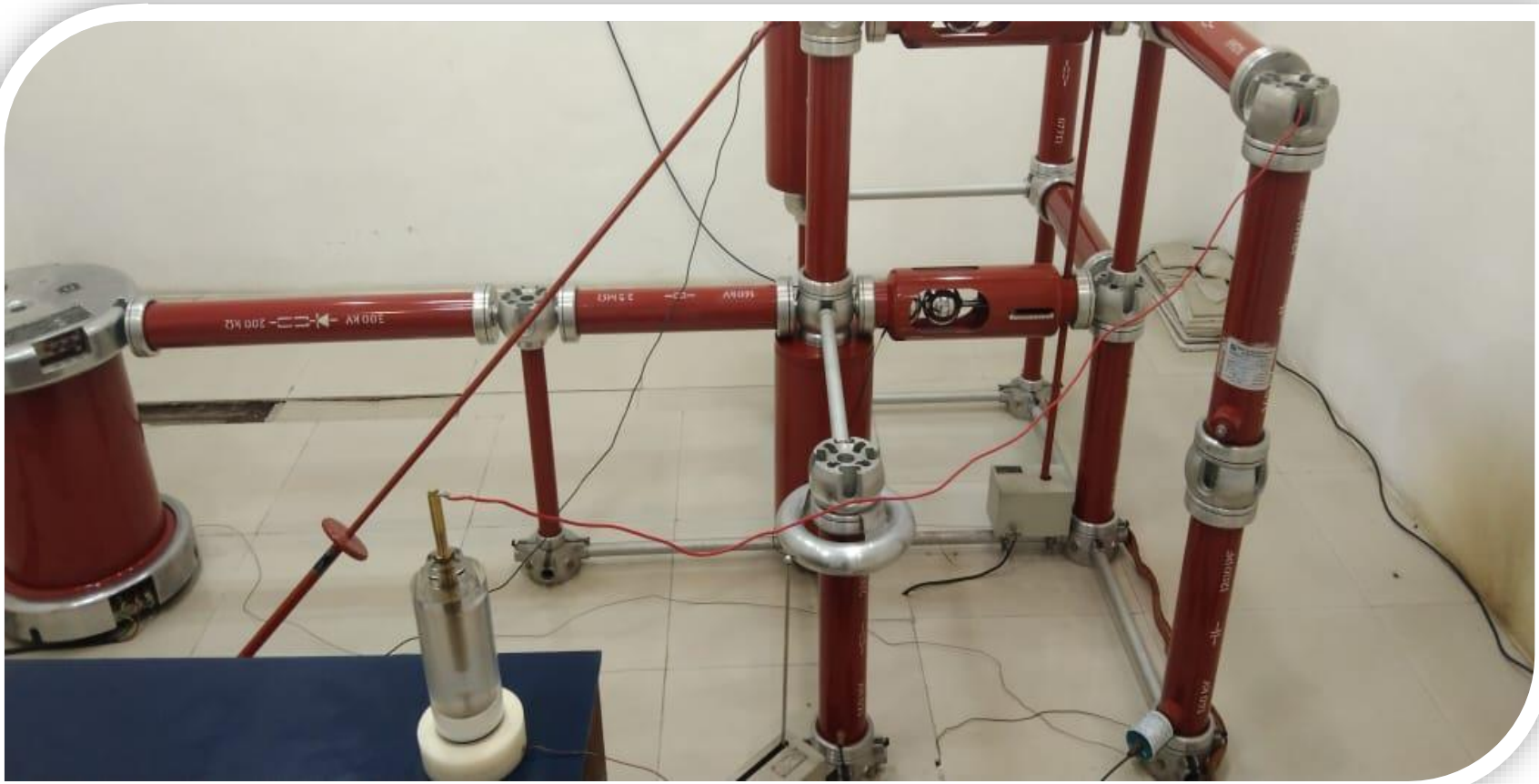
RAJ PETRO
A BRENNTAG GROUP COMPANY

NEGATIVE IMPULSE (280KV Impulse Test Set)



