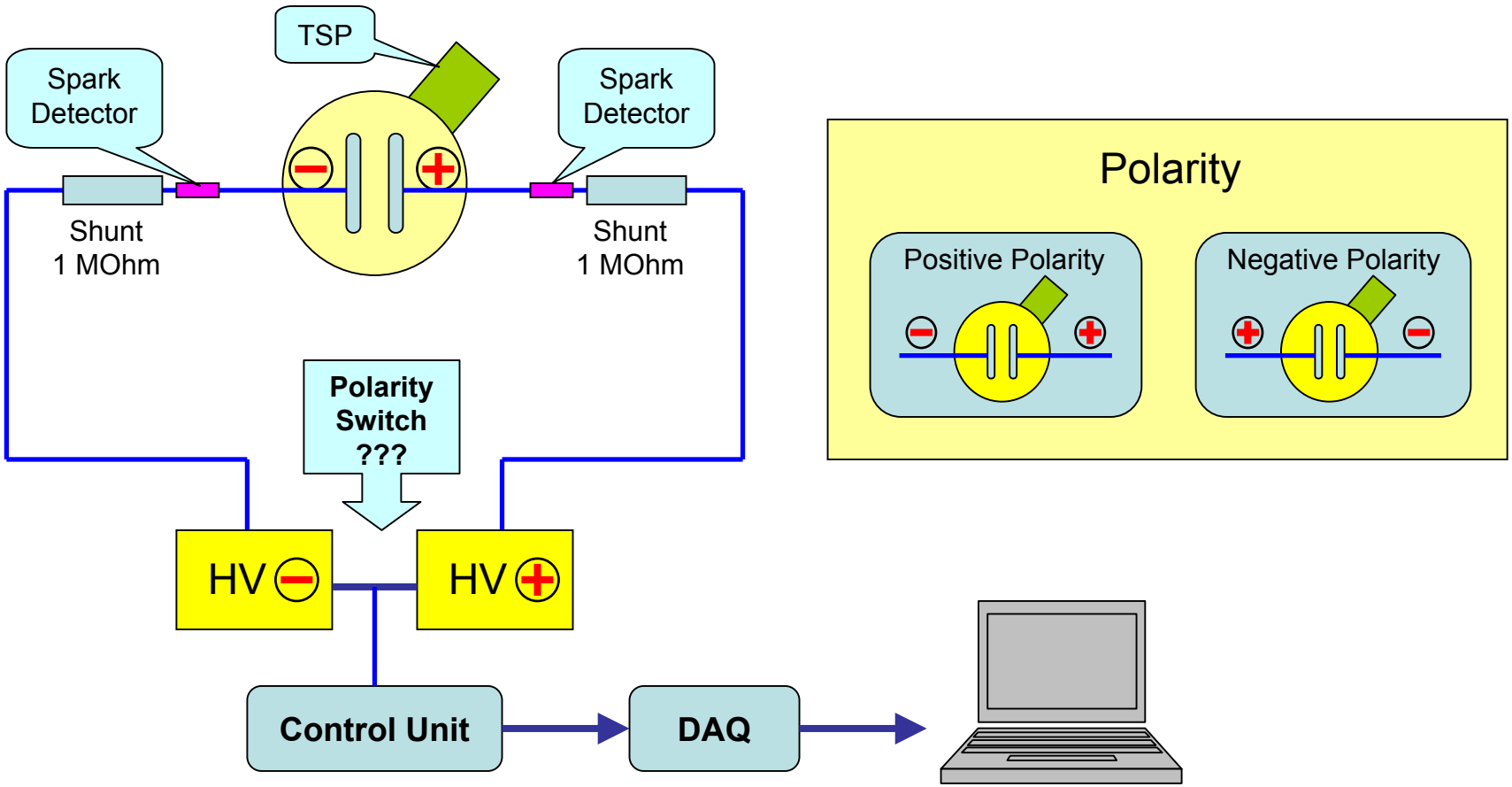
Results of conditioning tests for separator #29

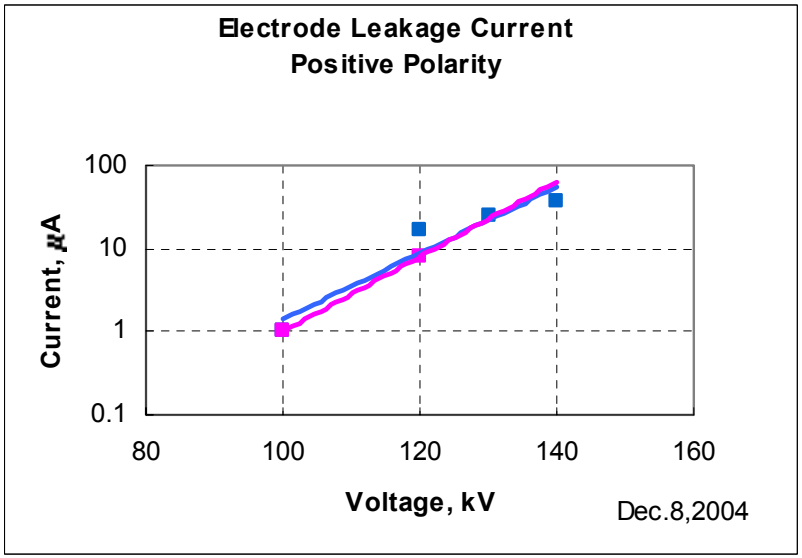
- Measurement scheme
- Conditioning at 150 kV
- Conditioning tests at 170 kV and 180 kV
- Spark/breakdown rate
- Technical specs for good production separator
- Plans

