

Cigre WG A3-06 “HV Equipment Reliability”

Preliminary Results from Present Cigre Survey

Disconnectors and Earthing switches

Population cards 2004

Failure cards 2004 and 2005 (partly)

WG A3-06 Tutorial

June 2006

Rio de Janeiro

TF DES

J.G. Krone, A. Hyrczak, Kyong-Yop Park,

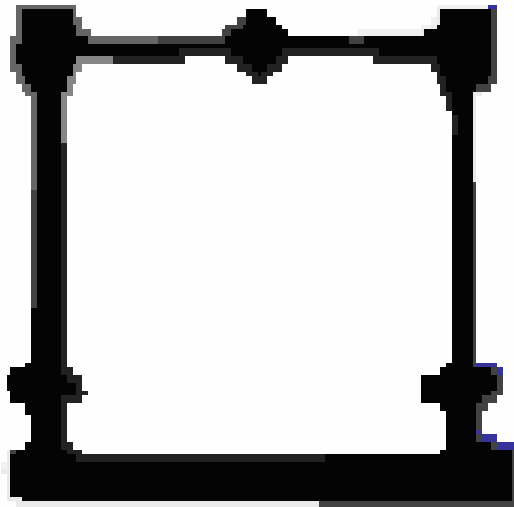
S. Desanti, T. Kuntze

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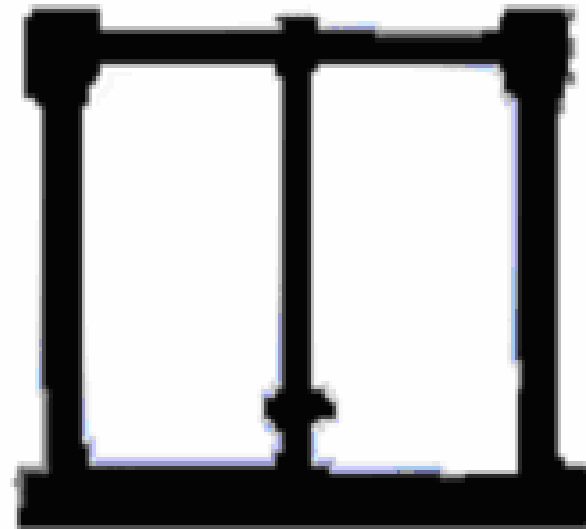
- **First survey on reliability of Disconnectors and Earthing switches**
- **Total of 21 countries participated both in GIS and AIS equipment**
- **So far for 2004 a total of 223 820 disconnector/earthingswitches are included**
- **Of which 164669 in AIS and 59151 in GIS**

Cigre WG A3-06 "HV Equipment Reliability"

Type of design



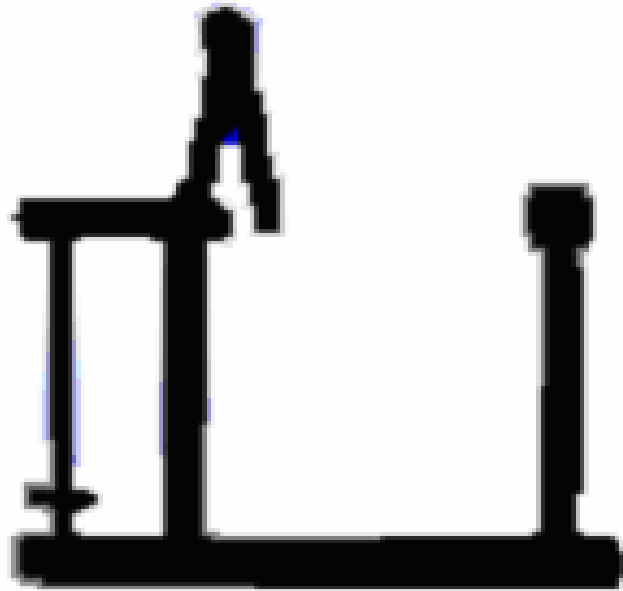
**Centre-break
disconnecter**



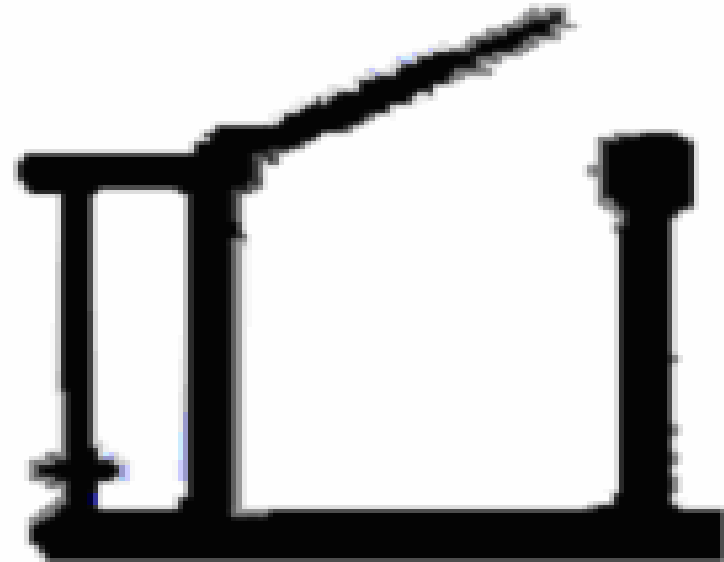
**Double-break
disconnecter**

Cigre WG A3-06 "HV Equipment Reliability"

Type of design



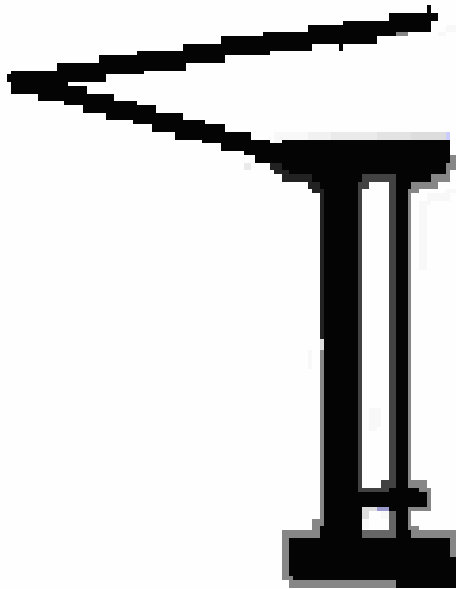
**Knee-type
Disconnecter**



**Vertical-break
Disconnecter**

Cigre WG A3-06 "HV Equipment Reliability"