PRESENTED BY:
VINEET DUBEY

AGENDA

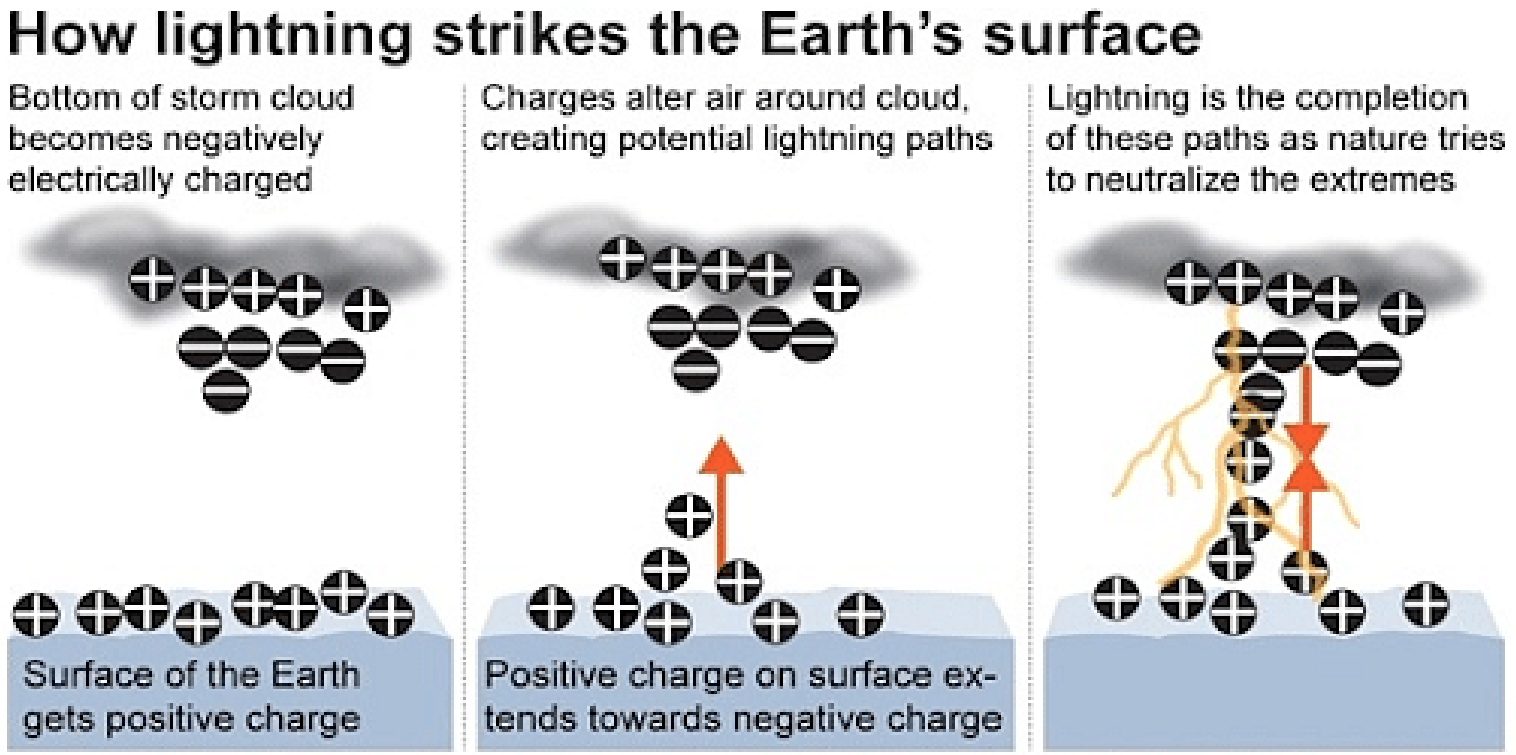
- Introduction(what is impulse?)
- Natural Lightning phenomena
- Purpose
- Test methods
- Apparatus Required
- Working Principle
- Operating Procedure
- Safety clearances

WHAT IS IMPULSE?