Measurement Scheme

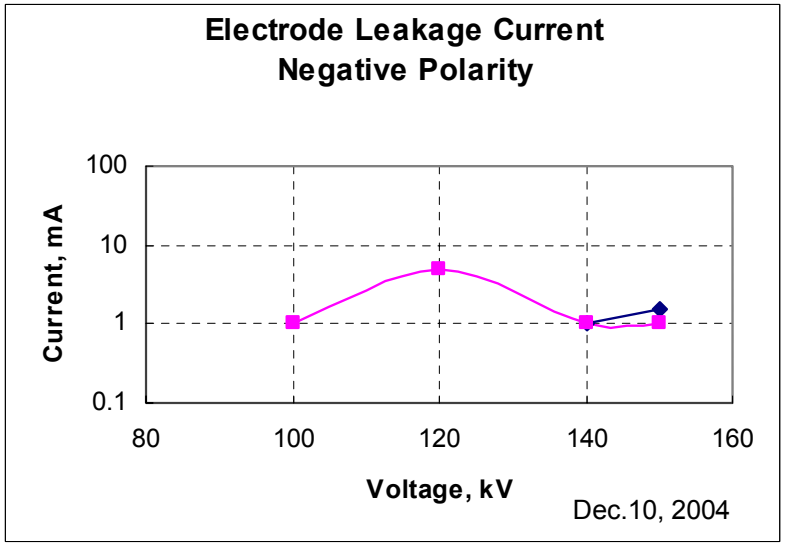


Electrode/cable leakage tests

Positive Polarity



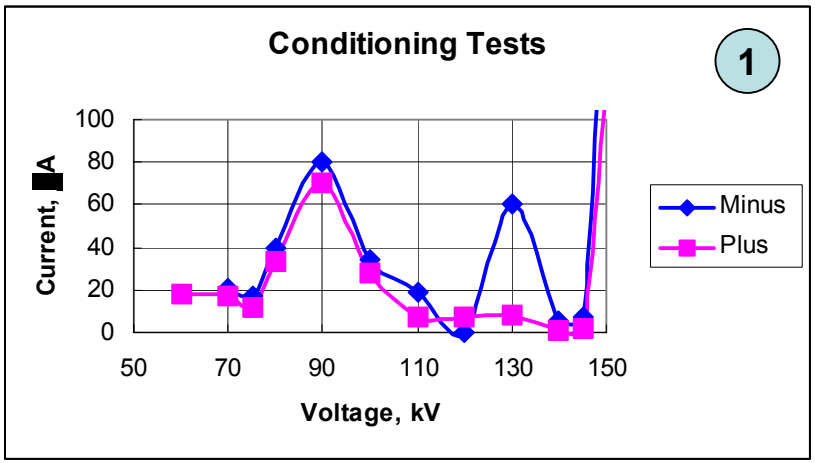
Negative Polarity



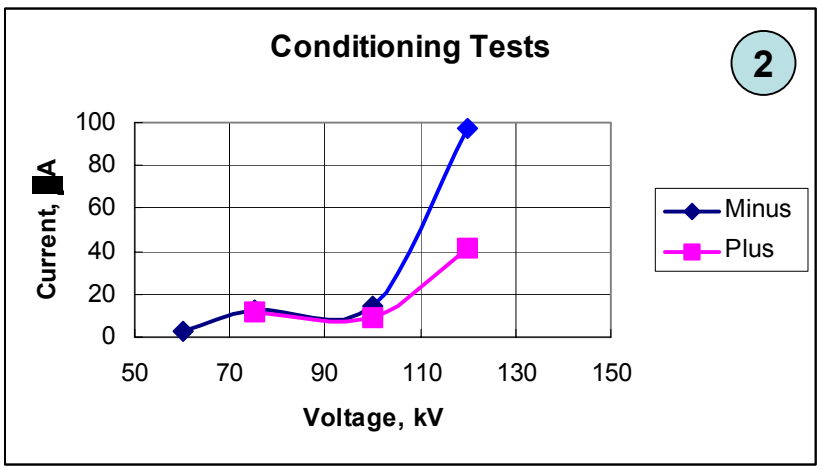
Reasonable to check electrode/cable leakage current for both polarities before starting conditioning tests:

Starting of Conditioning Tests (Dec.8-10, 2004)

Positive Polarity

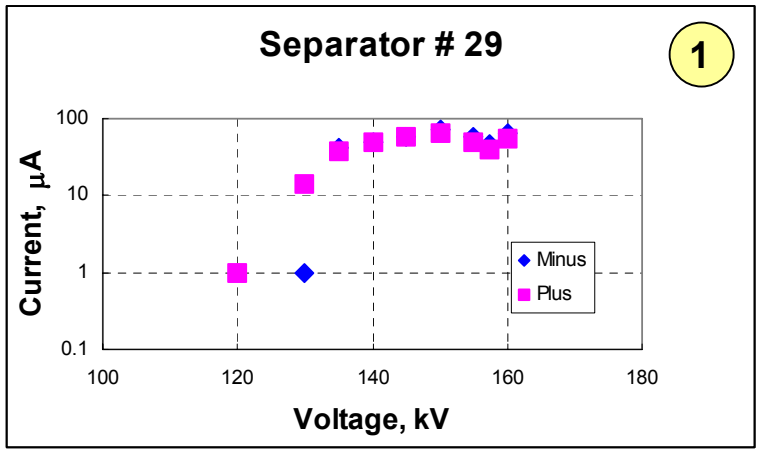


Conditioning at 150kV for ~1 hour : 392 sparks

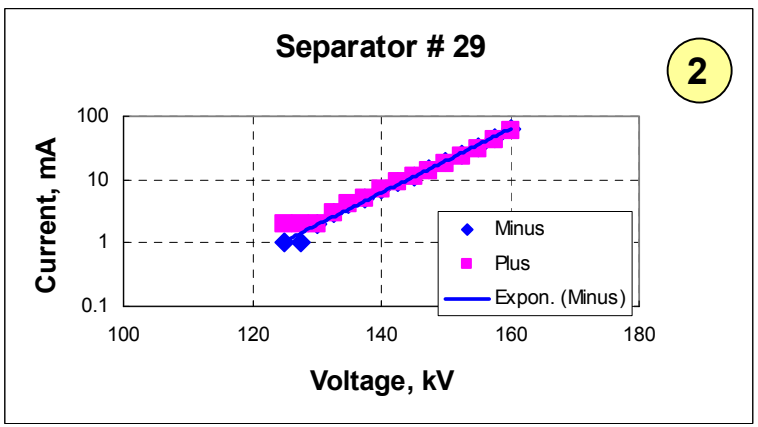


Results: corona and high current 120kV

Negative Polarity



Conditioning at 150-160 kV for 22 hours: 571 sparks

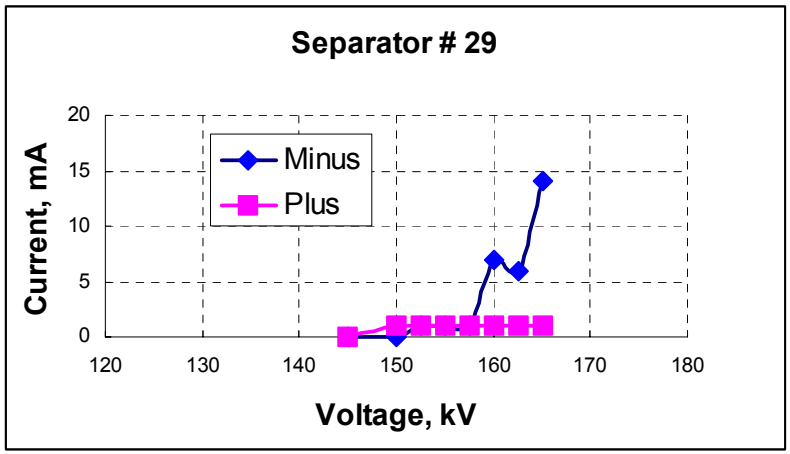


Results: corona (between plates) starting at 130 kV

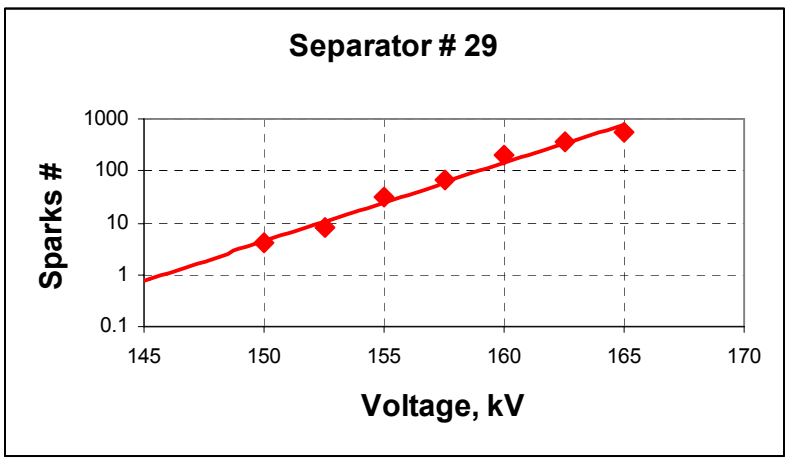
No good progress for the fist round of conditioning tests

