeholders involved viz. manufacturers, vendors, utilities, etc and ultimately for the end consumer.

- c) **To avoid overloading/ overcrowding of testing facilities:** Repeating the type tests on the same equipment without the judicious need would create the capacity constraints for the testing infrastructure for type testing.

Thus, setting uniform and rational periodicity of validity of type tests will significantly reduce, if not eliminate the unnecessary requirement of repetition of type testing. This will ensure availability of testing infrastructure for type testing of new equipment/ modified equipment/ products needed for Research and Development (R&D) and commercial requirements.

3. Broad Guidelines

- (a) The type tests on indigenous equipment, for which testing facility is available in India, shall be conducted in any independent laboratory approved by the Government or the laboratories accredited by the National Accreditation Body of the Country. In the case of Indian Standards made mandatory by the government under QCOs, the tests must be conducted only in BIS certified labs.

The type tests on indigenous equipment, for which testing facility is not available in India, shall be conducted in a laboratory of a foreign Country accredited by the National Accreditation Body of that Country.

- (b) The type tests on imported equipment shall be conducted in an Indian laboratory or foreign laboratory accredited by the National Accreditation Body of the respective Country.
- (c) The type tests conducted in-house by a manufacturer shall also be acceptable provided the laboratory is accredited by the National Accreditation Body of the Country and the test has been conducted in the presence of a representative of a testing laboratory accredited in their respective country. Such type test report shall record the details of such witness including the signature/ authentication in the type test report.
- (d) The result of all type tests shall be recorded properly in the Type Test Reports (TTRs) containing sufficient information like the ratings, the relevant drawings, model number, test circuit, calculations (if any), photographs and compliance to the relevant standards (IS/ IEC etc.). The relevant clauses of the standards (IS/ IEC) according to which type test have been conducted and acceptance criteria/values need to be brought out clearly in the report.
- (e) The date of the type test report shall be reckoned from the date of issuance of the complete type test report.

The type test report shall be issued within 30 days from the date of completion of the last test of the series of tests under the type test of that equipment as per the relevant standards

The periodicity of type test conducted on the equipment i.e., the period for which Type Test Reports (TTRs) shall be acceptable to user/ utility provided no major change has been introduced in the basic design/ technology/ material/ mechanical construction/

functionalities of the equipment/ performance characteristic/ manufacturing process of the equipment shall be as per given **Annexures** [Annexure-I, II and III).

- (f) For the purpose of deciding the acceptability of the type test reports, the date of issue of the type test report shall be reckoned with reference to the date of the submission of the bid by the bidder.
- (g) Type test report of 220 kV voltage class equipment shall be valid for 230 kV voltage class equipment as the highest system voltage is same in both cases provided Basic Insulation Level is same.
- (h) All the testing equipment used for type testing shall be duly calibrated and the valid calibration reports shall form part of the Type Test Reports.
- (i) Type test report of the equipment shall be acceptable in case the test has been conducted on the equipment to be supplied from the same manufacturing works/or from the works of the same manufacturer where the same design and manufacturing process has been adopted. In case of technology transfer/ Joint Venture (JV)/ own manufacturing plant etc., the type tests conducted on the equipment manufactured at the works of Parent Company/organization or parent company's subsidiary situated elsewhere shall also be acceptable.
- (j) In case of Gas Insulated Switch gear (GIS), Hybrid switchgear and Ring Main Unit (RMU), Type Test Reports of parent company/ collaborator or its subsidiary situated in other country, may be accepted provided same design and process by which parent company/ collaborator or its subsidiary has manufactured the equipment, has been followed by the Indian manufacturer.
- (k) The type tests shall be repeated if there is change in technology or basic design or manufacturing process or combination of any of above or the respective Standards have undergone a change/ amendment/ revision. However, minor changes, which have no effect on the functionality and reliability of the equipment, may not require repetition of type tests. Minor changes do not include changes in electrical stress, thermal stress, mechanical stress, change in construction, change in dielectric material, impregnating oil, thickness of electrode and internal fuse design in a capacitor, enclosure materials (magnetic, non-magnetic like stainless steel, Aluminum) etc. The OEM/ manufacturer shall submit an undertaking to this effect.