AN IMPULSE IN VOLTAGE MEANS A SUDDEN AND QUICK INCREASE OR CHANGE IN ELECTRICAL POWER. IT'S LIKE A SUDDEN SURGE OF ENERGY THAT CAN HAPPEN IN AN ELECTRICAL SYSTEM, SOMETIMES CAUSING DAMAGE IF NOT HANDLED PROPERLY.

Natural Lightning Phenomena

- IT IS LIKE A MASSIVE FLOW OF TINY CHARGED PARTICLES CALLED ELECTRONS. DURING A THUNDERSTORM, CLOUDS BUILD UP A LOT OF ELECTRICAL CHARGE. WHEN THE CHARGE DIFFERENCE BETWEEN PARTS OF THE CLOUD OR BETWEEN THE CLOUD AND THE GROUND BECOMES TOO BIG, IT CAUSES A SUDDEN RELEASE OF ENERGY IN THE FORM OF LIGHTNING. THIS RELEASE INVOLVES A HUGE MOVEMENT OF ELECTRONS FROM ONE PLACE TO ANOTHER, CREATING THE BRIGHT FLASH WE SEE AND THE LOUD THUNDER WE HEAR.

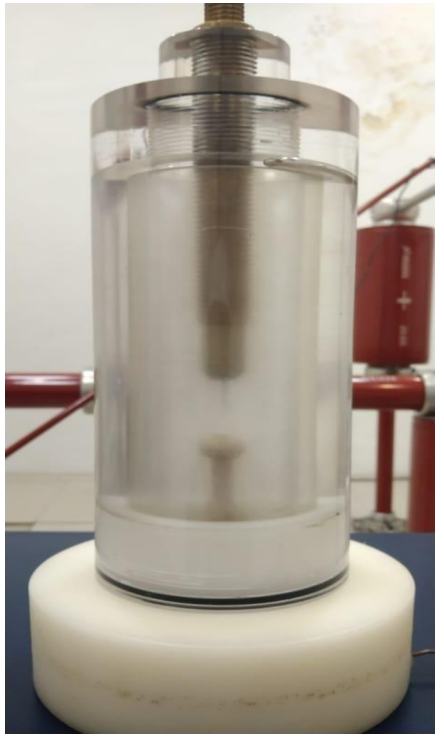


Purpose:

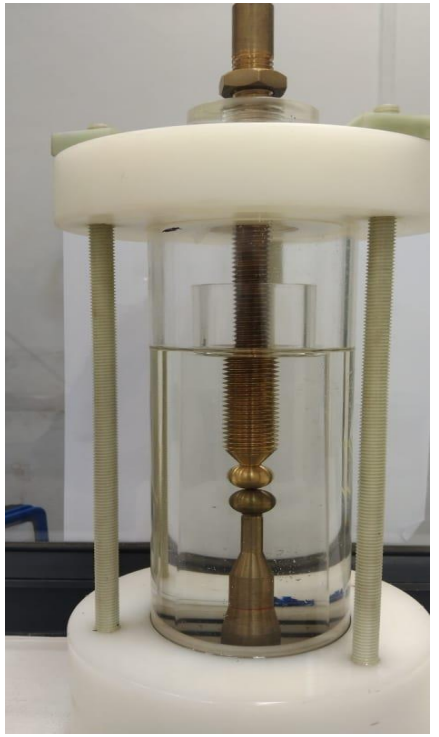
- The purpose of the test is to secure that the transformer insulation withstand the lightning overvoltage's which may occur in service.
- Determination of the dielectric breakdown voltage of insulating oils in a highly divergent field under impulse conditions.