Conditioning tests (Dec.11, 2004)

Positive Polarity

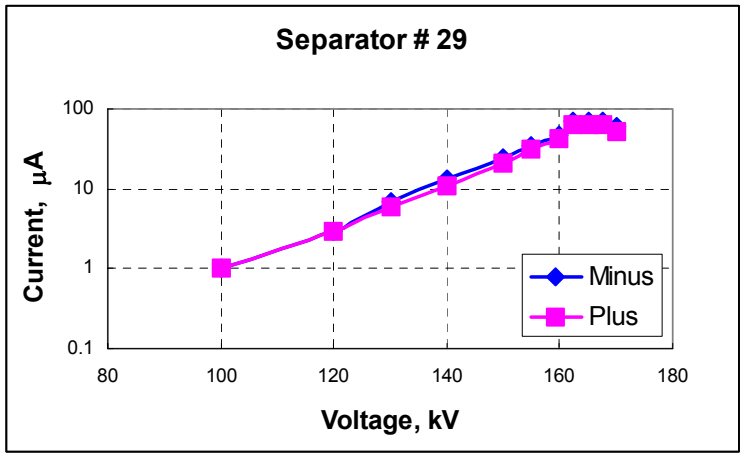


Conditioning at 165kV for ~1 hour

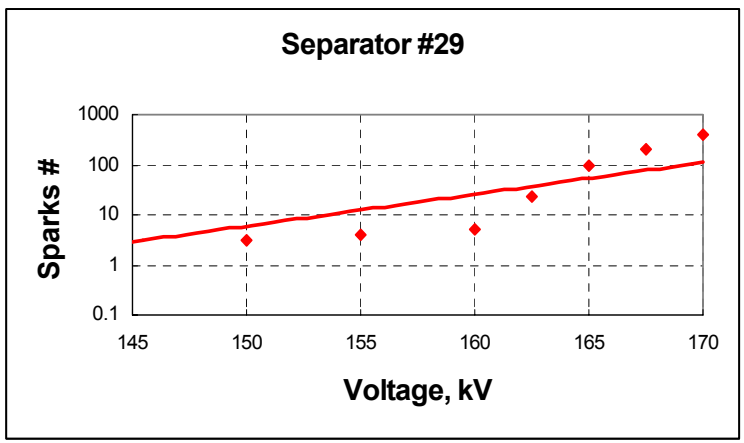


Integrated spark number verses high voltage

Negative Polarity



Conditioning at 170 kV for ~3 hours

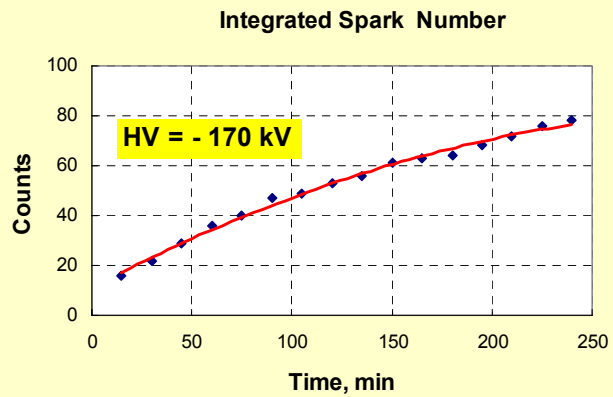


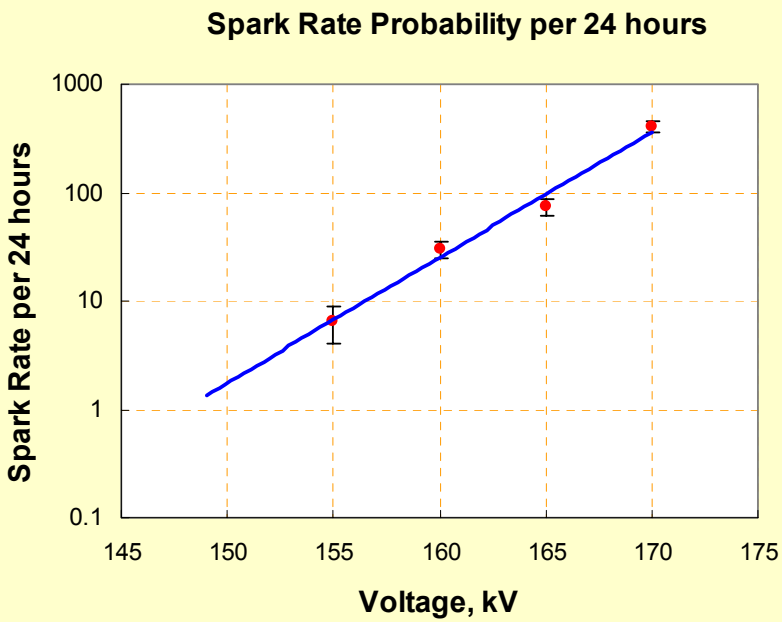
Integrated spark number verses high voltage

