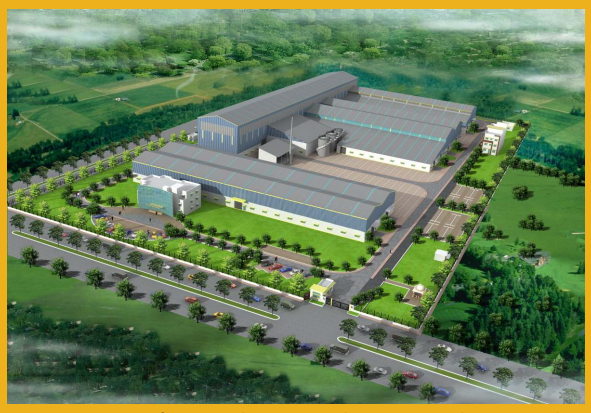
Energising India since 1969...

TECHNICAL ASSOCIATES LIMITED

An ISO 9001 : 2015 & ISO 45001 : 2018 Company

WE TRANSFORM
THE NATION'S POWER

POWER TRANSFORMERS



INTRODUCTION

Technical Associates Ltd. (TAL) is one of India's most respected, reliable, and well regarded pure-play transformer specialists in the manufacturing of Power and Extra High Voltage (EHV) Transformers. Wherever electrical energy is generated, transmitted and distributed, TAL offers power transformation products, services & solutions meeting customer and end user requirements.

Technical Associates Ltd. (TAL) was established in 1969 in Lucknow Uttar Pradesh INDIA. Today, with an annual manufacturing capacity of 20,000 MVA, TAL has grown into a well established company and is amongst the Top Ten OEMs of Power and EHV Transformers in India. Today, TAL is proud to be a unique manufacturer having indigenously developed and refined the capability to manufacture and supply upto 500 MVA, 400kV class transformers, with TAL transformers of 220 kV having been successfully type tested and short circuit tested in accordance with IEC 60076 and IS 2026, at Central Power Research Institute (CPRI) - a member of STL – the Short-Circuit Testing Liason of international testing laboratories

PRODUCT RANGE

TAL manufactures HV and EHV transformers (up to 400 KV) which cater to following applications:

1. Power Transformers
2. Green Energy Grid Connected Renewable Transformers
3. Transformers for Railway Applications
   - o METRO & Mass Rapid Transit System (MRTS)
   - o Auto Transformer
   - o Track-Side

160 MVA, 220/132/11 KV, Auto Transformer

100 MVA, 220/33/11 KV Power Transformer

4. Auto Transformers for Transmission Grids
5. Interconnecting Transformers
6. Generator Transformers
7. Unit Auxiliary Transformers
8. Isolation Transformers
9. Repair and Refurbishment of Ageing Transformers for Energy Efficiency
10. Re-Manufacturing for Power/ Range/ Life enhancement/ Augmentation

100 MVA, 220/132 KV Power Transformer

100 MVA, 220/132/11 KV Auto Transformer

160 MVA, 220/132/11 KV, Auto Transformer

FACILITIES

EHV Power transformers are manufactured by TAL out of its state of the art facility at Sitarganj, Uttarakhand. Spread out over an area of 12.5 acres with total covered manufacturing area of approx. 23,000 sq mtr, this is one of India's largest transformer manufacturing setups. Featuring heights of up to 22 mtr in its manufacturing bays, adequate lifting capacity up to 300 MT, and all modern equipments including Vertical Winding machines, high capacity assembly stations, climate controlled winding and assembly areas and capability for conducting all routine and type tests in-house (including Impulse & Temperature Rise), TAL's manufacturing setup is one of the most modern setups in India today.

The factory and its manufacturing processes have also been certified in compliance to ISO 45001:2018 - the Standard for Occupational Health & Safety Management System in the work place, and ISO9001:2015 – the standard for quality assurance.

Our test facilities have been assessed and accredited by the National Accreditation Board for Testing and Calibration Laboratories (NABL) for compliance with ISO/ IEC 17025:2017upto 400 KV, 500 MVA, offering further proof of robustness of the quality of transformers manufactured by us.

EXPERTISE AND EXPERIENCE

Led by seasoned technocrats through its history, TAL has supplied approximately 3000 Numbers of Power and EHV Transformers, both in India and overseas. We have a 2 decade manufacturing experience of 132 KV transformers and have been manufacturing 220 KV class transformers for more than a decade. Over the last 50 years, 1,50,000 MVA (One Hundred Fifty Thousand MVA) equivalents of Transformers have been successfully supplied by TAL and are in satisfactory operation in our customer networks.