Type of design

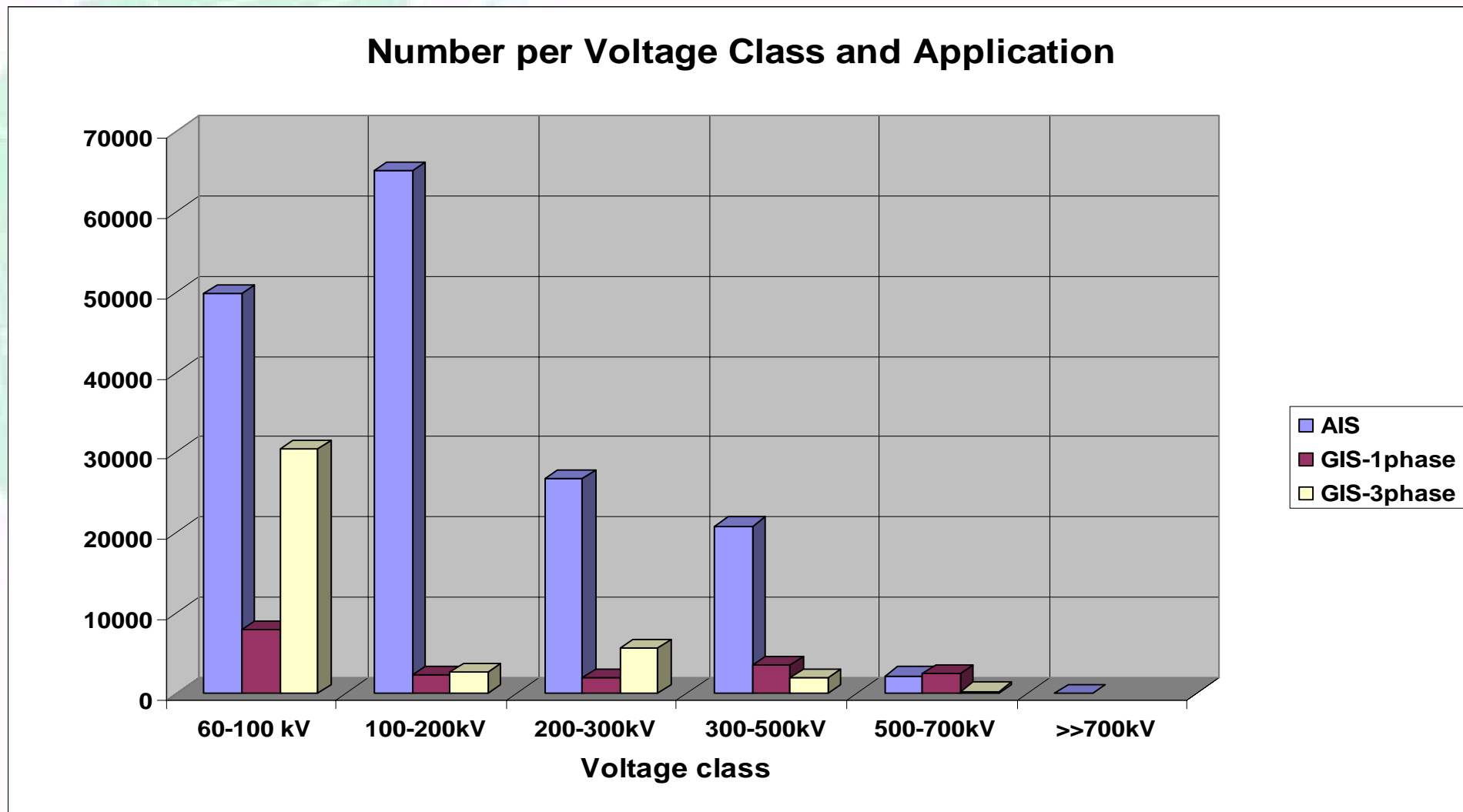


**Semi-pantograph
disconnector**



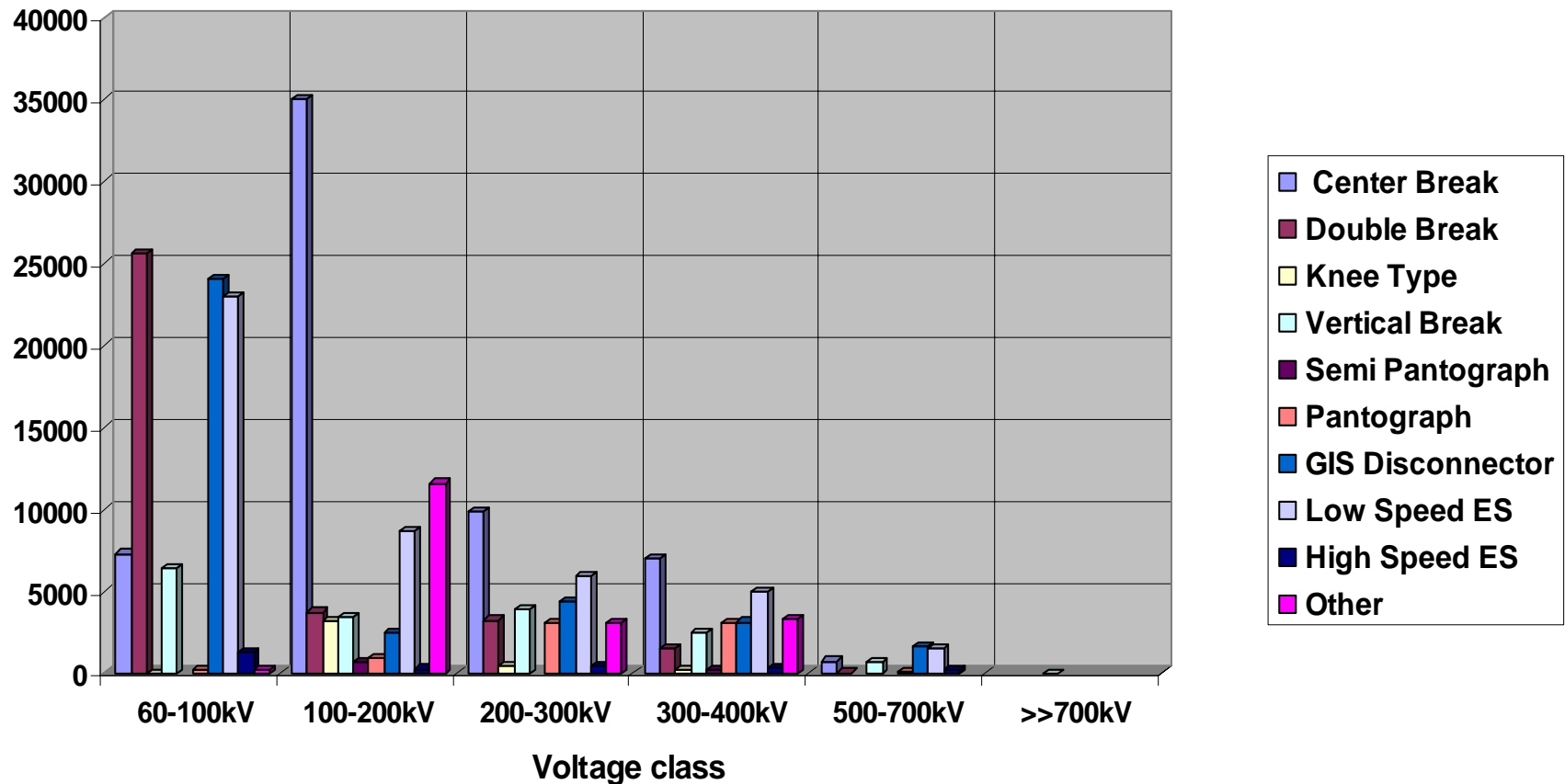
**Pantograph
disconnector**

WG A3.06 - Reliability of HV equipment – DES population (2004)



