

● TP Installations

Thousands of TP's sold worldwide

The TRANSFORMER PROTECTOR (TP) complies with the NFPA recommendation of Fast Depressurization Systems for all Power Plants and Substations Transformers, under the code 850.



Research Articles

- "Protection of oil filled transformer against explosion", CIGRE Conference, *Cape Town, South Africa, August 17-21, 2009*, ref: AtTPra18b01e
- "An answer to prevent transformer explosion and fire: live test and simulations on large transformers", *Power Gen Europe, Milan, Italy, 2008, Best Paper Award*, ref: AtTPra06b01e
- "Prevention of transformer tank explosion, Part 3: Design of efficient protections using numerical simulations", ASME Pressure Vessels & Piping Conference, *Prague, Czech Republic, July 26-30, 2009*, ref: AtTPra14b01e



SERGI
TRANSFORMER PROTECTOR

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186, avenue du Général de Gaulle
P.O. Box 90 – 78260 Achères – France
Phone: +33 1 39 22 48 40
Fax: +33 1 39 22 11 11
E-mail: sergi@sergi-tp.com

www.sergi-tp.com



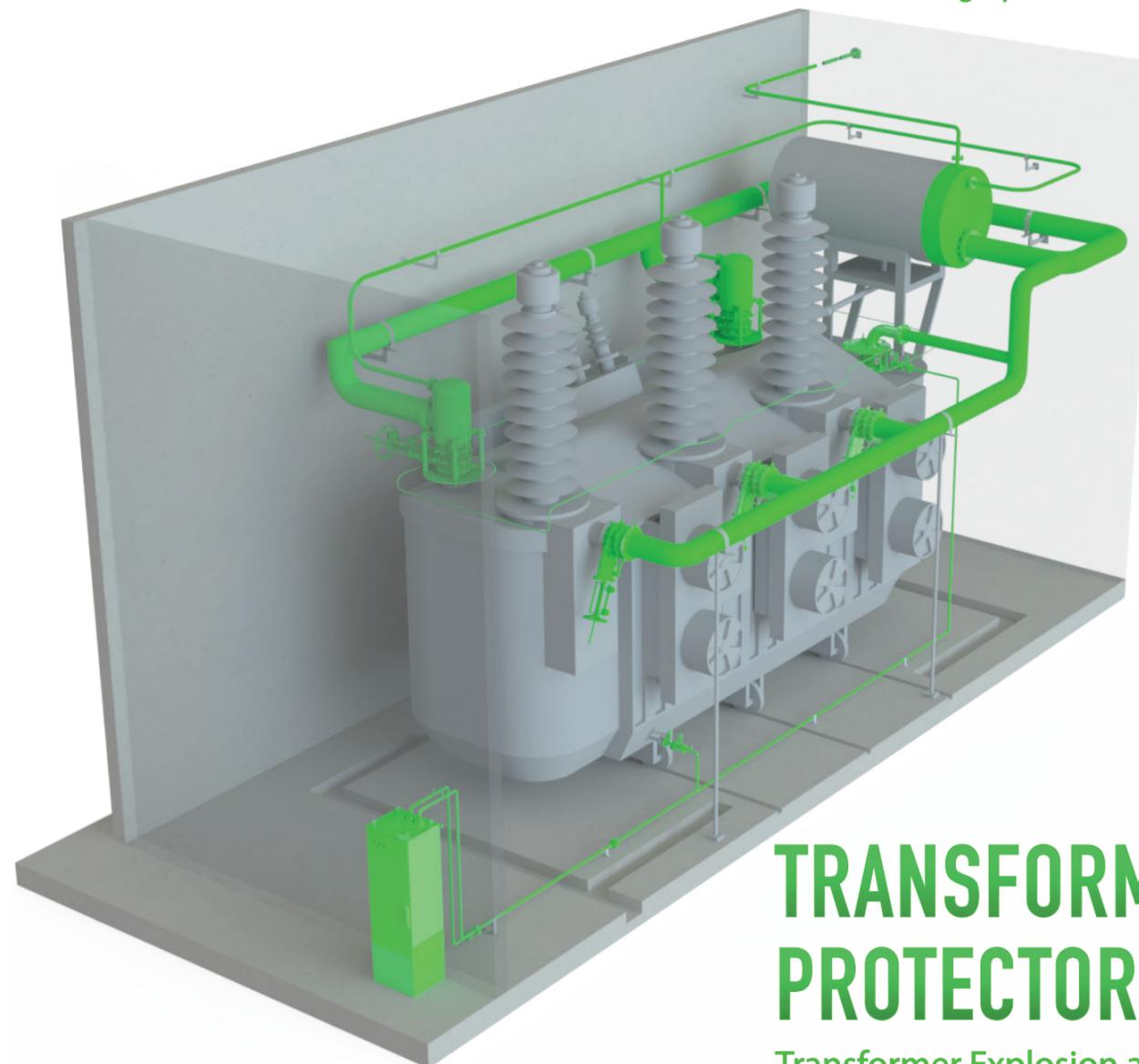
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TRANSFORMER PROTECTOR

Transformer Explosion and Fire Prevention



Depending on arc location and transformer size, the **TRANSFORMER PROTECTOR (TP)** is activated within 0.5 to 20 milliseconds by the first dynamic pressure peak of the shock wave, avoiding transformer explosions before static pressure increases.