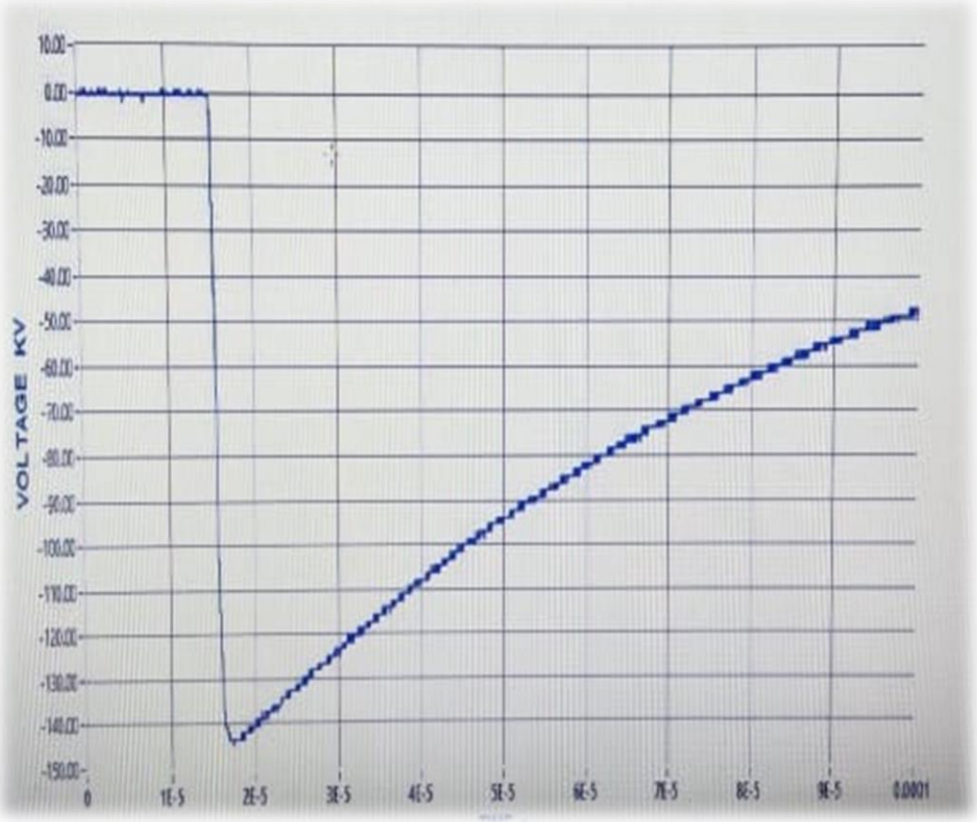
Test method	Type of electrode	Gap b/w electrode
ASTM D3300	Sphere to sphere Sphere to needle	3.8 mm 25.4 mm
IEC 60897	Sphere to needle	15mm