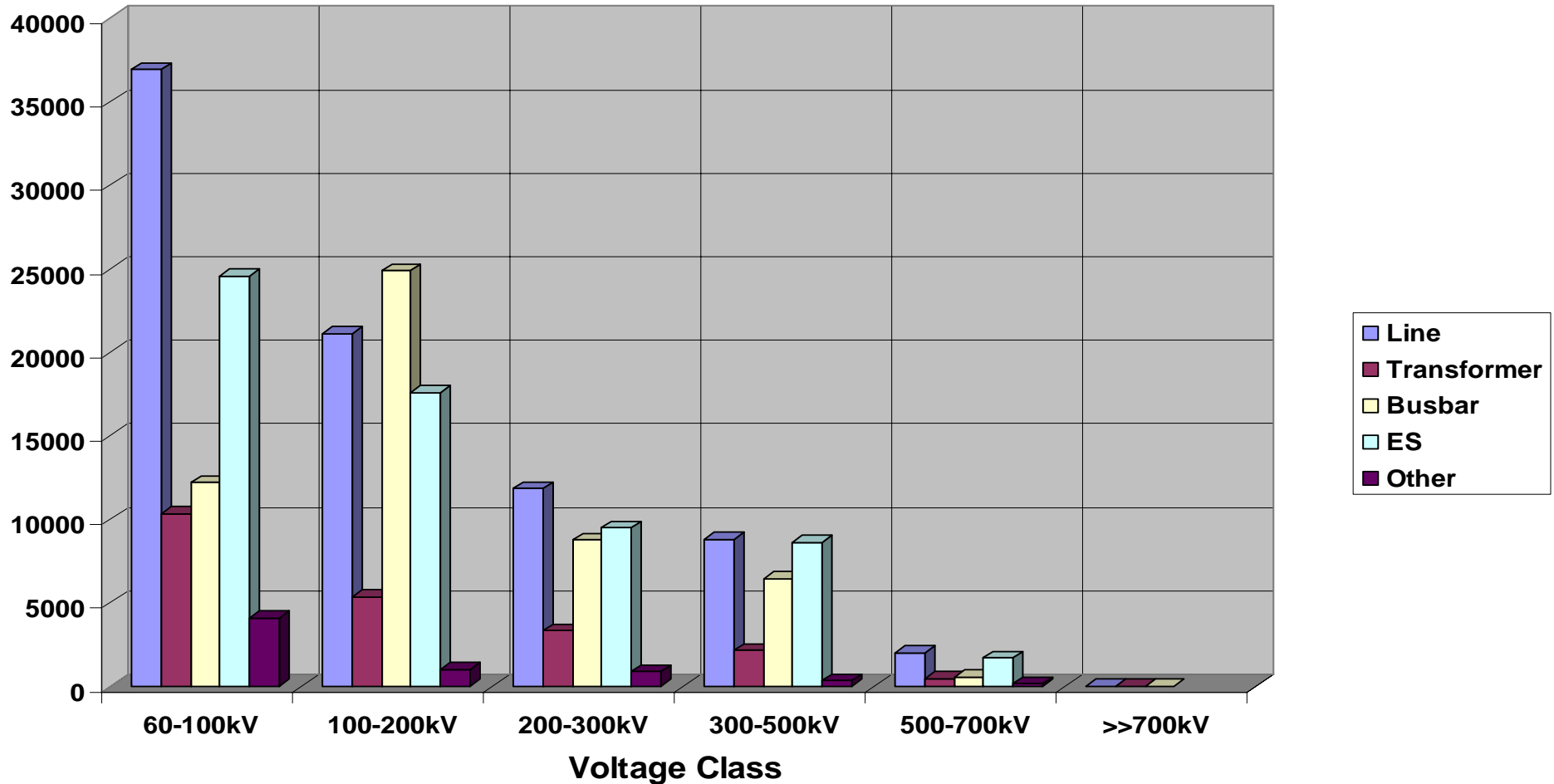
WG A3.06 - Reliability of HV equipment – DES population (2004)

Number per Voltage and Design

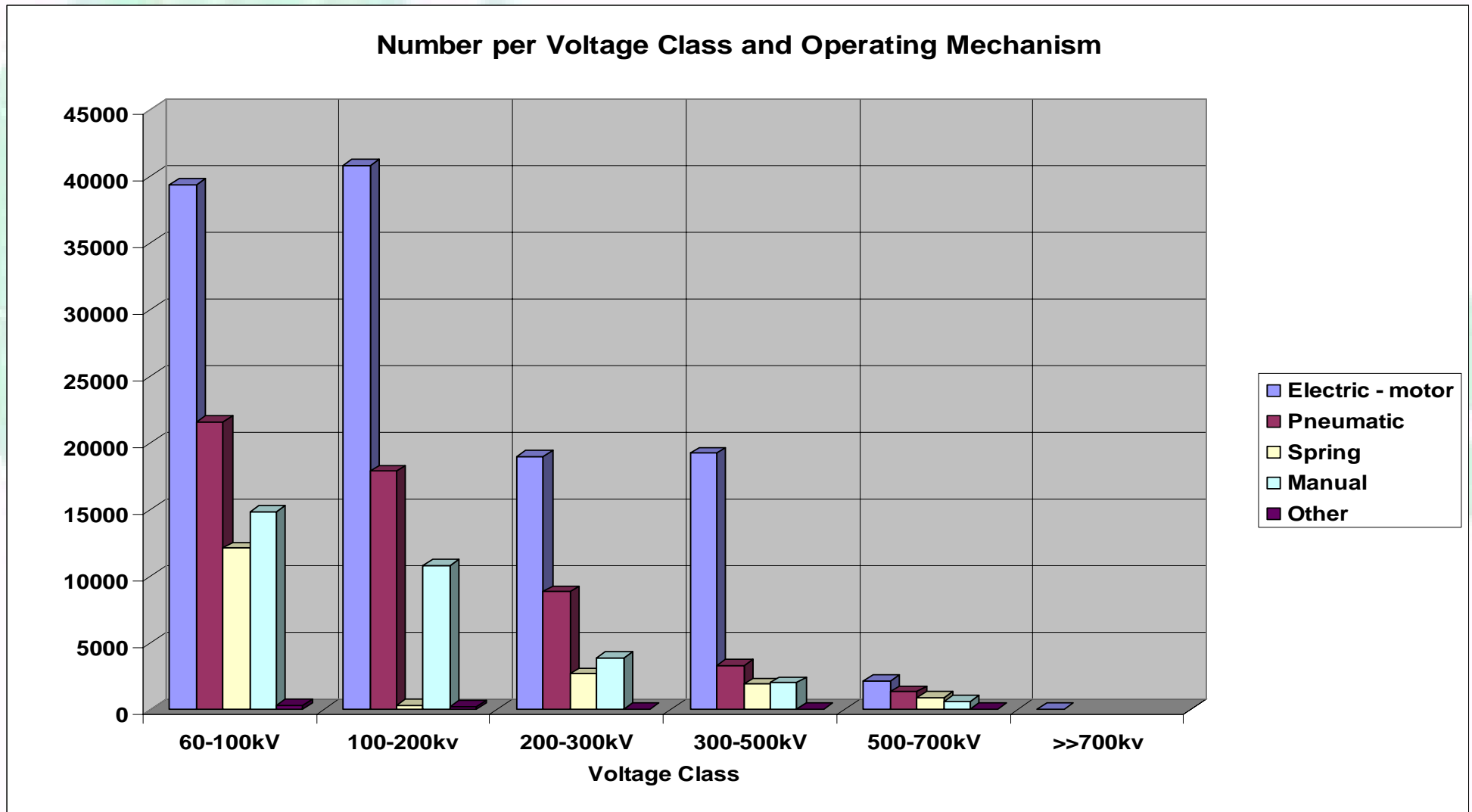


WG A3.06 - Reliability of HV equipment – DES population (2004)