We are proud to be a manufacturer of choice for many transmission utilities across the country with many other leading national and international companies choosing TAL's transformers for their robustness, quality and value for money. We are proud of our rich legacy which motivates us to continue to strive harder in the future.

DESIGN, RESEARCH AND DEVELOPMENT

Aided by a reputed international software-based design, customised needs of individual clients and end users are ensured. Iterations from software-based design narrows down

- Dynamic Short Circuit Withstand capability
- Short Duration Over Load
- Lightning Impulse Withstand Capability
- Noise & Vibration Reduction
- Application of 3 D Modelling for Mechanical Structure
- Eliminates Mechanical Mis-Match and Fouling
- Adequate Structural Strength

Highly experienced design team under able leadership of industry doyens have enabled rolling out reliable products offering cost effective and economical solutions to power the economy.

SPECIAL TEST, SHORT CIRCUIT TESTS AND TYPE TESTING

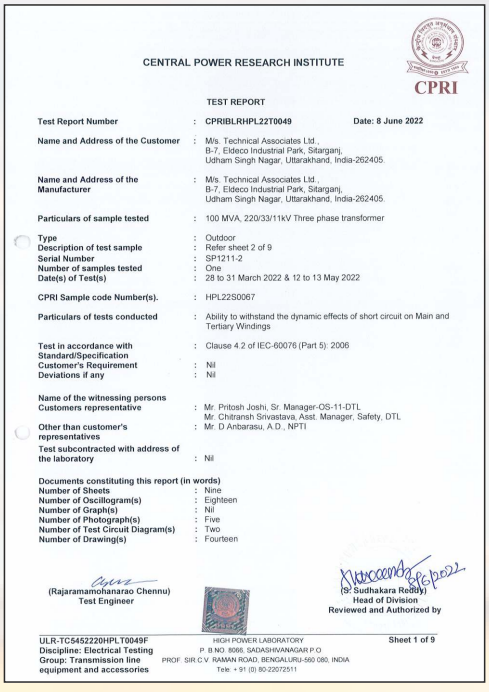
A. Special Tests as per IEC 60076-1,

As per IEC 60076-1, Short Circuit test comes under Special Test Category. Transformers supplied up to 220 kV have been successfully short circuit tested in accordance with IEC 60076 and IS 2026, in Central Power Research Institute (CPRI), a member of STL International group of testing laboratories.

B. Special Tests as per IEC 60076-1

All In-House Facilities are available for carrying out following Special Tests, except short circuit test:

a. Dielectric special tests (IEC 60076-3)
b. Winding hot-spot temperature-rise measurements
c. Determination of capacitances windings-to-earth, and between windings
d. Measurement of dissipation factor (tan d) of the insulation system capacitances.
e. Determination of transient voltage transfer characteristics (Annex B of IEC 60076-3:2000)
f. Measurement of zero-sequence impedance(s) on three-phase transformers (11.6)
g. Measurement of d.c. insulation resistance each winding to earth and between windings



CENTRAL POWER RESEARCH INSTITUTE

TEST REPORT

CPRI

Test Report Number	: CPRIBLRHPL22T0049	Date: 8 June 2022
Name and Address of the Customer	: M/s. Technical Associates Ltd., B-7, Eldeco Industrial Park, Sitarganj, Udham Singh Nagar, Uttarakhand, India-262405.	
Name and Address of the Manufacturer	: M/s. Technical Associates Ltd., B-7, Eldeco Industrial Park, Sitarganj, Udham Singh Nagar, Uttarakhand, India-262405.	
Particulars of sample tested	: 100 MVA, 220/33/11kV Three phase transformer	
Type	: Outdoor	
Description of test sample	: Refer sheet 2 of 9	
Serial Number	: SP1211-2	
Number of samples tested	: One	
Date(s) of Test(s)	: 28 to 31 March 2022 & 12 to 13 May 2022	
CPRI Sample code Number(s).	: HPL22S0067	
Particulars of tests conducted	: Ability to withstand the dynamic effects of short circuit on Main and Tertiary Windings	
Test in accordance with Standard/Specification	: Clause 4.2 of IEC-60076 (Part 5): 2006	
Customer's Requirement	: Nil	
Deviations if any	: Nil	
Name of the witnessing persons Customers representative	: Mr. Pritosh Joshi, Sr. Manager-OS-11-DTL Mr. Chitransh Srivastava, Asst. Manager, Safety, DTL	
Other than customer's representatives	: Mr. D Anbarasu, A.D., NPTI	
Test subcontracted with address of the laboratory	: Nil	
Documents constituting this report (in words)		
Number of Sheets	: Nine	
Number of Oscillogram(s)	: Eighteen	
Number of Graph(s)	: Nil	
Number of Photograph(s)	: Five	
Number of Test Circuit Diagram(s)	: Two	
Number of Drawing(s)	: Fourteen	