- (l) If relevant Standards (IS/ IEC) of the equipment is revised or amended, fresh type test is warranted even if equipment has not changed in design/ material, etc. However, fresh type testing shall be limited to only those tests for which test procedure/ method, any technical requirement or test levels have been changed in the revised Standards. In such cases, enough time as mutually agreed between the user and manufacturer, shall be given to manufacturer to comply with revised provision in Standards.
- (m) The utilities shall co-relate the need of repeating type test(s) to changes in design/ technology and may emphasize/ insist for stage inspection to check workmanship, manufacturing process and to ensure quality of the component/ material used in the manufacturing of the equipment.
- (n) The change in the make of component(s) of the equipment shall not be the criteria for repetition of type tests provided that the component of new make has been successfully type tested and its use shall not affect the functionality, performance and reliability of the equipment. The type test reports of the component of new make shall be submitted.
- (o) The utilities, if so desires, may demand the repeat of the type tests, at their own cost even if valid TTRs have already been provided by the bidder/ manufacturer. However, the utilities should refrain from making it as a regular practice. The utility shall clearly specify which type tests shall be repeated in the event of award of the contract and quotation for such tests shall be invited separately in the price bid. In such case utility shall provide extra time for repetition of such type tests.
- (p) In case of the submitted type test reports, the following confirmation shall be furnished by the bidder/ Original Equipment Manufacturer (OEM) – that there is:
- (i) No change in the Design after the type tests.
 - (ii) No change in the material.
 - (iii) No change in the manufacturing process.
 - (iv) No change in the manufacturing quality plan.
- (q) The philosophy of extending type test results of the equipment is based on two primary factors: similar design and design with higher stresses (electrical, mechanical, thermal, and environmental). The validity of type test report of an equipment may be extended to the same equipment of similar design, manufacturing process, manufacturing quality plan, material, and/or lower design stress provided relevant Standard (IS/ IEC) permits

with tropical/ sub-tropical climate similar to the country of supply/ India. The relevant clauses of the respective IEC standards, e.g. IEC 62271-307 for switchgear and control gear for rated voltages above 1 kV and up to and including 52 kV, may be referred to establish this validity.

- (r) It is practically impossible to subject all possible arrangements of the Gas Insulated Switchgear (GIS) (for a particular switching scheme corresponding to a specified voltage level) to type tests as various arrangements are possible using same combination of equipment depending on layout arrangement and space availability. The performance of any arrangement shall be substantiated from type test results obtained on representative assemblies or sub-assemblies. The user shall check to ensure that the tested sub-assemblies shall be a representative form of the user's arrangement and meet the desired requirement/ objective.
- (s) For capacitors, the successful completion of each type test shall also be valid for units having the same rated voltage and lower output (kVAr), provided that they do not differ in any way (i.e. design, construction, material, and manufacturing process, etc.) that may influence the properties to be checked by the test.
- (t) The repetition of short circuit test on transformer is not required due to change in make and type of bushings and/ or make of On Load Tap Changer (OLTC) provided bushings and OLTC of supplied make have same or better rating and have been successfully type tested as per relevant IS/ IEC.

The utility shall not reject the transformer for supply against the contract, if the Short Circuit (SC) test was conducted on the subject transformer as per relevant Standards (IS/ IEC) and it has successfully passed the SC tests and other type tests as per relevant standards

(u) **Guidelines specifically applicable to Hydro Power Sector**

- i. The design of turbine/ pump-turbine/ reversible turbine along with its various components/ parts/ sub-assemblies varies on the basis of various parameters such as available head, discharge, dimension of water conductor system, capacity, etc to achieve an optimum performance and efficiency, and hence are specific to the project and tailor-made. Not only the type of turbine (Kaplan/ Francis/ Pelton, etc) differs based on the available head, but various components

of a particular turbine, viz. runner, guide apparatus, stay and guide rings, head cover, turbine shaft, shaft seal, bearings, governor system, etc differ depending upon the requirements of different projects. As such, it is not possible to specify uniform Type Test periodicity for different types of turbine/ pump-turbine/ reversible turbine along with its various components/ parts/ sub-assemblies. Hence, only those components of turbine auxiliaries are included for which Type Test periodicity could be specified for a longer period and which don't undergo major changes.