Sphere to needle test cell

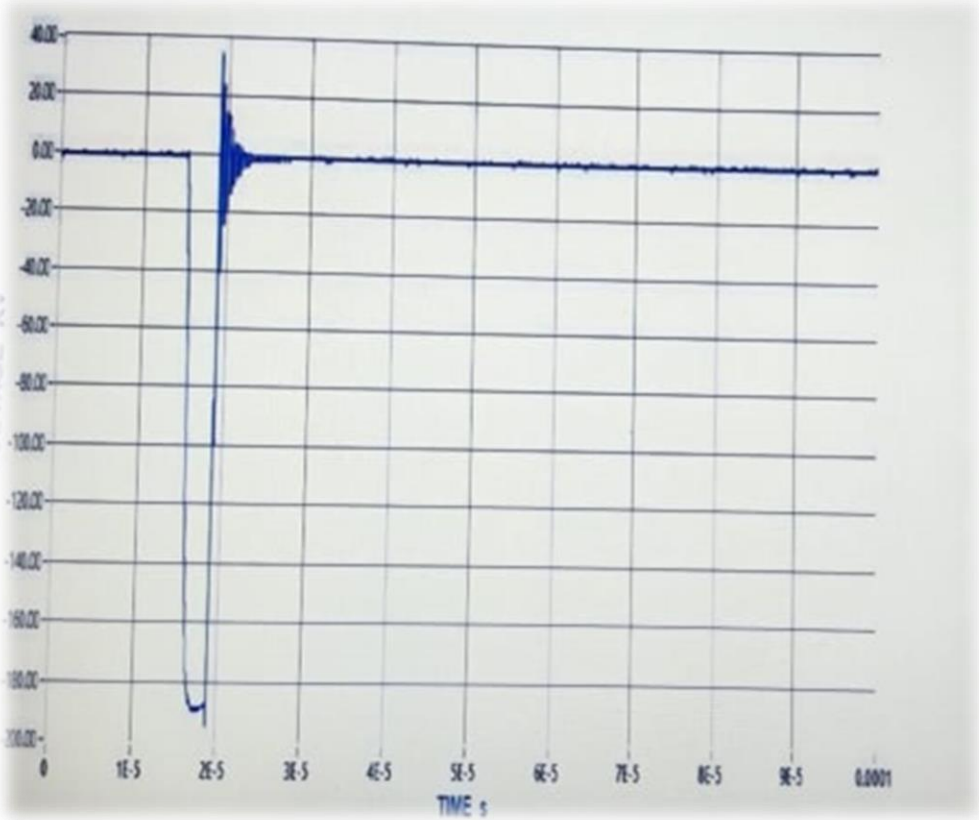


Sphere to sphere test cell



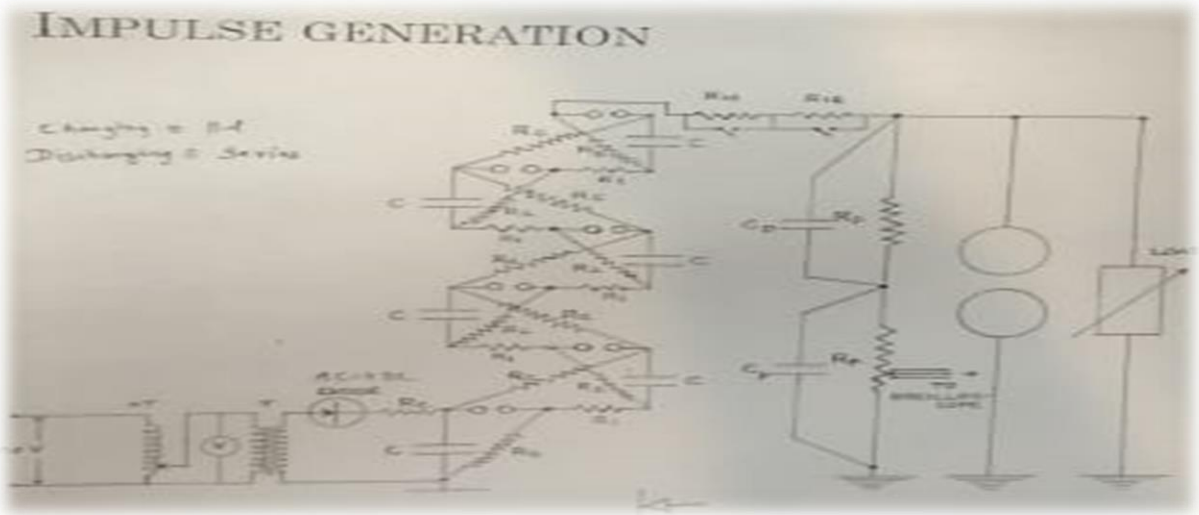


Live wave diagram

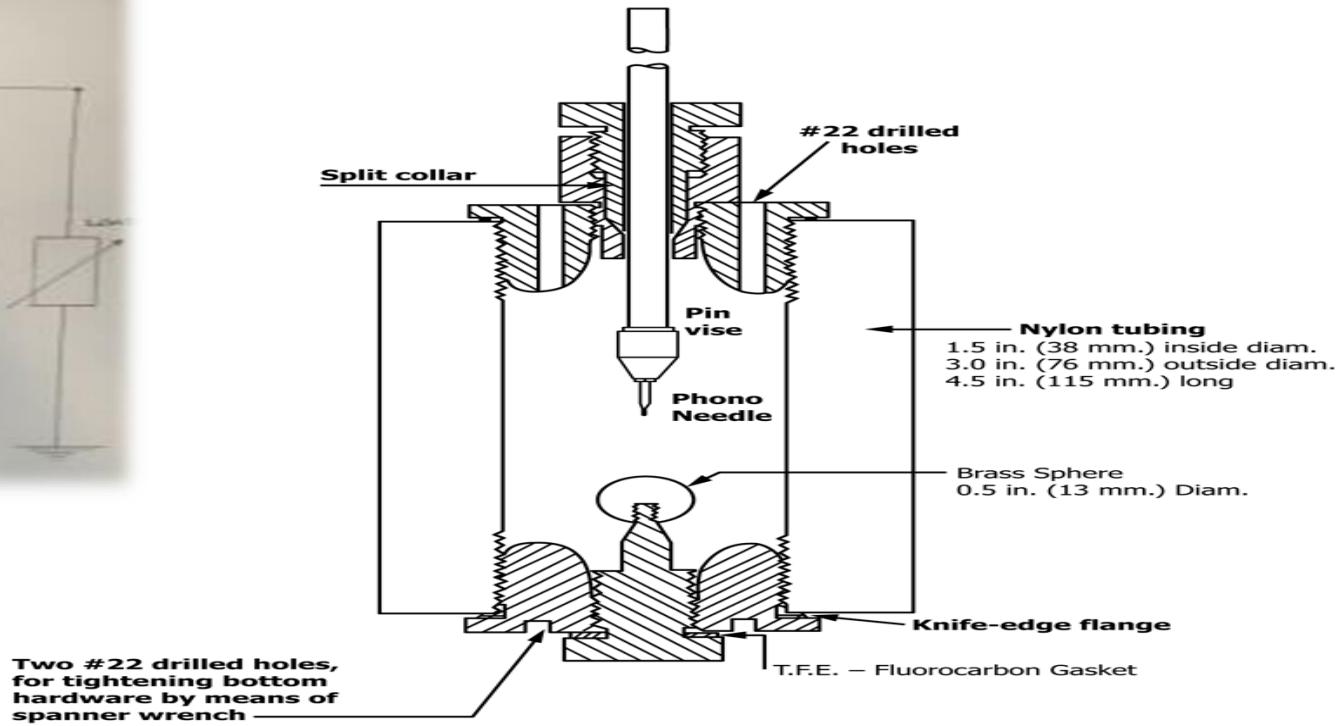


Break down wave diagram