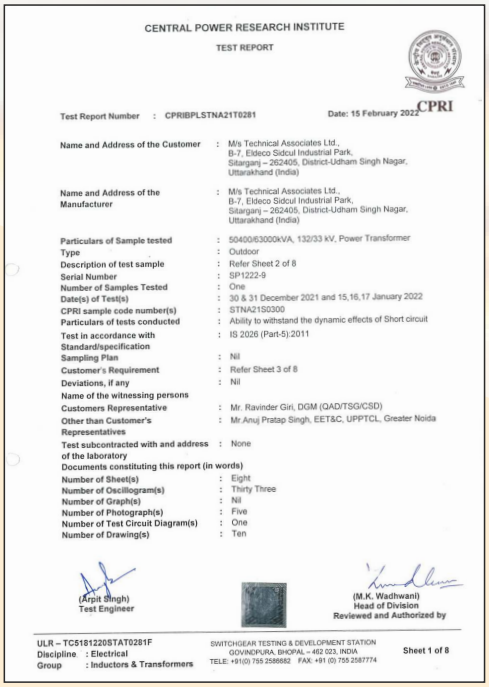
(Rajaramamohanarao Chennu)
Test Engineer

(S. Sudhakara Reddy)
Head of Division
Reviewed and Authorized by

ULR-TC5452220HPLT0049F
Discipline: Electrical Testing
Group: Transmission line equipment and accessories

HIGH POWER LABORATORY
P. B.NO. 8066, SADASHIVANAGAR P.O.
PROF. SIR C.V. RAMAN ROAD, BENGALURU-560 080, INDIA
Tele: + 91 (0) 80-22072511

Sheet 1 of 9



CENTRAL POWER RESEARCH INSTITUTE

TEST REPORT

CPRI

Test Report Number	: CPRIBPLSTNA21T0281	Date: 15 February 2022
Name and Address of the Customer	: M/s Technical Associates Ltd., B-7, Eldeco Sidcul Industrial Park, Sitarganj – 262405, District-Udham Singh Nagar, Uttarakhand (India)	
Name and Address of the Manufacturer	: M/s Technical Associates Ltd., B-7, Eldeco Sidcul Industrial Park, Sitarganj – 262405, District-Udham Singh Nagar, Uttarakhand (India)	
Particulars of Sample tested	: 50400/63000kVA, 132/33 kV, Power Transformer	
Type	: Outdoor	
Description of test sample	: Refer Sheet 2 of 8	
Serial Number	: SP1222-9	
Number of Samples Tested	: One	
Date(s) of Test(s)	: 30 & 31 December 2021 and 15,16,17 January 2022	
CPRI sample code number(s)	: STNA21S0300	
Particulars of tests conducted	: Ability to withstand the dynamic effects of Short circuit	
Test in accordance with Standard/specification	: IS 2026 (Part-5):2011	
Sampling Plan	: Nil	
Customer's Requirement	: Refer Sheet 3 of 8	
Deviations, if any	: Nil	
Name of the witnessing persons Customers Representative	: Mr. Ravinder Giri, DGM (QAD/TSG/CSD)	
Other than Customer's Representatives	: Mr.Anuj Pratap Singh, EET&C, UPPTCL, Greater Noida	
Test subcontracted with and address of the laboratory	: None	
Documents constituting this report (in words)		
Number of Sheet(s)	: Eight	
Number of Oscillogram(s)	: Thirty Three	
Number of Graph(s)	: Nil	
Number of Photograph(s)	: Five	
Number of Test Circuit Diagram(s)	: One	
Number of Drawing(s)	: Ten	

(Arpit Singh)
Test Engineer

(M.K. Wadhwani)
Head of Division
Reviewed and Authorized by

ULR – TC51812205TAT0281F
Discipline : Electrical
Group : Inductors & Transformers

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GOVINDPURA, BHOPAL – 462 023, INDIA
TELE: +91(0) 755 2586662 FAX: +91 (0) 755 2587774

Sheet 1 of 8

h. Vacuum deflection test on liquid immersed transformers (11.9)
i. Pressure deflection test on liquid immersed transformers (11.10)
j. Vacuum tightness test on site on liquid immersed transformers (11.11)
k. Frequency response (Frequency Response Analysis or FRA)
l. Check of external coating (ISO 2178 and ISO 2409 or as specified)
m. Measurement of dissolved gasses in dielectric liquid
n. Mechanical test or assessment of tank for suitability for transport