Number per Voltage and Kind of Service

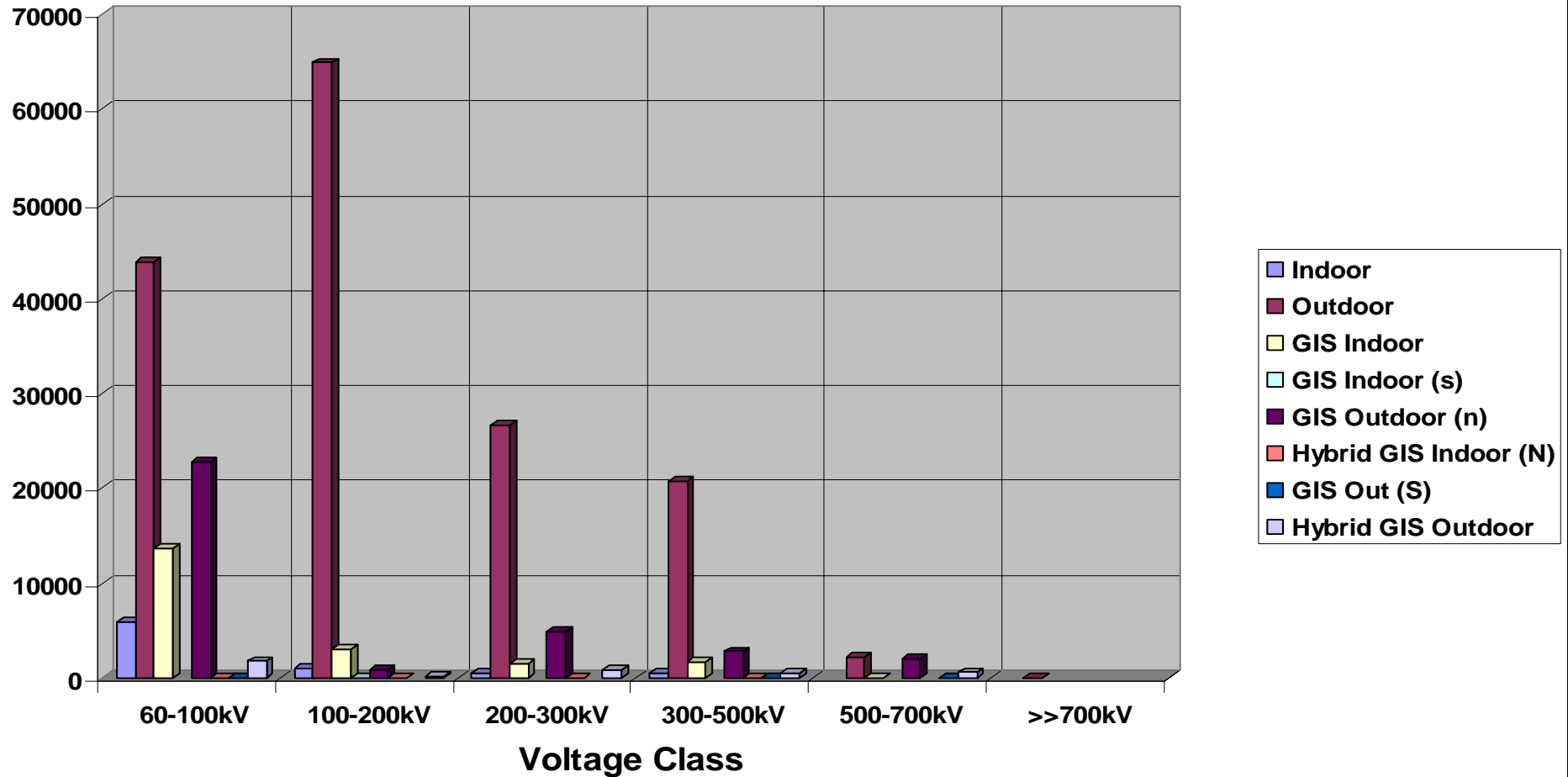


WG A3.06 - Reliability of HV equipment – DES population (2004)



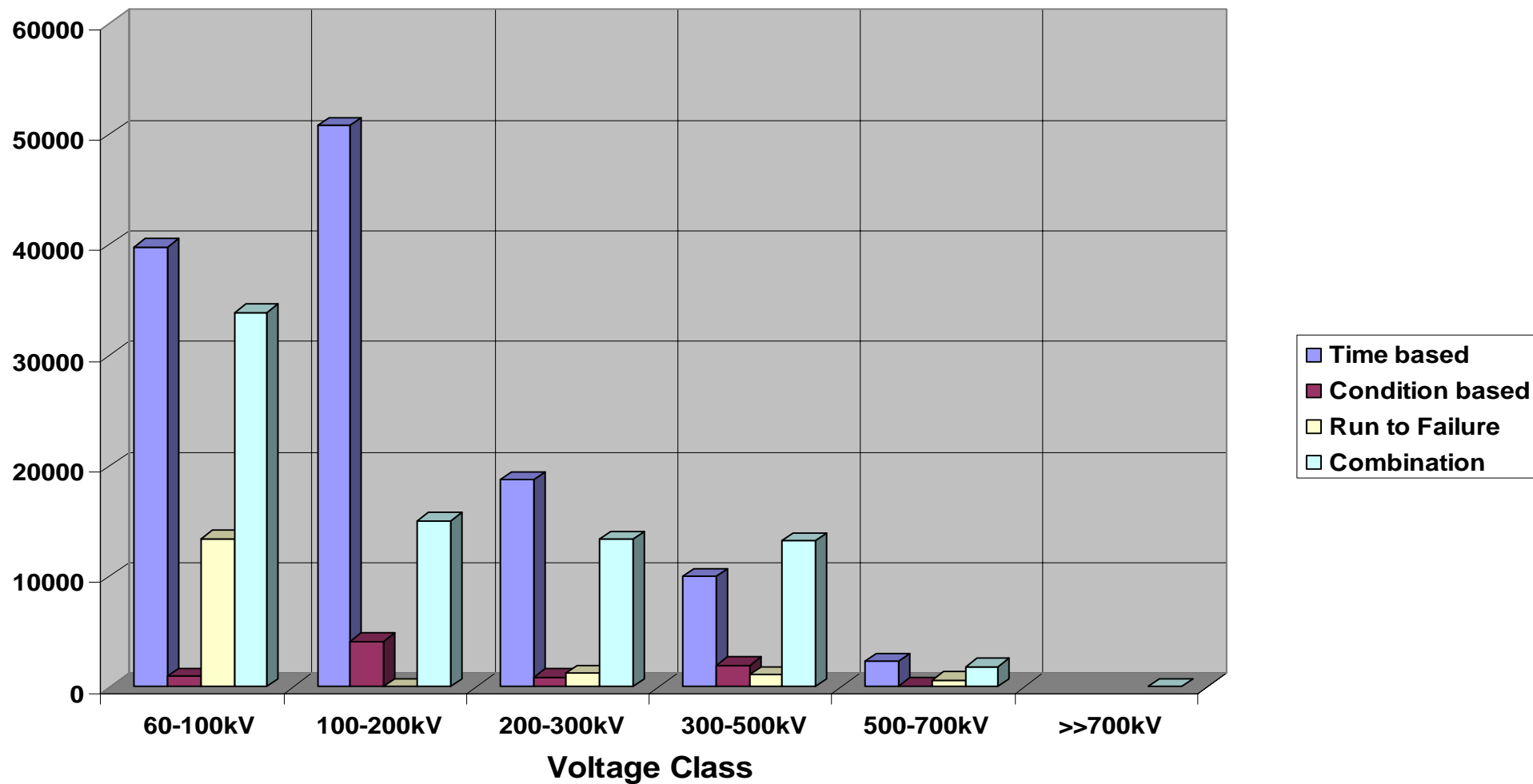
WG A3.06 - Reliability of HV equipment – DES population (2004)

Number per Voltage Class and Location



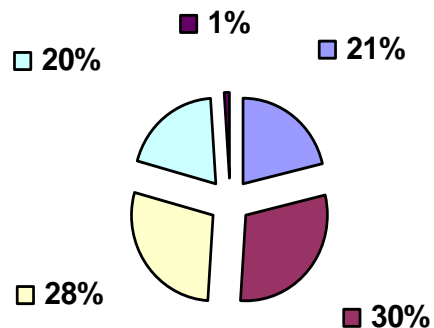
WG A3.06 - Reliability of HV equipment – DES population (2004)