CIRCUIT DIADRAM (280kV impulse test set)



TEST CELL

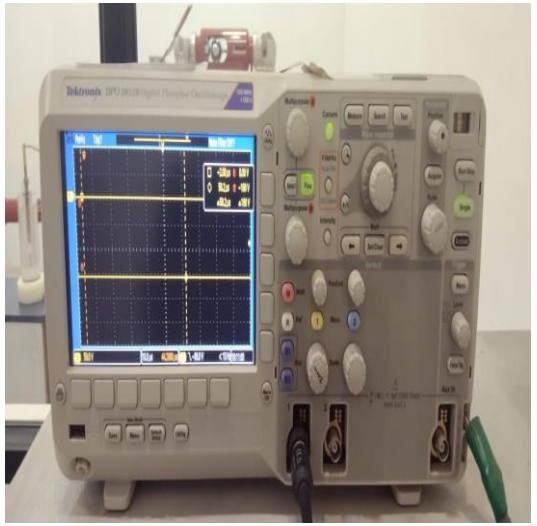


Step up Transformer(0-100kV)

Diode(300 KV)

Capacitor(100000pF)

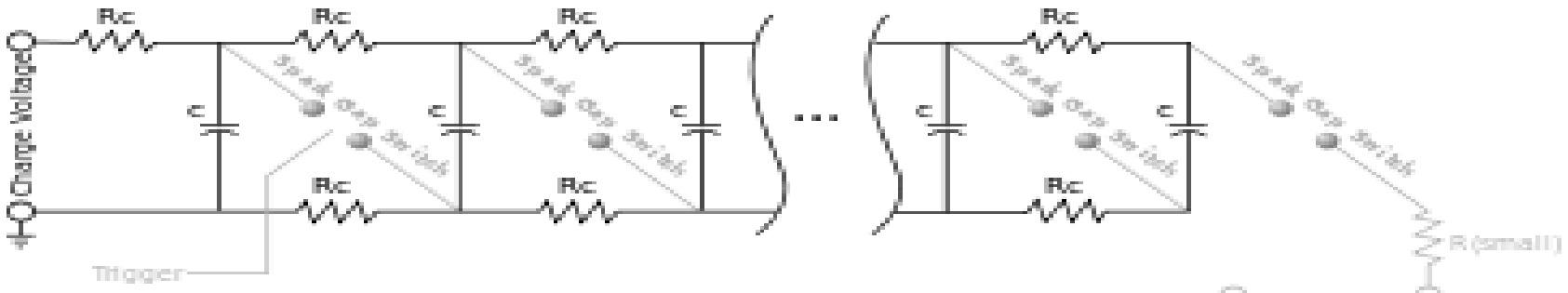
Oscilloscope(100MHz)



