

***Task Force – Transformer Tank Rupture and  
Mitigation  
Review Group #7***

Gas Insulated Power Transformers

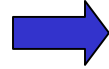
Review Group: Craig Swinderman

# ***Gas Insulated Power Transformers***

- **Use SF<sub>6</sub> Gas as the insulating and cooling medium instead of insulating oil.**
- **First units produced in 1967.**
- **Several thousand units now in service worldwide.**
- **Transformer applications: Distribution class units up to 400 MVA, 345 kV.**
- **Primarily used in substations located in urban areas (including inside buildings, underground) due to safety benefits.**

# Features of Gas Insulated Transformers

Oil Immersed Transformer



Gas Insulated Transformer

## ① Insulation · Cooling

Insulating Oil



SF<sub>6</sub> Gas

## ② Solid Insulation Material

Oil Impregnated Paper  
Pressboard



Plastic Film,  
Aramide Paper  
Pressboard

## ③ Conservator

Necessary



Unnecessary

## ④ On-Load Tap Changer

• **Diverter Switch**

Arcing Switching in Oil



Vacuum Valve

• **Tap Selector**

Slide Contact



Roller Contact

## ⑤ Type of Cooling

• **Inside**

Natural or Forced Gas Cooling

• **Outside**

Gas/Air, Gas/Water Heat Exchanger  
Radiator (Forced Air or Natural  
Cooling)

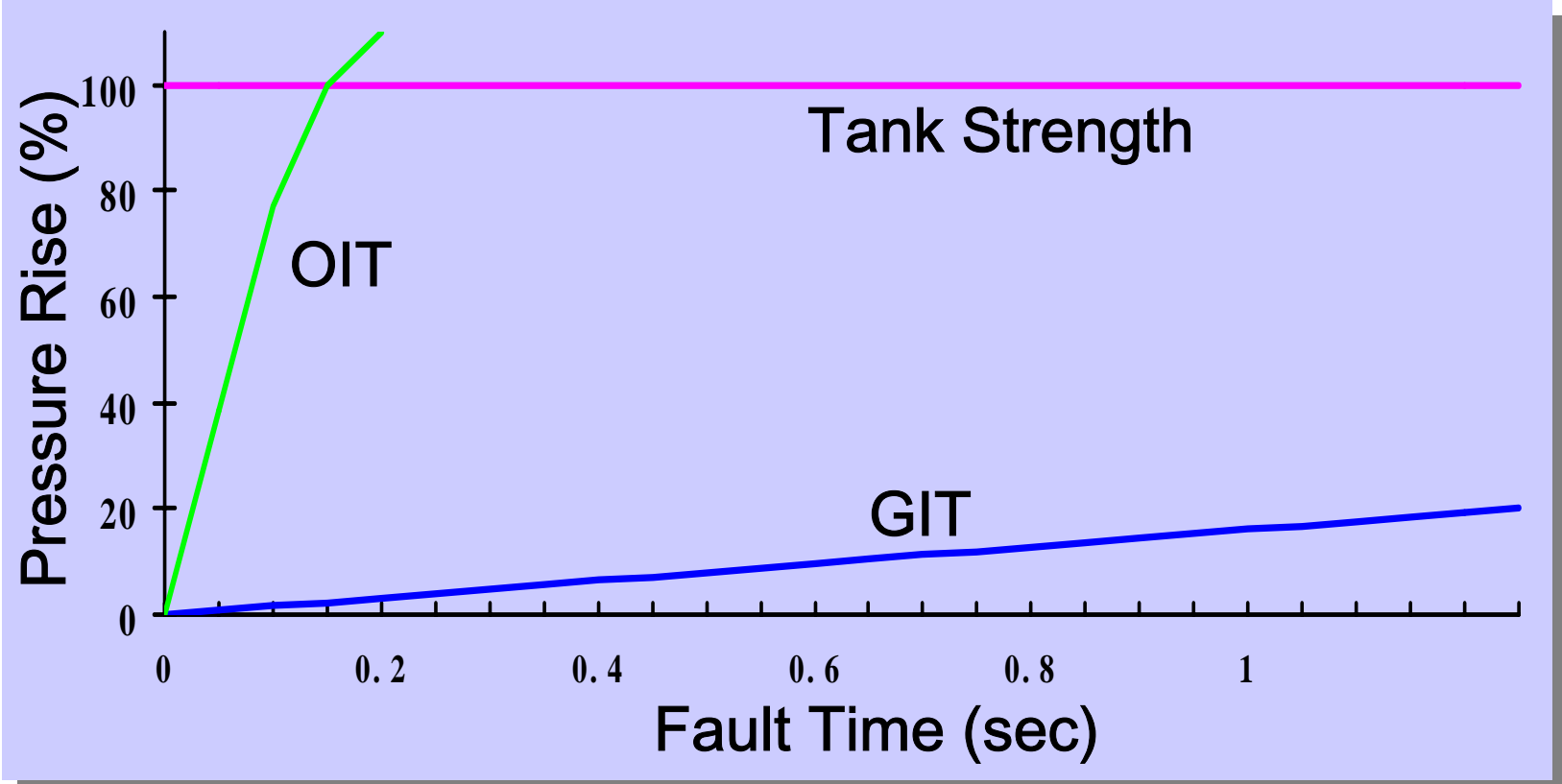
# ***Benefit of Gas Insulated Transformers***