Number per Voltage Class and Maintenance Philosophy

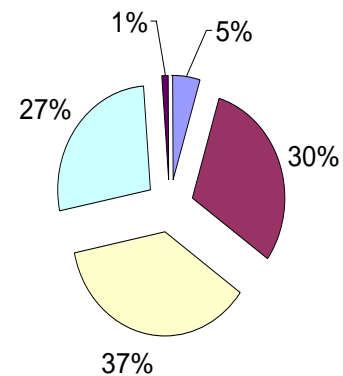


WG A3.06 - Reliability of HV equipment – DES population (2004)

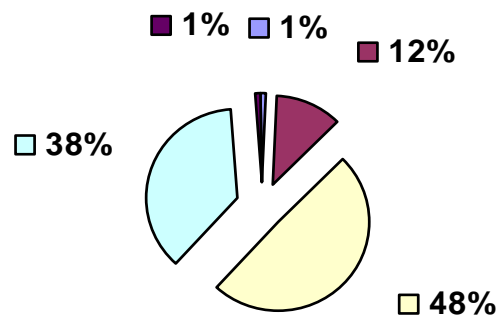
Distribution GIS 1ph



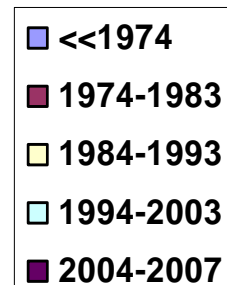
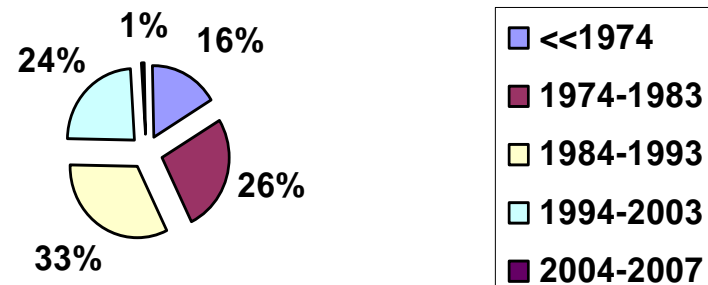
Distribution GIS 3ph