C. Type Tests as per IEC 60076-1

All In-House Facilities are available for carrying out following Type Tests:

a. Di-Electric Type Tests (IEC 60076-3)
b. Temperature Rise (IEC 60076-2)
c. Noise Measurement (IEC 60076-10)
d. No Load Loss and Current at 90% and 110% of rated Voltage (IEC 60076-1)
e. Power Taken by Fan

OPERATIONAL EXCELLENCE

The manufacturing works at Sitarganj, Uttarakhand are spread over 23,000 Square Metre of covered manufacturing sheds with a manufacturing capacity of 20,000 MVA, per annum. Using TAL's Operational Excellence and Financial strength, in catering to National and International clients, we have continued the strategy of:

1. Investing in high-end engineering software
2. Regular type testing and short circuit testing of newly engineered ratings
3. Backward Integration with In-House Facility for effective quality control at:
   a. Copper Conductor Drawing and Paper Covering
   b. Insulation Processing
   c. Oil Storage and Filtration
   d. All Major Type Testing including Tank
4. LEAN Principles of manufacturing with single piece flow
5. A state-of-the-art world class manufacturing facility backed by high end Material Handling and Testing Equipment set ups
   a. EOT Cranes up to 300 MT handling Capacity
   b. Vapour Phase Drying Plant
   c. Vertical Winding Machines with Variable Frequency Drives (VFD)
   d. Air Castors for flexibility and movement of High Tonnage load

TESTING & OTHER INFRASTRUCTURE

TAL EHV Laboratory has been assessed and accredited by NABL up to 400 KV, 500 MVA in accordance with the standards ISO/IEC 17025: 2017 for its competence of testing laboratories. NABL is an autonomous body setup under Ministry of Commerce & Industry Government of India (DPIIT) and is a constituent board of Quality Council of India (QCI). We have full fledged plant machinery and Testing Equipments suitable for manufacturing up to 400 kV, 500 MVA.

a.	Motor & Generator Test set	- 1	Make:BHEL+Stamford/Cummins
b.	Motor & Generator Test set	- 1	Make: Siemens + AEG
c.	Motor & Generator Test set	- 1	Make: CG + Kirloskar Electric
d.	Impulse Generator	- 2	Make: HAEFELY- Range: upto 900 & 1600 Kvp
e.	Vapour Phase Drying System	- 1	Make: SAVAS
f.	Autoclave	- 2	Make: SAVAS
g.	Oven	- 3	Make: TAL
h.	Largest EOT crane	-150Tx2	Make: Mukund
i.	Winding Machine	-18	Make-J.V Engg.
j.	Vertical Winding Machine	- 1	Make: Vikrant
k.	Temperature Rise test set-up	-3	Three Set-ups for uninterrupted working
l.	Clean room for Winding/Assembly	-2	

QUALITY POLICY

We, at Technical Associates, are committed to achieve total satisfaction of our customers by:

- Effectively implementing and continually improving the Quality System
- Delivering on time, products conforming to agreed specifications at competitive prices
- Collectively and individually striving to do things right - the first time and every time-both in personal life as well as at the work place
- Continuous up-gradation of technology and active involvement of all employees and associates in productivity improvement

SERVICES

TAL also undertakes installation and commissioning of Power Transformers of its own make on customer requests for the same. TAL service team consists of experienced Engineers having expertise of installation, commissioning and repairing. We also offer comprehensive maintenance of all TAL installations. Our service is backed by supply of spares and components in shortest time as per customer needs. TAL also undertakes specialized service activities which include: Repair of Power Transformers up to 400 KV and is approved by prestigious customers like PGCIL for both site and factory repair of Power Transformers.

WAY FORWARD

Technical Associates Limited (TAL) as a brand, has always led the way with authenticity and with this ethos at the core, TAL is checking into newer, relevant areas of energy. With an organisational commitment to Continuous Learning, Commitment to Quality, Continued Improvement, and Innovative approach to its Products, Processes and People, TAL has successfully catered to the requirements of its many customers with quality and timely supplies, service, and support.

Our vision for the future of energy hinges on the three key defining parameters of:

- Best in Class Energy Efficiency
- Reduced Carbon Foot Print
- A Sustainable and Inclusive Future for all

With this vision, we hope to continue being a partner in the growth of the Nation, contributing to a prosperous, energy efficient, green planet.

Intertek UKAS MANAGEMENT SYSTEMS

Energising India since 1969...

TECHNICAL ASSOCIATES LIMITED

An ISO 9001 : 2015 & ISO 45001 : 2018 Company

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- Jabalpur
- Patiala • Patna

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