Cigre WG A3.06 "Reliability of HV equipment"

Intermediate Results from Present Cigre Survey

Disconnectors and Earthing Switches (DES)

Population cards 2004 - 2007

Failure cards 2004 - 2007

WG A3.06 Tutorial

31st October 2008

Seoul – Korea

Task Force DES

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Cigre WG A3.06 - Reliability of HV equipment - DES

- First survey on reliability of Disconnectors and Earthing Switches
- Total of 24 countries participated both in GIS and AIS equipment
- Population in year

90%

2004:	243.078
2005:	217.046
2006:	43.149
2007:	5.270

508.543 DES-years (more than 4 times of CB-years)

- Failure cards in year

2004:	1.484
2005:	1.045
2006:	297
2007:	8

2.834 major and minor failure reports

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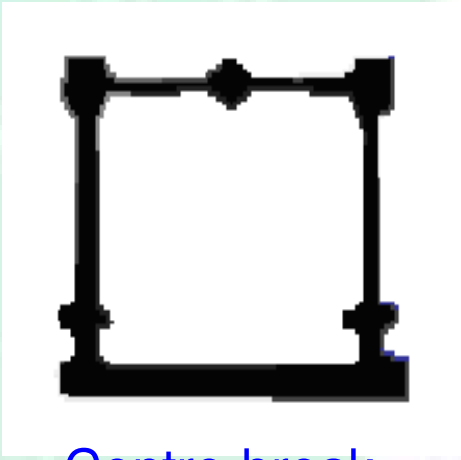
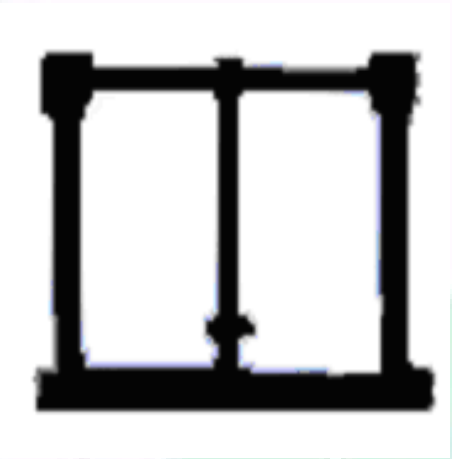
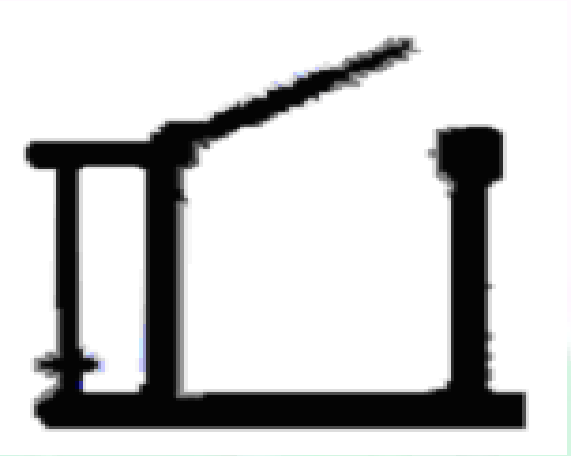
Types of disconnector design