SERGI TP

TRANSFORMER, a Critical Safety Equipment

Transformers are considered by Corporate Risk Managers and Insurers as the most critical equipment inside plants due to the large quantity of oil in contact with high voltage elements.

The loopholes in regulation and the market globalization have resulted in a disturbing demise in the quality of new transformers. Therefore many experts anticipate that the life span of transformers will sharply decrease and the number of failures will increase significantly in the near future.



Protecting transformers against explosion and fire has become a priority because:

- The worldwide privatization programs of electricity production and distribution companies have resulted in a reduction of investments
- Today's competitive markets demand longer operations for greater production. This results in aging equipment and overloaded transformers

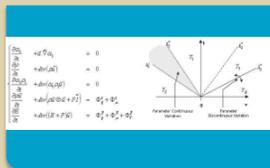
Conventional Transformer Protection Inefficiency

- Pressure Relief Valve inadequacy
- Buchholz and Rapid Pressure Relay inefficiency
- Electric Breaker opening time

High Level of Research and Tests

An intensive research and experimentation program started in 1995.

Research and Tests

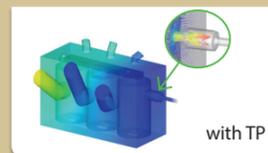
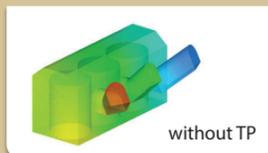


62 tests have been conducted to demonstrate the TRANSFORMER PROTECTOR (TP) efficiency. In every test, the TP saved the transformer tank without any permanent deformation.

During the 62 tests, SERGI has found:

- Arc energy and transformer power are not key parameters for transformer tank explosion prevention;
- Buchholz never activated;
- The first Mega Joule produces 2.3 m³ (80 ft³) of explosive gas, while 100 Mega Joule produces only 4.3 m³ (150 ft³).

Validation

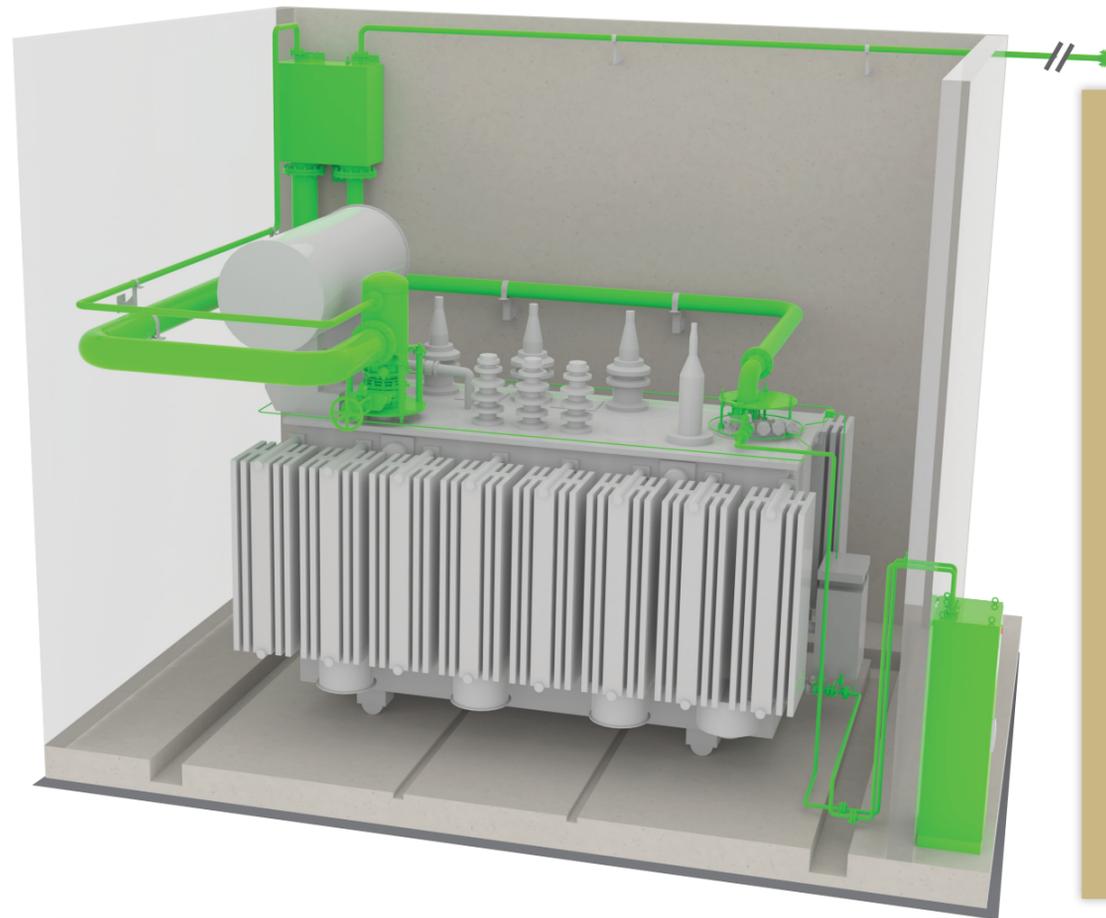


Simulations show the dynamic pressure after 120 milliseconds for a short circuit of 11 Mega Joule occurring in a 200 MVA.