- ii. The design of Synchronous/ Asynchronous Machine/ Generator-Motor along with its various components/ parts/ sub-assemblies depend on various parameters such as MW rating, Voltage level, Current Level, specific speed, number of poles, head and type of turbine used, run-away speed, etc. Similar to the case of turbines, different types of generators (umbrella, semi-umbrella or suspended type) are selected depending upon the project requirements. Further, their components such as rotor, stator, windings, shaft, bracket, bearings, etc are uniquely designed for each project. As such, it is not possible to specify uniform type test validity period for different types of Generators along with its various components.

Unless the relevant standard in use (such as IS/ IEC/ IEEE etc) specifies different type test requirements for the product/ equipment as per its end use application (such as in generation, transmission, or distribution of electricity or in any auxiliary application), the periodicity of Type Test shall be uniform for a given class of equipment/ product irrespective of its application.

Annexure-I**Equipment used in Electrical Power System/ Industry**

Sl. No.	Name of Equipment	Periodicity (in years)
1.	Power Transformer (GT/ ST/ ICT/ Auto Transformer)	10
2.	Distribution /Auxiliary Transformer (Oil filled/ Dry type)	10
3.	Neutral Grounding Resistor	10
4.	Shunt Reactor/ Neutral Grounding Reactor	10
5.	Air Core Reactor/ Series Reactor	10
6.	On Load Tap Changer (OLTC)	10
7.	Bushing for Power Transformer/ Reactor	10
8.	Transformer/ Reactor fittings and Accessories	10
9.	Outdoor Circuit Breaker	15
10.	Outdoor Isolator	15
11.	Outdoor Lightning Arrester	10
12.	Wave Trap	10
13.	Instrument Transformers	10
14.	Gas Insulated Switchgear (GIS) and Hybrid Switchgear	15
15.	Cable termination kits for GIS and Hybrid switchgear (66 kV to 400 kV)	10
16.	Cable termination kits for GIS and Hybrid switchgear (33 kV and below)	15
17.	Compact Secondary Substation (CSS/PSS)	15
18.	Cables, associated joints and termination bushings	10
19.	Capacitor / Capacitor Bank	10
20.	Ring Main Unit (RMU)	15
21.	Numerical Relays/ BCP/ BCU	10
22.	Remote Terminal Unit (RTU)/Feeder Remote Terminal Unit (FRTU)	10
23.	Insulators	10
24.	Insulators hardware fittings, and accessories for conductor and ground wire	10
25.	PLCC/ Fiber Optic cable/OPGW	10
26.	LV and MV Switchgear	15
27.	MV Air Insulated Switchgear (AIS) and Vacuum Circuit Breakers	15
28.	Air Break Switches	10
29.	Battery and Charger	10
30.	Control & Relay Panel	10
31.	Substation Automation System	10
32.	Conductors and earth wire	10

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33.	High Temperature (HT) / High Temperature Low Sag (HTLS) conductor	10
34.	Energy Meter (Electronic meter, Smart meters, prepaid)	10
35.	Energy Meter (ABT meters)	10
36.	Power Quality (PQ) Meter	10
37.	Fault Passage Indicator (for overhead lines)	10
38.	Phasor Measurement Unit (PMU)	10
39.	Isolated Phase Bus Duct (IPBD)/ Segregated Phase Bus Duct (SPBD)/ Sandwich Bus Duct	10
40.	Generator Circuit Breaker (GCB)	15
41.	Motor (AC/ DC)	10
42.	Dry Cast Resin type CT, PT, NGT, CVT and CBCT	10
43.	Power Contactors	10
44.	Control Transformers	10
45.	Transformer - Insulating Oil	10
46.	Lighting and Welding Transformer	10
47.	Cable Termination Kit & Straight Through Jointing Kit	10
48.	Galvanised Iron (GI) Cable Trays and GI Cable Tray Flexible Support System	10
49.	Diesel Generating (DG) Set	10
50.	Lighting Fixtures	10
51.	Lighting Mast	10
52.	Variable Frequency Drive (VFD) System	10
53.	In-Line Magnetic Separator/ Suspended Magnet	10
54.	Metal Detector	10
55.	Electro-hydro thruster (EHT) Brake/ EHT Rail Clamps	10
56.	Actuators (Without Integral Starter)	10
57.	Geared Motor	10
58.	Belt Weigher	10
59.	Weigh Bridge	10
60.	Heavy Duty Limit Switches	10
61.	Aviation Light	10
62.	Electro-static Precipitator Transformer Rectifier (ESP-TR) Set	10
63.	ESP-Panel Type Hopper Heater	10