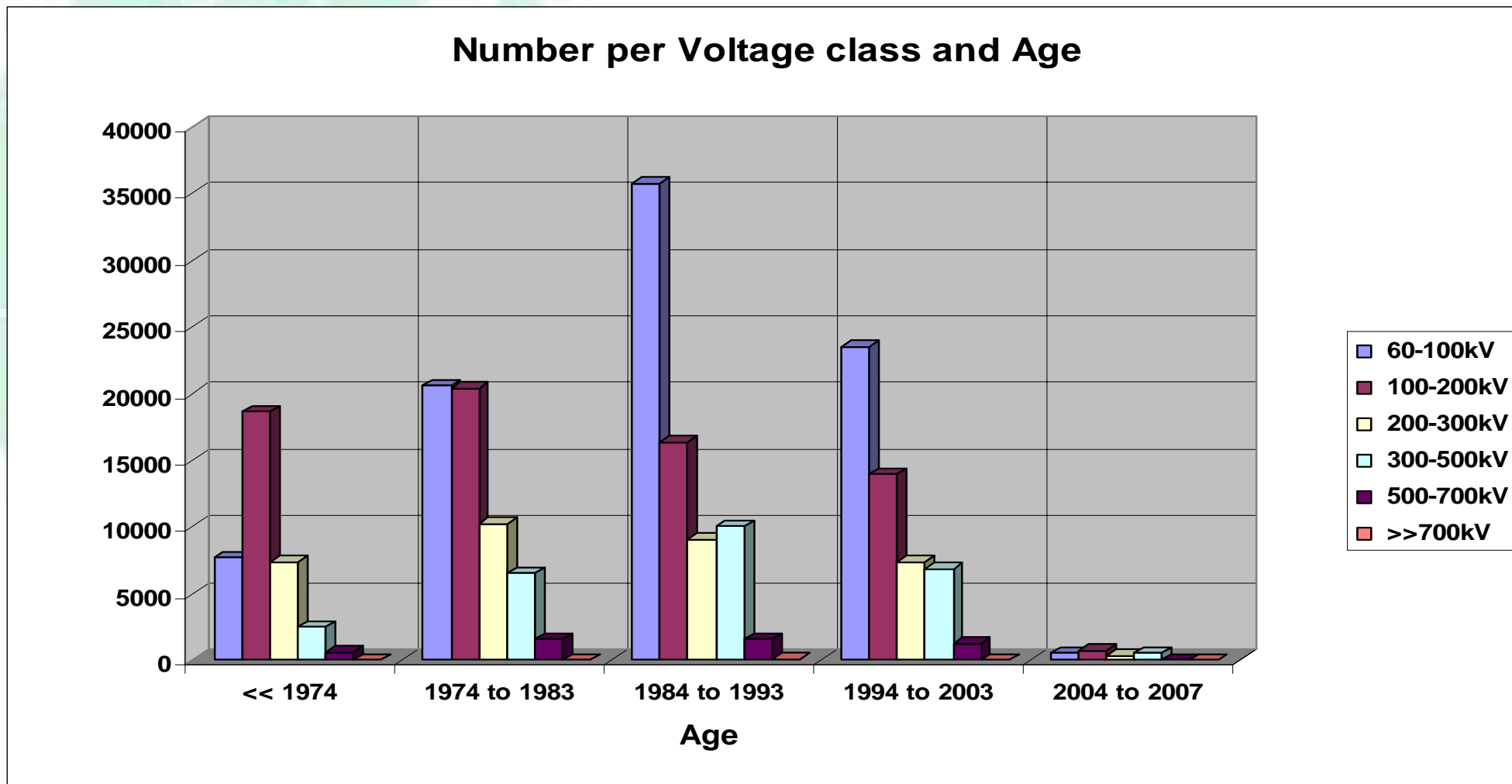
Distribution AIS



Distribution Total

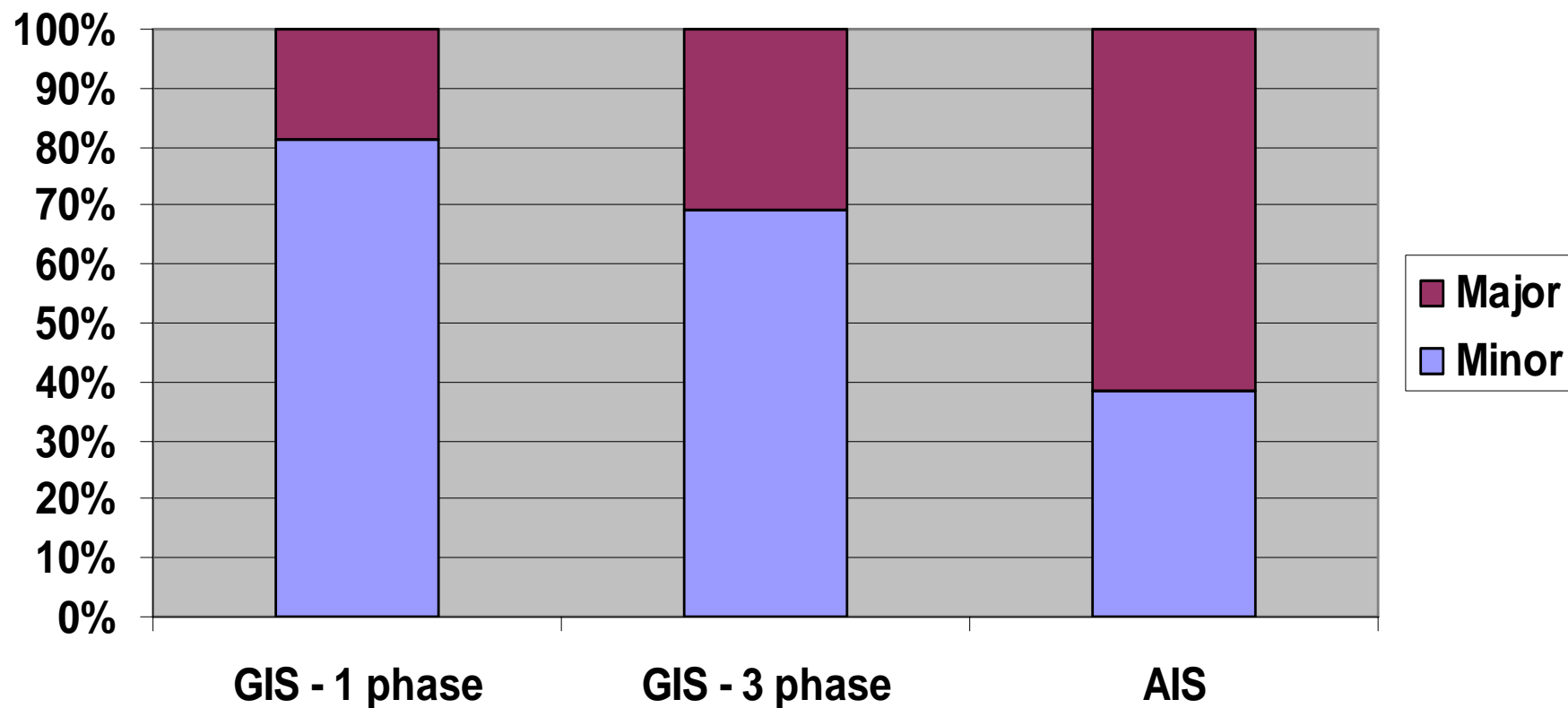


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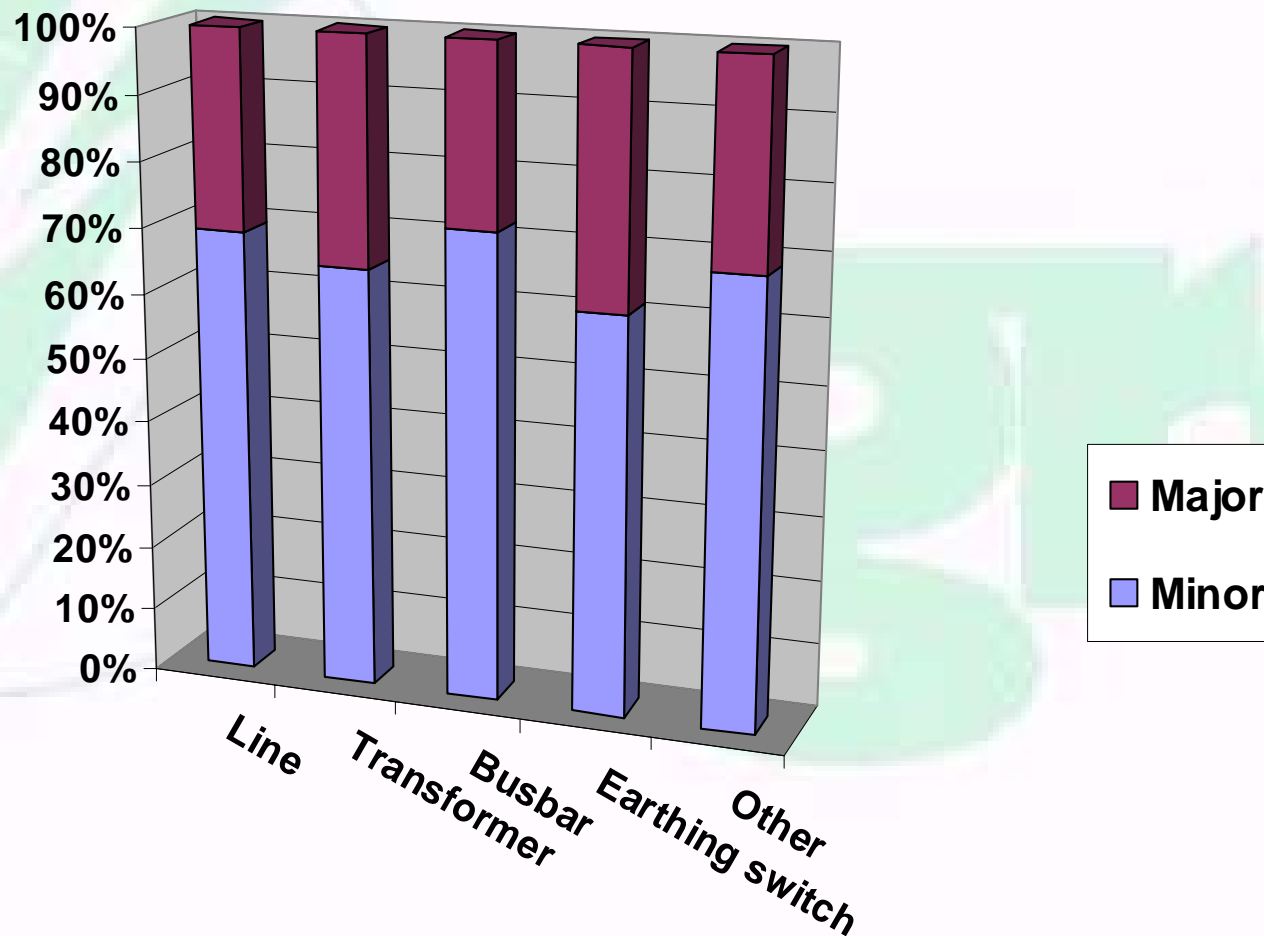
WG A3.06 - Reliability of HV equipment – DES failures

Minor / Major failure v. application



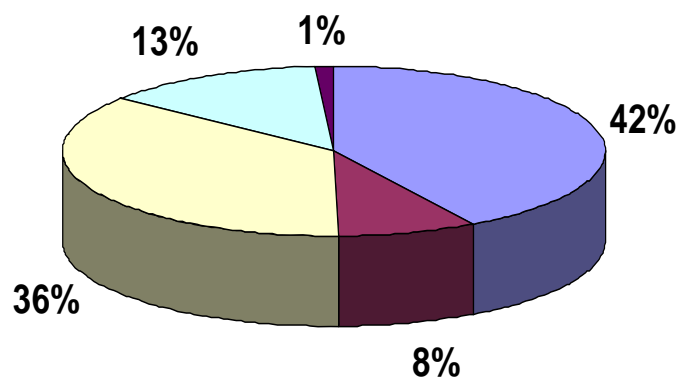
WG A3.06 - Reliability of HV equipment – DES failures

Minor / major failure v. kind of service

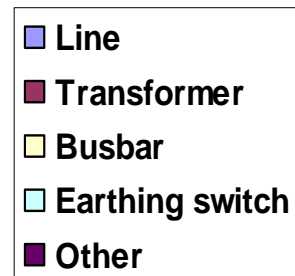
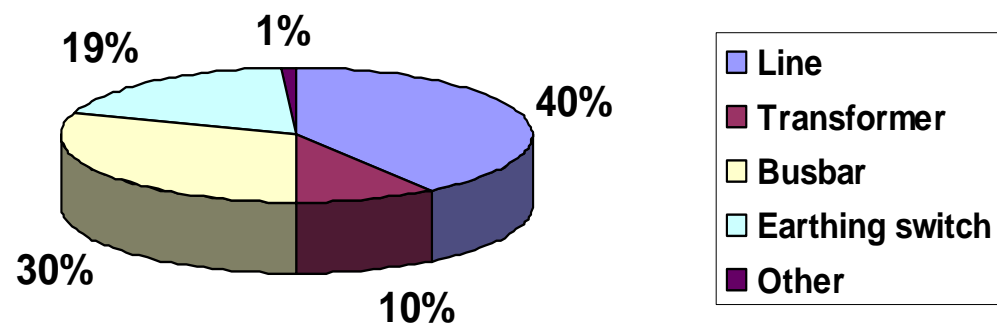