Centre-break

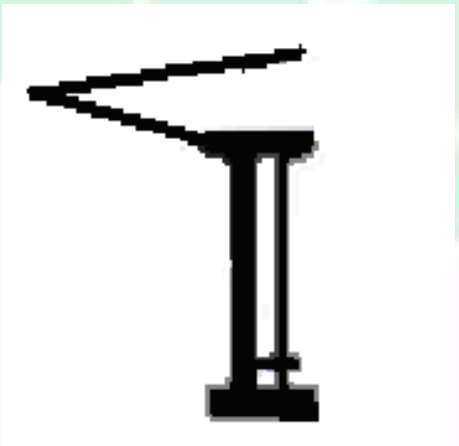


Double-break



Vertical-break

Knee-type



Semi-panthograph

Pantograph

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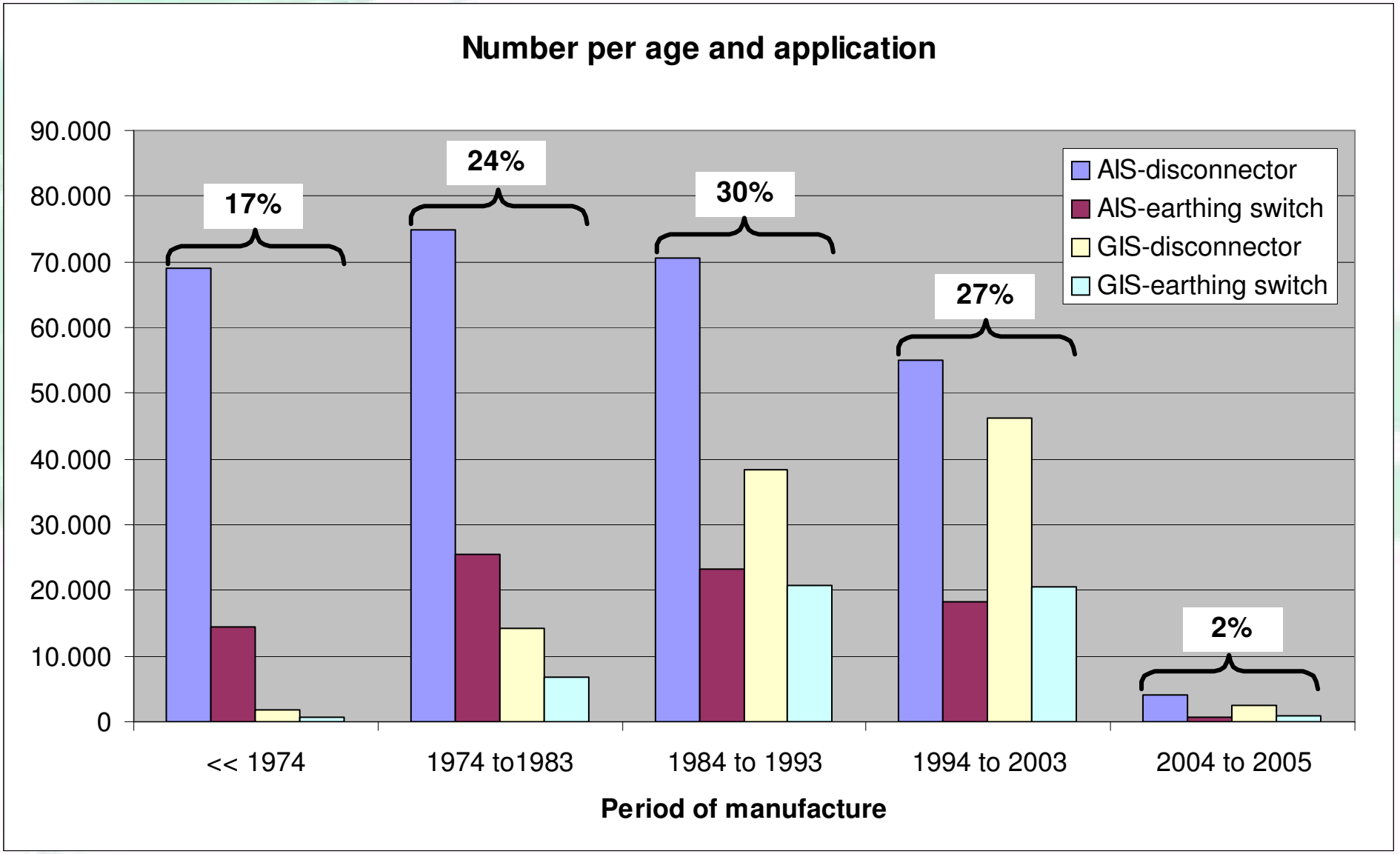