Thermal Power Plant

List of major mechanical equipment :			
Sl. No.	Name of Equipment	Test(s)	Periodicity (in years)
1.	Butterfly Valves (Water Application)	Life Cycle Test (Proof of Design Test) as per AWWA C 504 / C-516	5 Years
2.	GRP (Glass Reinforced Pipes)	UV Test	Once for each product type
3.	3 LPE Coated MS Pipes	Adhesion Test, Impact Test Indentation Test, Elongation Test, Cathodic Disbondment Test, Degree of Cure for Epoxy, Long Duration test- Heat aging, Light aging and Coating Resistivity	5 Years for each product type/ size/ design
4.	Metallic Expansion Joint	Life Cycle test for 10 ⁴ Cycle Meridional yield, Rupture test Squirm test	5 Years
5.	Rubber Expansion Joint in Condenser Inlet and Outlet	Life Cycle test, Burst test	5 Years for each product type/ size/ design
6.	PVC Drift Eliminators	Ultra Violet Rays Resistance Test for 500 Hours & then Izod Impact Test, ASTM B 256 / ASTM G 155-1	5 Years for each product type/ size/ design
7.	PVC Fills	Ultra Violet Rays Resistance Test for 500 Hours & then Izod Impact Test, ASTM B 256/ ASTM G 155-1	5 Years for each product type/ size/ design
8.	FRP Blades	Structural Stability Test	5 Years for each product type/ size/ design
9.	Carbon Fiber Shafts	Torsional Test	5 Years for each product type/ size/ design
10.	Dual Plate Check Valve	Life Cycle Test – 10 ⁵ cycles	5 Years for each product type/ size/ design
11.	Main Turbine Oil Centrifuge	Particle size impurities test and moisture test on one oil centrifuge	5 years
12.	Drive turbine oil centrifuge	Particle size impurities test and moisture test on one oil centrifuge	5 years
13.	Boiler Feed Pump	On one BFP - Thermal shock test - Visual Cavitation Test - Pressure Pulsation test	a. One per size/ type/ model in each project

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		<ul style="list-style-type: none"> - Axial thrust measurement - Complete strip down test - Pressure drop test on one strainer of each type & size <p>On one BFP and One BP</p> <ul style="list-style-type: none"> - Dry running test <p>NPSH (R) test</p>	<p>Performance test, NPSH test, Strip Test at shop, and</p> <p>b. 5 years Pressure drop test on one strainer size/ type/ model</p>
14.	Condensate Extraction Pump	<ul style="list-style-type: none"> - NPSH (R) test - Pressure drop test on one CEP Suction strainer 	<p>a. One per size/ type/ model in each project, and</p> <p>b. 5 years Pressure drop test on one strainer size/ type/ model</p>
15.	Drip Pump	Cavitation Test, NPSH Test	One per size/ type/ model in each project
16.	Boiler Circulating Pump	Measurement of performance parameters like unit functioning at pump temperature and pressure, hot standstill and start up test etc.	One per size/ type/ model in each project
17.	Light Resin Bound Mineral Wool	Thermal Conductivity Test	One year
18.	Fireproof Door	Flame Proof Test	5 years
19.	ID Fan	Measurement of performance parameters like flow, pressure, power, efficiency etc	One per size/ type/ model in each project
20.	FD Fan	Measurement of performance parameters like flow, pressure, power, efficiency etc	One per size/ type/ model in each project
21.	PA Fan	Measurement of performance parameters like flow, pressure, power, efficiency etc	One per size/ type/ model in each project
22.	Seal Air Fan	Measurement of performance parameters like flow, pressure, power, efficiency etc	One per size/ type/ model in each project
23.	Dampers/ Gates	Leak Tightness Test	One per size/ type/ model in each project
24.	Gravimetric Coal Feeder	Weighing Accuracy	One per size/ type/ model in each project
25.	CW Pump	Performance test	One per size/ type/ model in each project

List of major C&I Equipment :