WG A3.06 - Reliability of HV equipment – DES failures

Minor failure v. kind of service

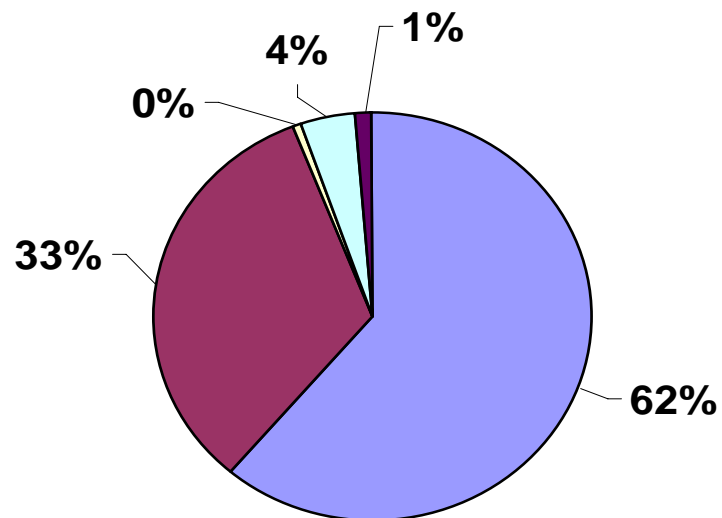


Major failure v. kind of service

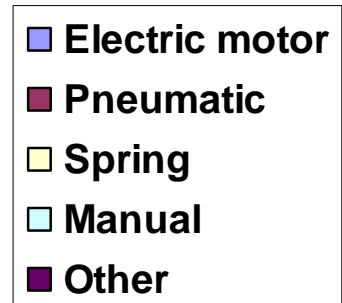
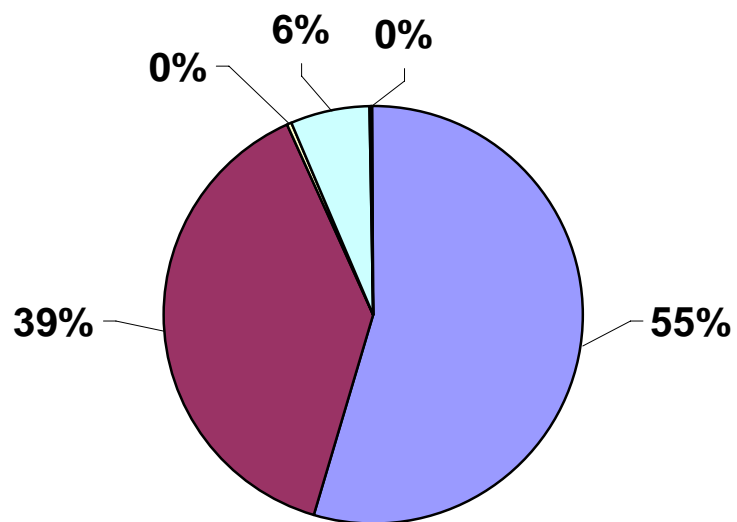


WG A3.06 - Reliability of HV equipment – DES failures

Minor failure v. operating mechanism

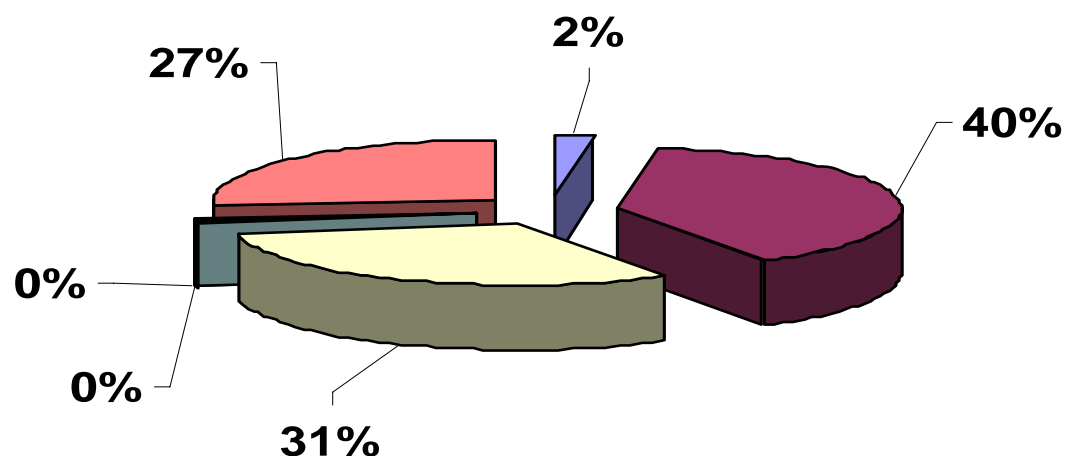


Major failure v. operating mechanism



WG A3.06 - Reliability of HV equipment – DES failures

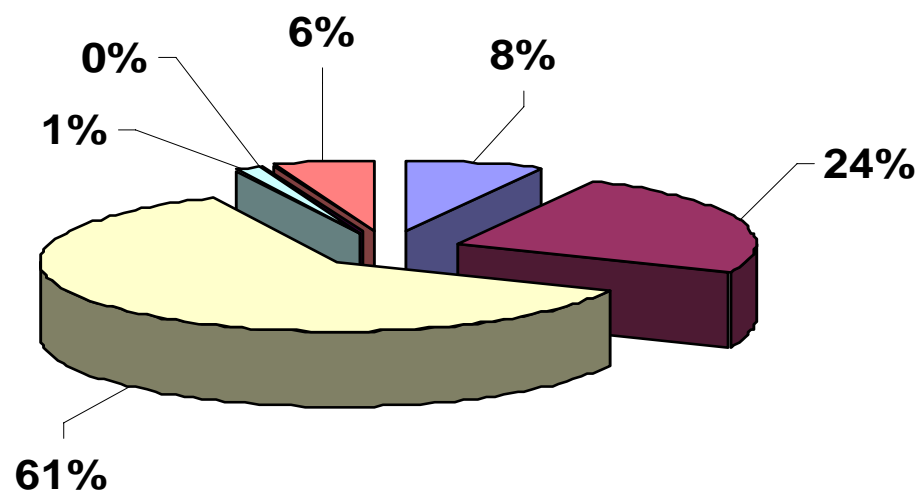
Minor failure v. service condition



- Deenergised, available for service
- Normal service - no operation
- Normal service operation demanded
- Fault making operation
- Operation without command
- During or directly after testing, maintenance