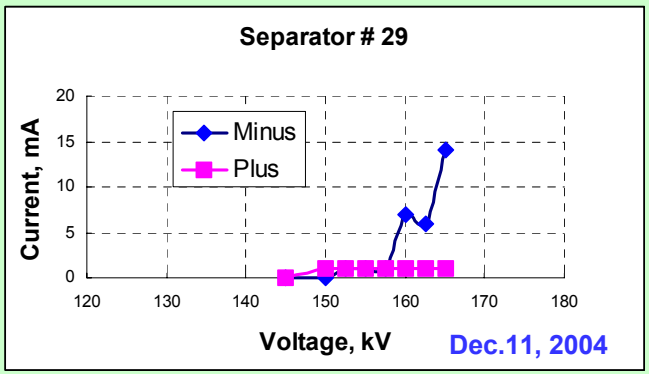
At 150 kV: I~ 0 μA at ○ and I ~20 μA at ○ polarity

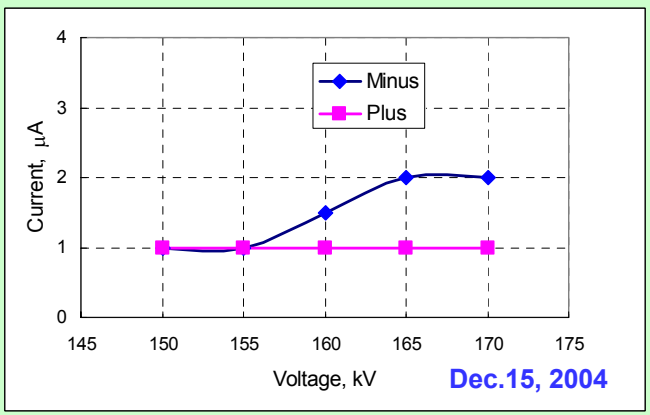
Spark Rate Measurements (Dec.11- 15, 2004)