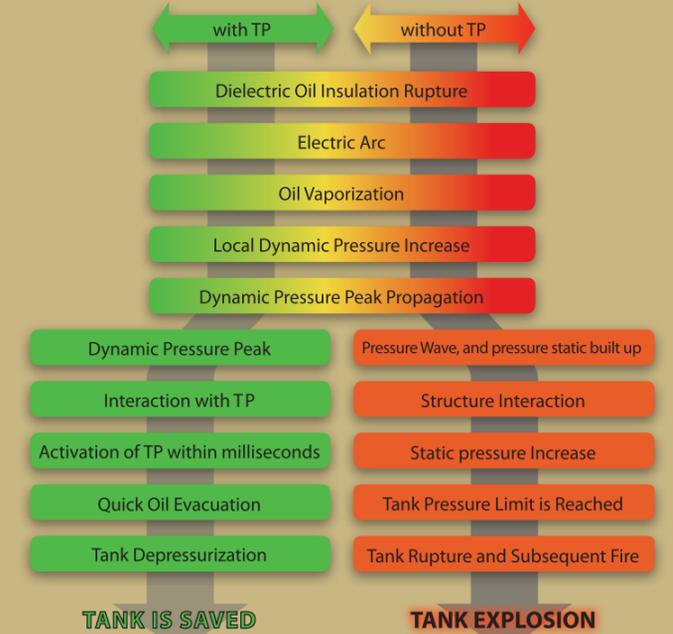
⚠ **Without TP, the tank explodes**

Success

SERGI has been **awarded** by the **2008 POWER-GEN Europe** with a paper entitled, "An answer to prevent transformer explosion and fire: live test and simulations on large transformers."(...) The judges felt that the paper **offered an important answer to safety problems that can occur in power plants.** (Source: pge08.events.pennet.com homepage dated of 13th of august 2008).



Consequences of Internal Electric Fault



TRANSFORMER PROTECTOR (TP), Explosion Prevention

The first dynamic pressure peak activates the TP before the build up of a static pressure. The transformer is therefore **protected against explosion** and fire without any need for an actuator. When the TP is activated, an alarm is sent to the Control Panel.

When a Dielectric Oil Insulation Rupture occurs, the TP prevents transformer explosion following the physical process shown in the **figure "Consequences of Internal Electrical Fault"**.

A Recommended Solution

The TRANSFORMER PROTECTOR complies with the **National Fire Protection Association (NFPA)** Civil Code 2015, edition of :

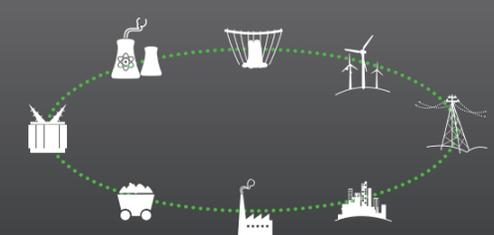
- **NFPA 850**, Recommended Practice for Fire Protection for Electric Generating Plants and High Voltage Direct Current Converter Stations. **ref: AtTPrdab**



The TP has already saved more than 20 transformers. Today, SERGI TP has already received several certificates of TP successful operation from customers.

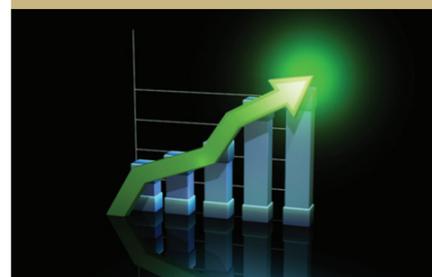
Applications

The TP can be installed on any existing and new oil filled transformers from 0.1 MVA to over 1,000 MVA. When retrofitting on existing transformer, the tank is never machined; existing flanges or manholes are always used.



For more information, visit our website : www.sergi-tp.com

TRANSFORMER PROTECTOR Benefits



Financial consequences due to transformer explosion and fire often reach hundreds of USD millions.

Using the Protection Financial Benefit ratio, often used by Corporate Risk Managers and Insurers, **the TP is strongly recommended and it compensates more than 1000 times the investment.**

- Sharply Reduces Plant Outages and Associated High Costs
- Prevents Oil Fire from spreading to the Transformer and its Surrounding Equipment
- Allows Transformer Repair after Internal Fault
- Prevents from Environmental Pollution
- Eliminates Risk to Human Life
- Saves Company reputation