**SF6 Gas Insulation**

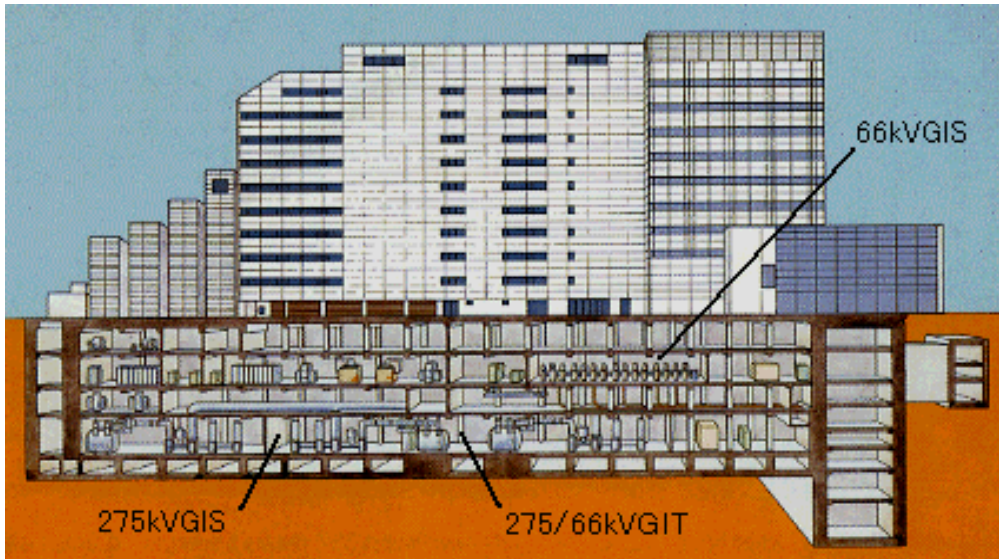
**Non-flammable**

**Pressure rise during fault is small**

**Non-explosion**



# Applications of Gas Insulated Transformers



**Sectional view of 300kV underground substation in Tokyo Area**

## List of main equipment

Equipment	May 1995	Future
<b>275kV300MVA GIT</b>	<b>2</b>	<b>3</b>
<b>66kV60MVA GIT</b>	<b>--</b>	<b>3</b>
<b>300kV GIS (3 phase type)</b>	<b>2</b>	<b>6</b>
<b>72kV GIS (3 phase type)</b>	<b>22</b>	<b>36</b>
<b>22kV Metal enc- losed switchgear</b>	<b>--</b>	<b>36</b>
<b>Cooling Tower (On Roof floor)</b>	<b>3</b>	<b>4</b>

# *Examples*



**25/37.5/50MVA, Three phase, 50Hz,  
Continuous Rating,  
Core-Form, Type GUB-VSG,  
Forced-Gas Forced Air,  
with On-Load Tap Changer  
GNAN/GFAN/GFAF**

**H.V. 110kV +/-8x1.5%**

**L.V. 10.5kV**

**Noise level 65dB(A)**

**Shipping Year 1998**

# *Examples*

**110kV-50MVA**

**Low-pressure type**



**275kV-300MVA**

**High-pressure type**