Positive Polarity





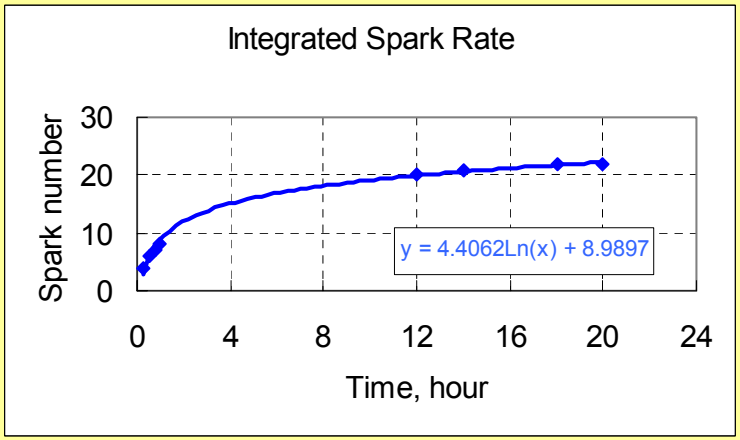


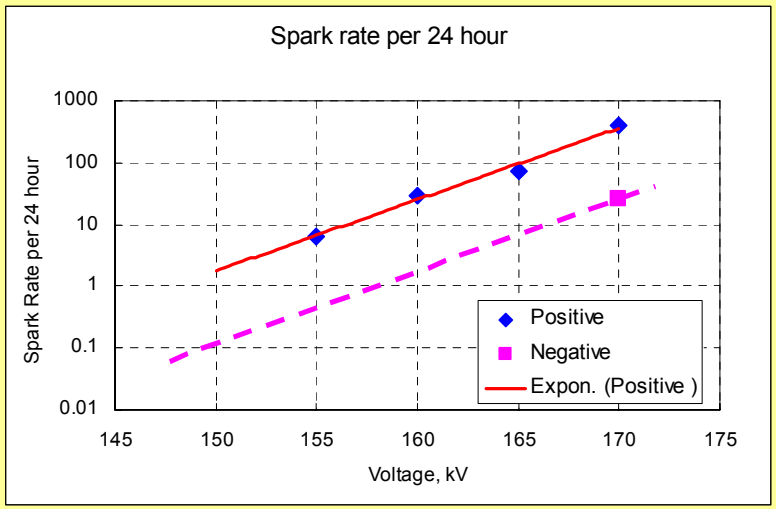


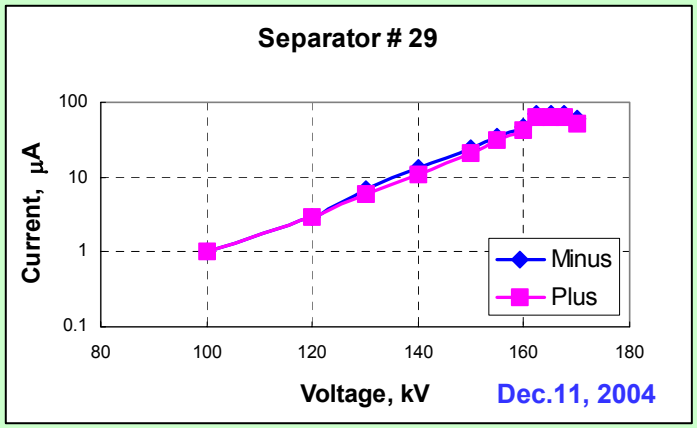
Current at 170 kV dropped to 1-2 μA after 4 days conditioning tests

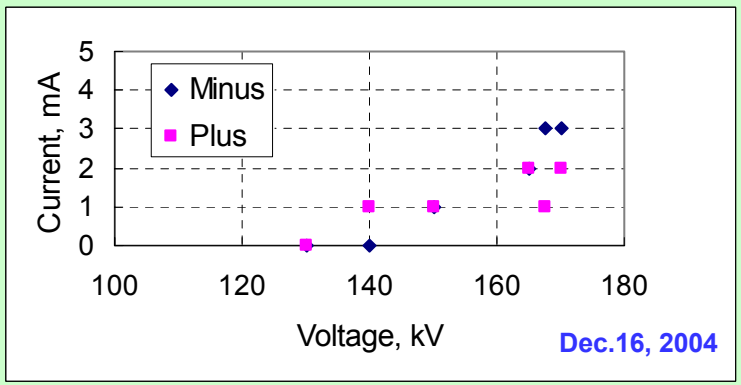
Separator Conditioning Tests (Dec.16-17, 2004)

Negative Polarity





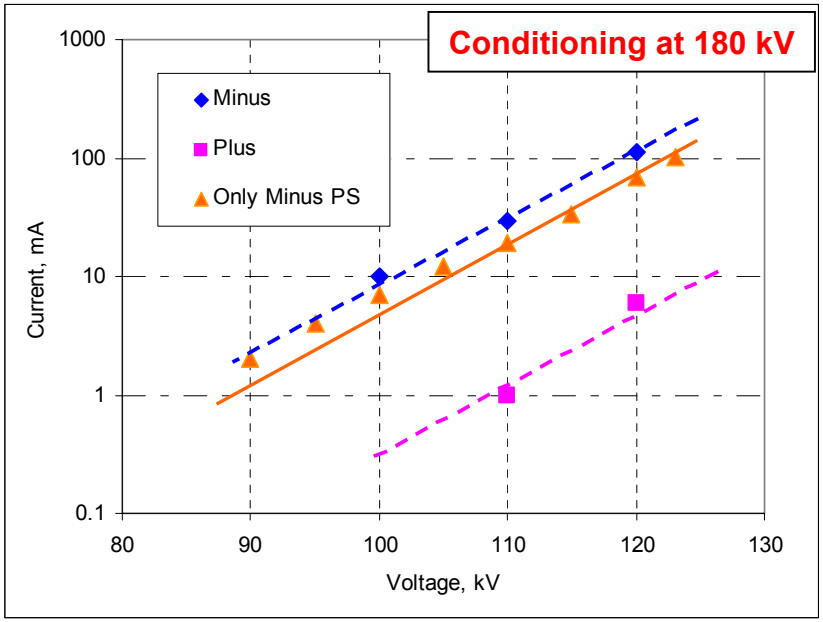


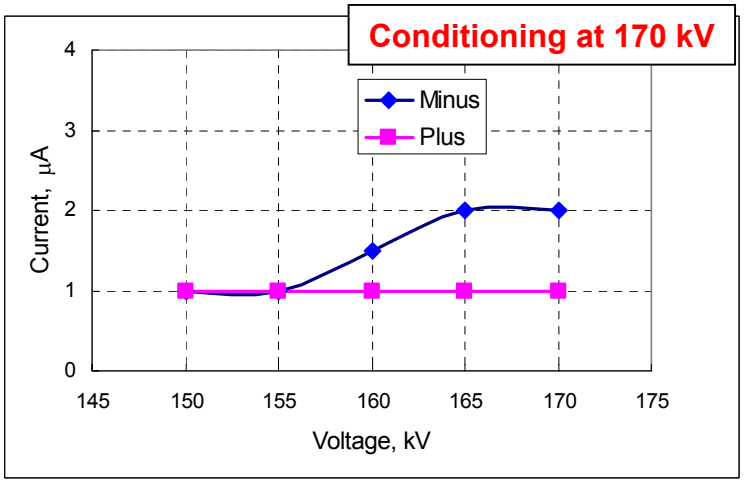


Current at 170 kV dropped to 2-3 μA after 5 days conditioning tests

Conditioning at 180 kV (Positive Polarity)