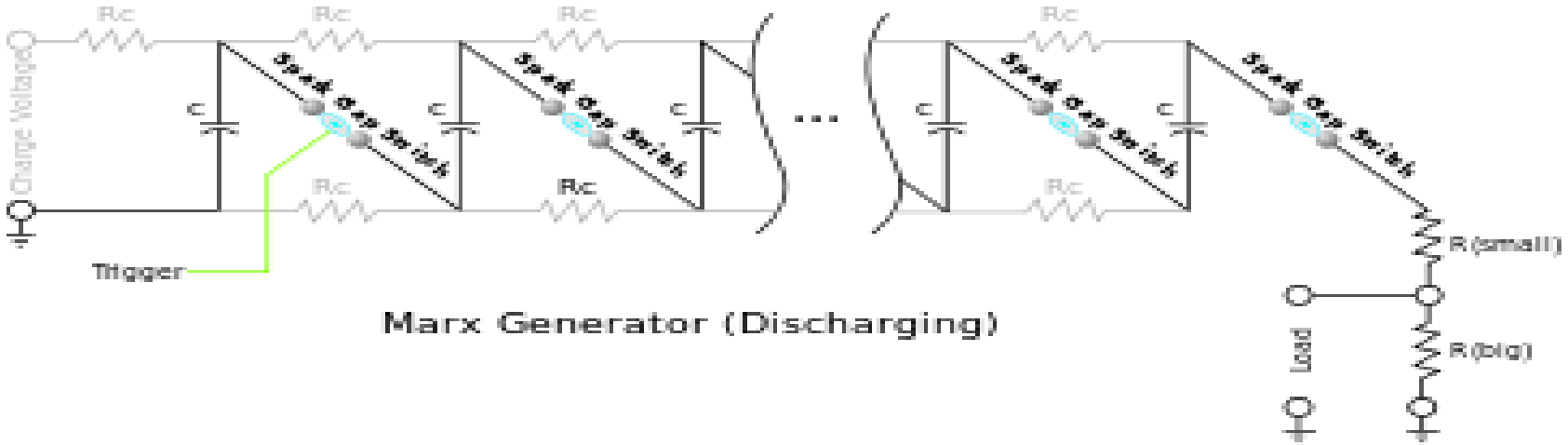
Divider(0-800)

Working Principle:

- The testing is conducted by artificial generation of lightning using IMPULSE GENERATOR.
- Its work on Erwin Otto MARX Generator Principle.
- In this Capacitors are charged in parallel from a DC source and is discharged in series to create impulse voltage of wave front 1.2µs±30% and tail of 50µs±20% .



Marx Generator (Charging)



Marx Generator (Discharging)

Operating Procedure

- Rinse the test cell with a portion of the sample and discard this liquid. Slowly fill the cell with the test liquid .Careful to avoid entraining air bubbles.
- Set the electrode spacing to the desired value.
- Allow it to set undisturbed for 2 min prior to testing.
- Apply the impulse wave of specified polarity starting approximately 40 kV below the expected breakdown level.
- Apply three impulse waves at each voltage level. Allow a minimum of 30 s between each test.
- Increase the voltage level in steps of 10 kV or less until breakdown occurs, noting the crest voltage level at breakdown.
- It is necessary to have at least three withstand levels prior to breakdown.

Safety clearances:

- Maintain specified distance with instrument during high voltage testing .
- Working ground should be insulated & earthing resistance should be less than 2Ω.

THANK YOU