Sl. No.	Name of Equipment	Test(s)	Periodicity (in years)
1.	Control valve	CV test	Once per product type/ size/ design
2.	UPS	Surge withstand capability Dry Heat test Damp Heat test Vibration test Electrostatic discharge tests Radio frequency immunity Electromagnetic Field immunity Degree of protection Fuse Clearing Capability Short Circuit current capability	10 years
3.	PA System	Amplifier Microphones Loud Speaker	10 years
4.	Transducers	All Type Test	10 years
5.	Electronic Transmitters	All Type Test	10 years
6.	Dust emission Monitor	Degree of protection	10 years
7.	Instrument cable/ Control Cable	Conductor Resistance test- Diameter test Tin Coating test (Persulphate test) Insulation Loss of mass- Ageing in air ovens** TS elongation before and after ageing Heat Shock Hot deformation Shrinkage Bleeding & blooming Inner sheath Loss of mass- Heat Shock Cold bend/cold impact test Hot deformation Shrinkage Outer Sheath Loss of mass- Ageing in air ovens** TS elongation before and after ageing Heat Shock Hot deformation Shrinkage	10 years

		Bleeding & blooming	
		Colour fastness to water	
		Cold bend/cold impact test	
		Oxygen index	
		Smoke Density Test	
		Acid gas generation test	
		Fillers	
		Oxygen index test	
		Acid gas generation test	
		AL-MYLAR shield	
		Continuity test	
		Shield thickness	
		Overlap Test	
		Over all cable	
		Flammability Test	
		Swedish Chimney Test	
		Noise interference	
		Dimensional checks	
		Cross talk	
		Mutual capacitance	
		HV test	
		Drain wire continuity	
8.	Power supply	Surge withstand capability	10 years
		Dry Heat test	
		Damp Heat test	
		Vibration test	
		Electrostatic discharge tests	
		Radio frequency immunity	
		Electromagnetic Field immunity	
		Degree of protection	
9.	Battery	Ni-Cd Batteries	10 years
		Lead Acid Plante Batteries	
10.	LIE	Degree of protection	10 years
11.	Flue gas analysers	Degree of protection	10 years
12.	Master Clock	Functional Test	10 years
13	Junction boxes	Degree of protection	10 years
14.	Flow nozzle	Calibration	10 years
15.	Electronic measuring instruments	All Type Test	10 years
16.	DDCMIS	Surge withstand capability	10 years
		Dry Heat test	
		Damp Heat test	
		Vibration test	
		Electrostatic discharge tests	
		Radio frequency immunity	
		Electromagnetic Field immunity	
17.	PLC		10 years

Hydro Power Plant

Sl. No.	Name of Equipment	Periodicity(in years)
1.	Auxiliaries of Turbine and Governing System a) Turbine Auxiliaries i. Heat Exchanger b) Governing System i. Servo valves	10 10
2.	Generator Auxiliaries a) Fire Fighting System	10
3.	Main Inlet Valve/ Penstock Valve a) Spherical Valve/ Butterfly valve i. Servomotor	10
4.	All types of Pump(Oil/ Water)	10
5.	a) DC Excitation System for Synchronous Machines b) AC Excitation System for Asynchronous Machines	10 10
6.	EOT Crane Auxiliaries i. Motors ii. Brakes iii. Limit Switches iv. Ropes v. Hooks	10 10 10 10 10
7.	Hydraulic Valves	10
8.	Static Frequency Converter (SFC) system/ Variable-Frequency Drive (VFD)	10
9.	Current Limiting Reactors	10
10.	Phase Reversal Disconnecting Switch	10
11.	Dynamic Braking cubicle/Starting Switch	10

Notes:

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- i) *Bought-out equipment have not been included in the above list since their Test Certificates (TCs) establishing the requirement of purchaser upon review shall be acceptable to the purchaser and these need not be tested again.*
- ii) *Complete systems such as Fire Fighting, Public Address & Communication, Heating, Ventilation & Air Conditioning (HVAC), Illumination, Dewatering and Drainage, Cooling Water, Oil Handling, Air Compressor system and Control & Protection System are not covered in this list since these systems are not hydro power sector specific. Further, they cannot be Type tested as a whole and contain certain bought-out equipment for which TCs upon review shall be acceptable. However, some components of these systems, which are considered important for their basic functioning in the power plant, such as pumps, motors, hydraulic valve, current limiting reactors, phase reversal disconnecting switch and dynamic braking cubicle / starting switch are included in this Type Test list.*
- iii) *Any equipment not covered in the list shall be subject to the terms of mutual agreement between supplier and purchaser.*