Current measurements





A small current up to 170 kV

At about of 172 kV breakdown has happened

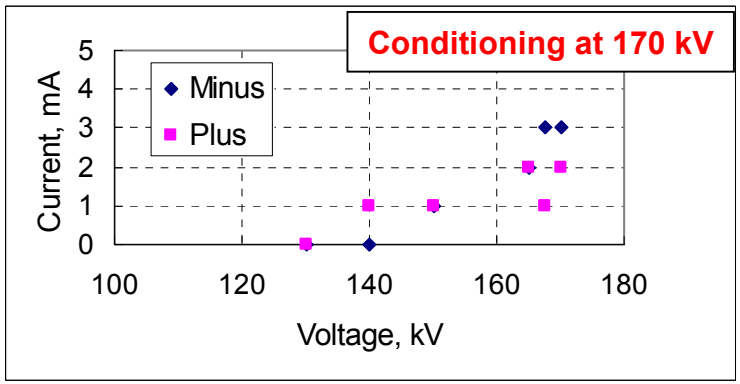
As results of this spark a stable corona from minus plate to shell ground was observed
No current between plates

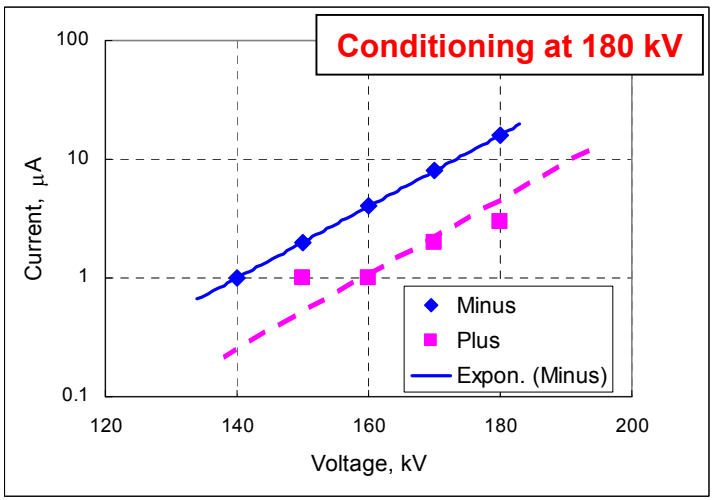
It is probably a metal chip "jumping" from shell surface.

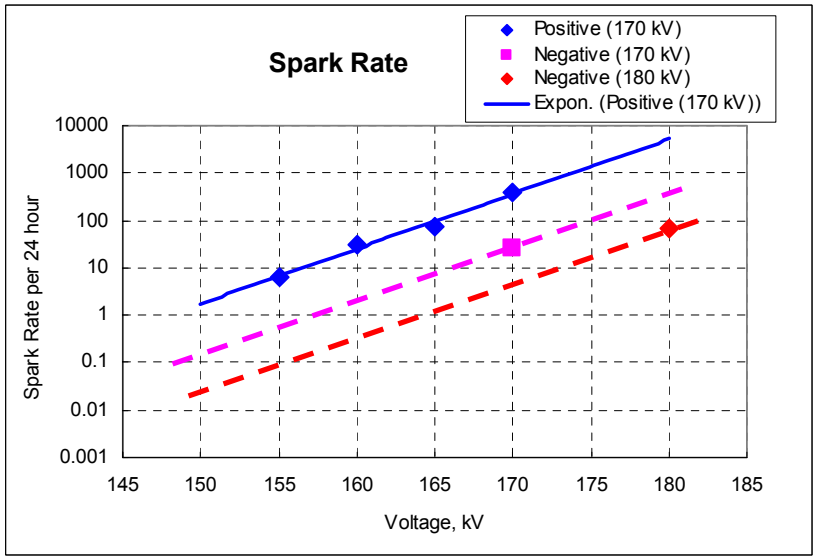
Need radiation scan to define corona location

Conditioning at 180 kV (Negative Polarity)