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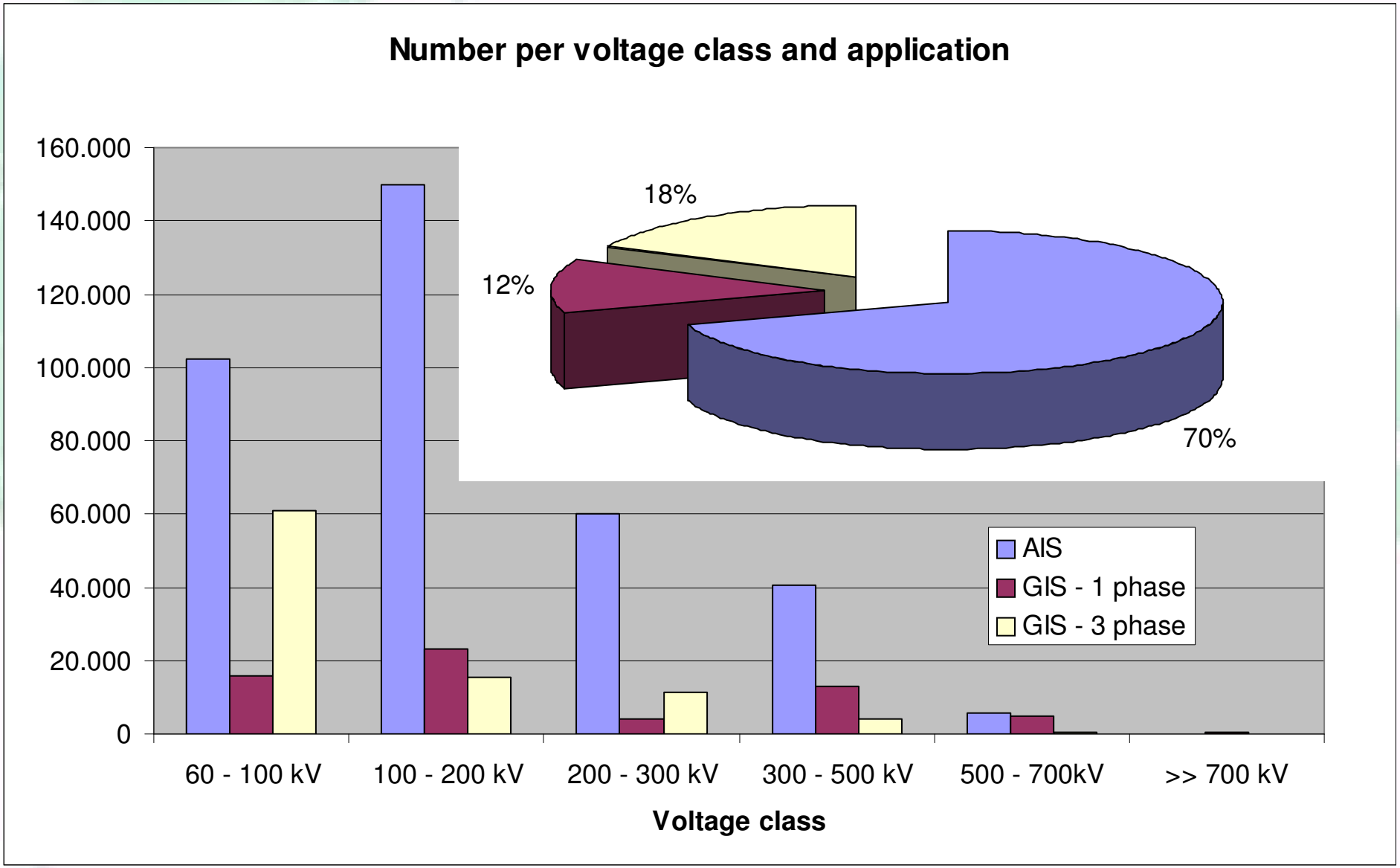