WG A3.06 - Reliability of HV equipment – DES failures

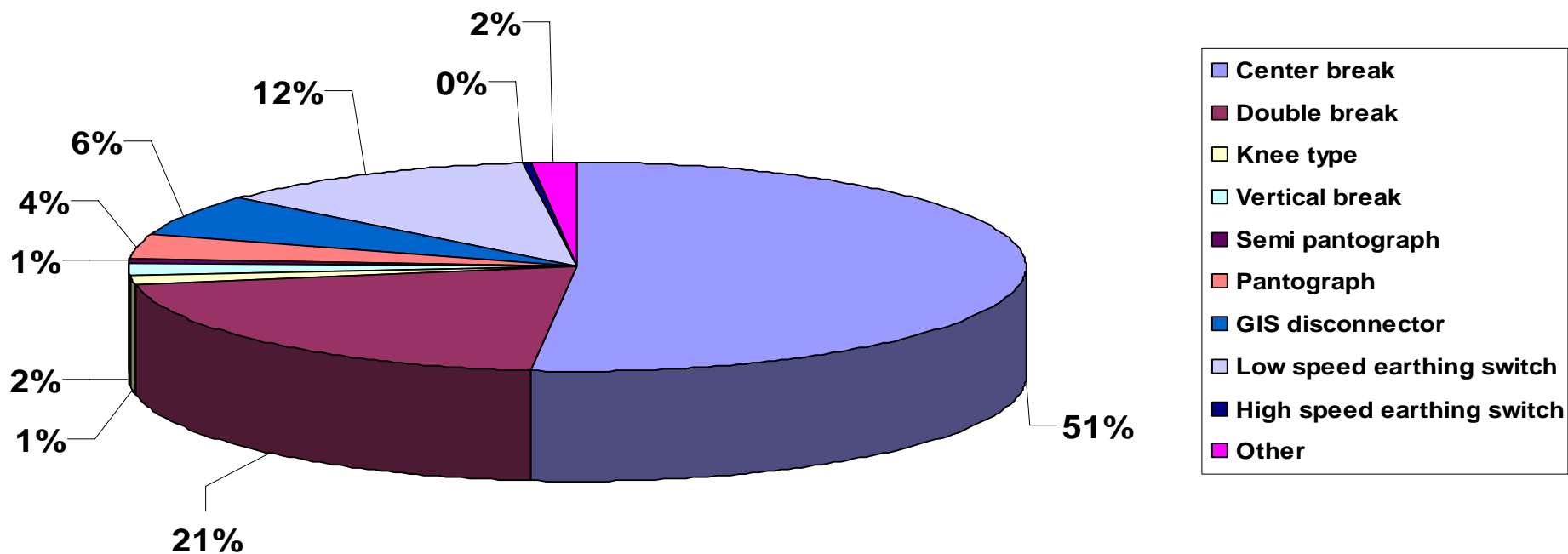
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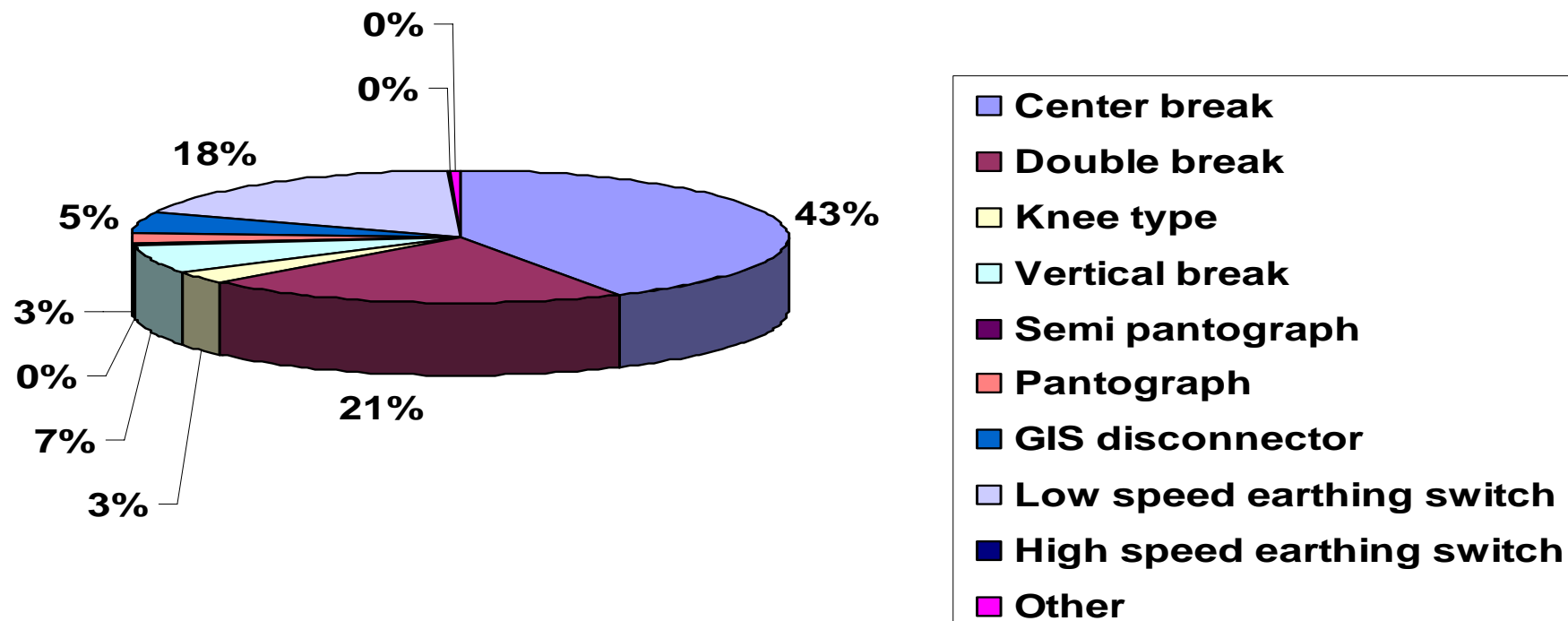
WG A3.06 - Reliability of HV equipment – DES failures

Minor failure v. design



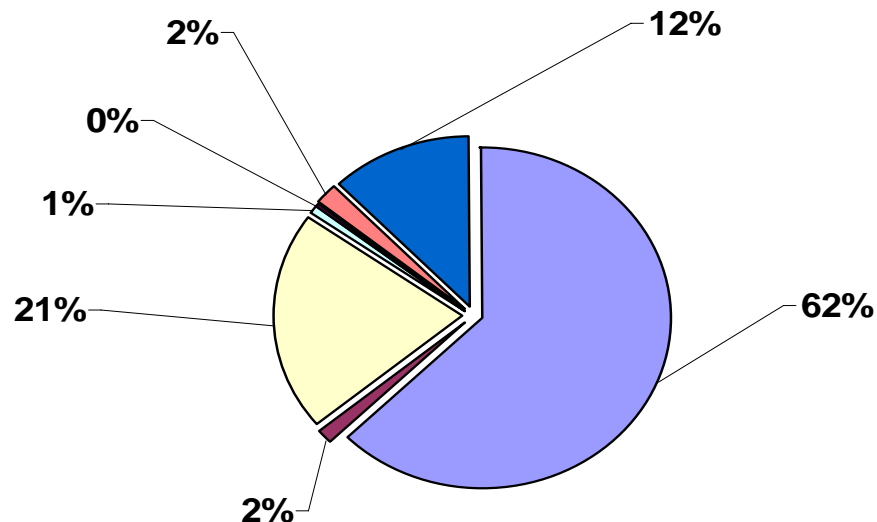
WG A3.06 - Reliability of HV equipment – DES failures

Major failure v. design



WG A3.06 - Reliability of HV equipment – DES failures

Type of repair



- Repair of failed component on site
- Repair in factory or shop
- Replacement of failed component on site (without replacement of enclosure)
- Replacement of failed component and its enclosure
- Replacement of failed equipment with another design
- Replacement of seals or refilling only
- Placed back into service without repair

WG A3.06 - Reliability of HV equipment – DES failures

Thanks for your attention