Current measurements







Spark/breakdown rate down at higher voltages

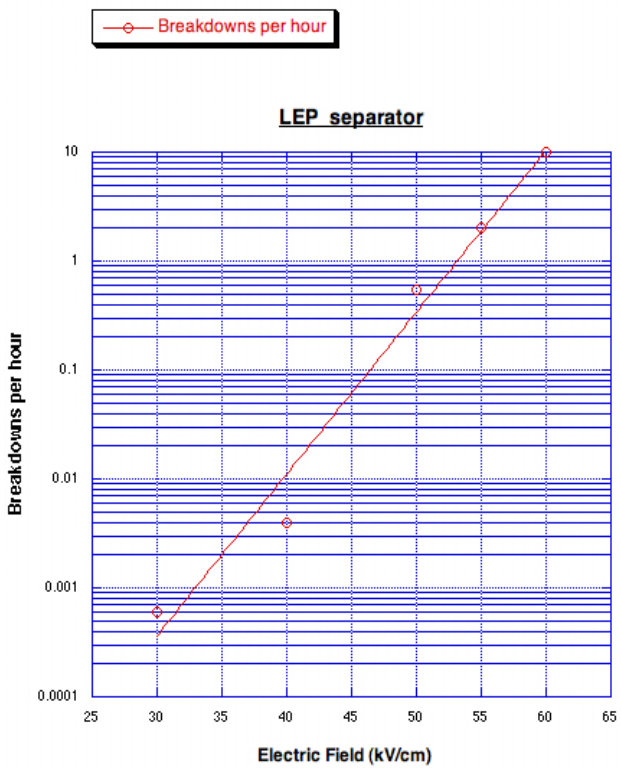
Need to measure spark rate at negative polarity

to estimate actual breakdown rate for our separator

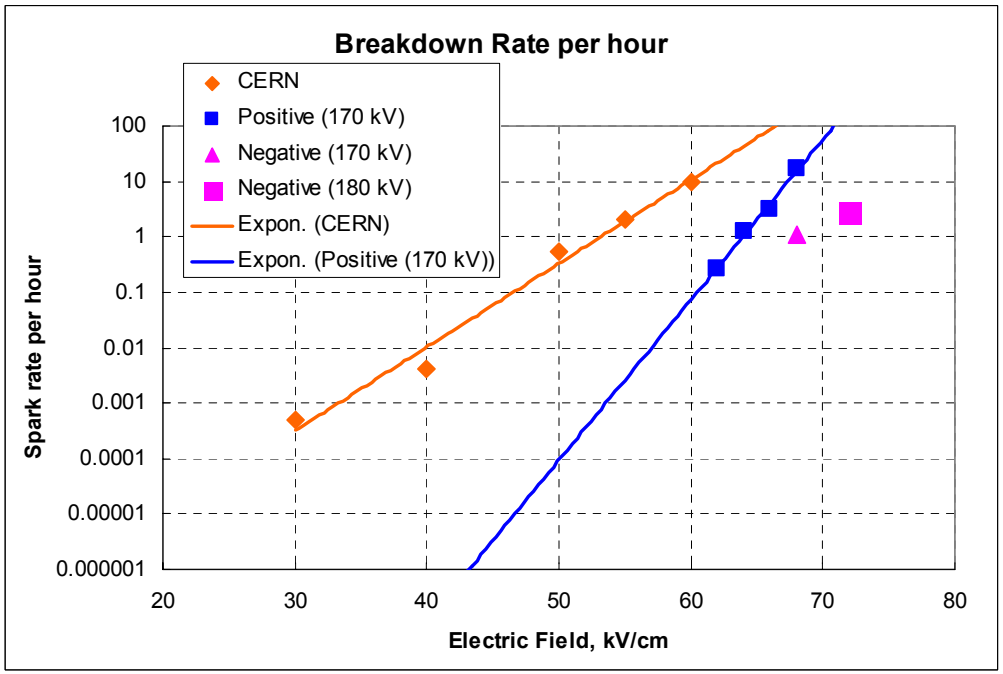
Current after conditioning at 180 kV higher than at 170 kV

Probably, due to corona at positive polarity

Separator Breakdown Rate



CERN data (P.Limon)



CERN design:

- **6 cm separation; no beam**
- **4 m long electrodes**
- **26 cm electrode width**
- **Polished with Scotch Brite "very fine 320" to satin finish**

Comparison CERN data (similar separator design) and MP-9 data.

Technical Specs for Conditioning Tests

Need to define a technical specs for separator conditioning tests

What means a good separator?

Proposal:

1. Separator conditioning test → up to 170 kV with current limit 100 μA
2. Spark/breakdown rate at 160 kV → less than 2 sparks per 24 hour
3. Currents at 160 kV for both polarities → less than 2 μA
4. Vacuum → better 1.0 exp-9 torr

Plans

Measurements:

- Breakdown rate for negative polarity (170kV, 175 kV, 180 kV)
- Corona location for positive polarity (radiation scan)

Conditioning tests setup improvements:

- Radiation scan setup (linear drive, detector, remote control)
- DAQ system commissioning (calibration, data file,…)
- Current measurement (need 0.1 μA accuracy)
- Acoustic sensors for spark location measurements