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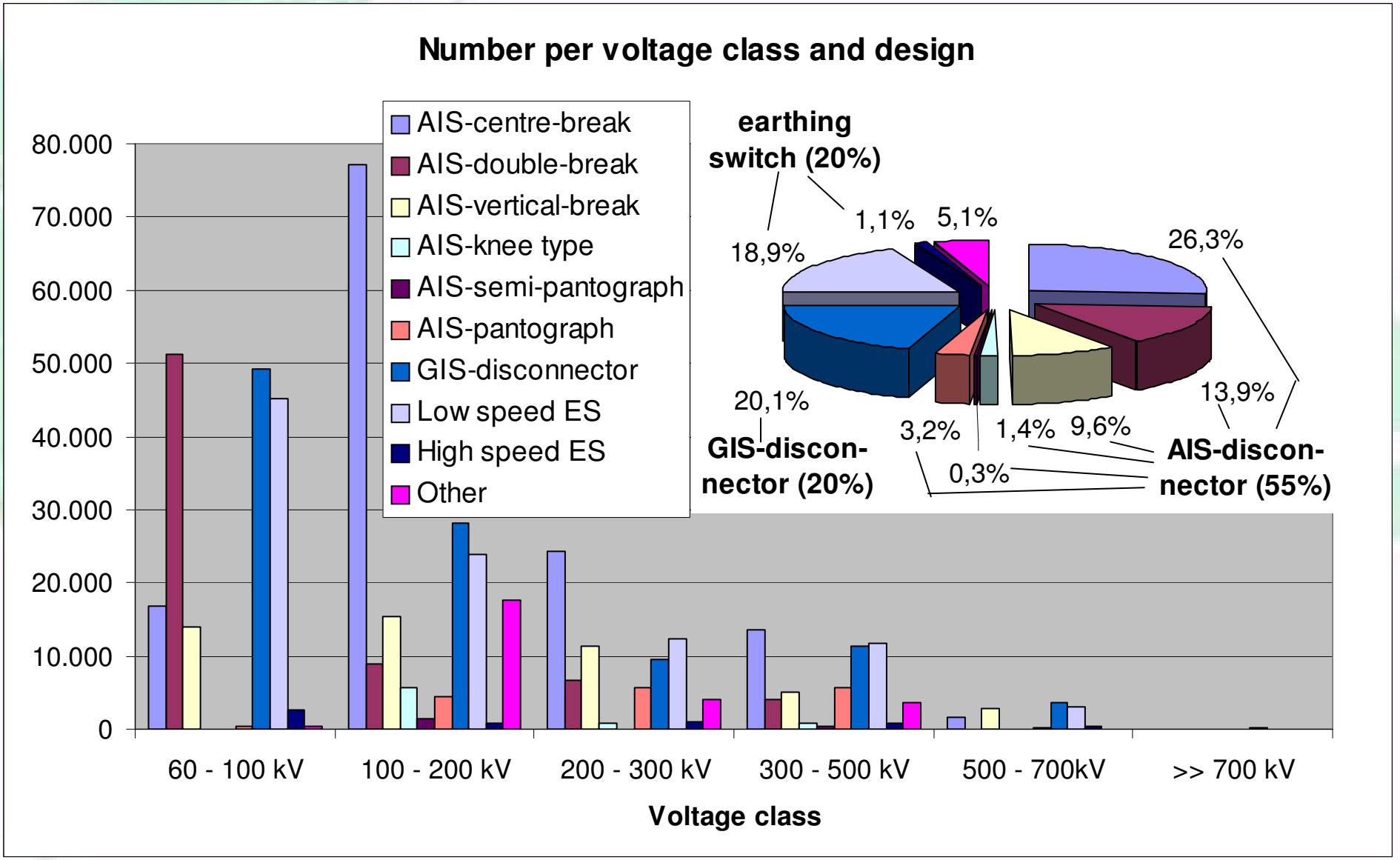
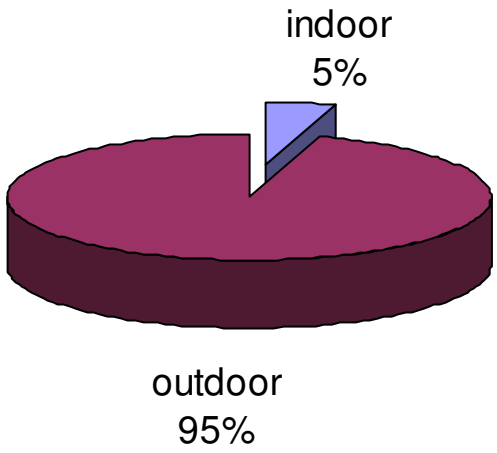


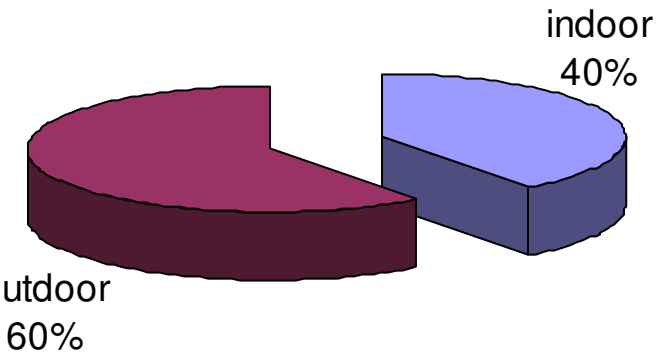
WG A3.06 - Reliability of HV equipment – DES population

Distribution per application and location

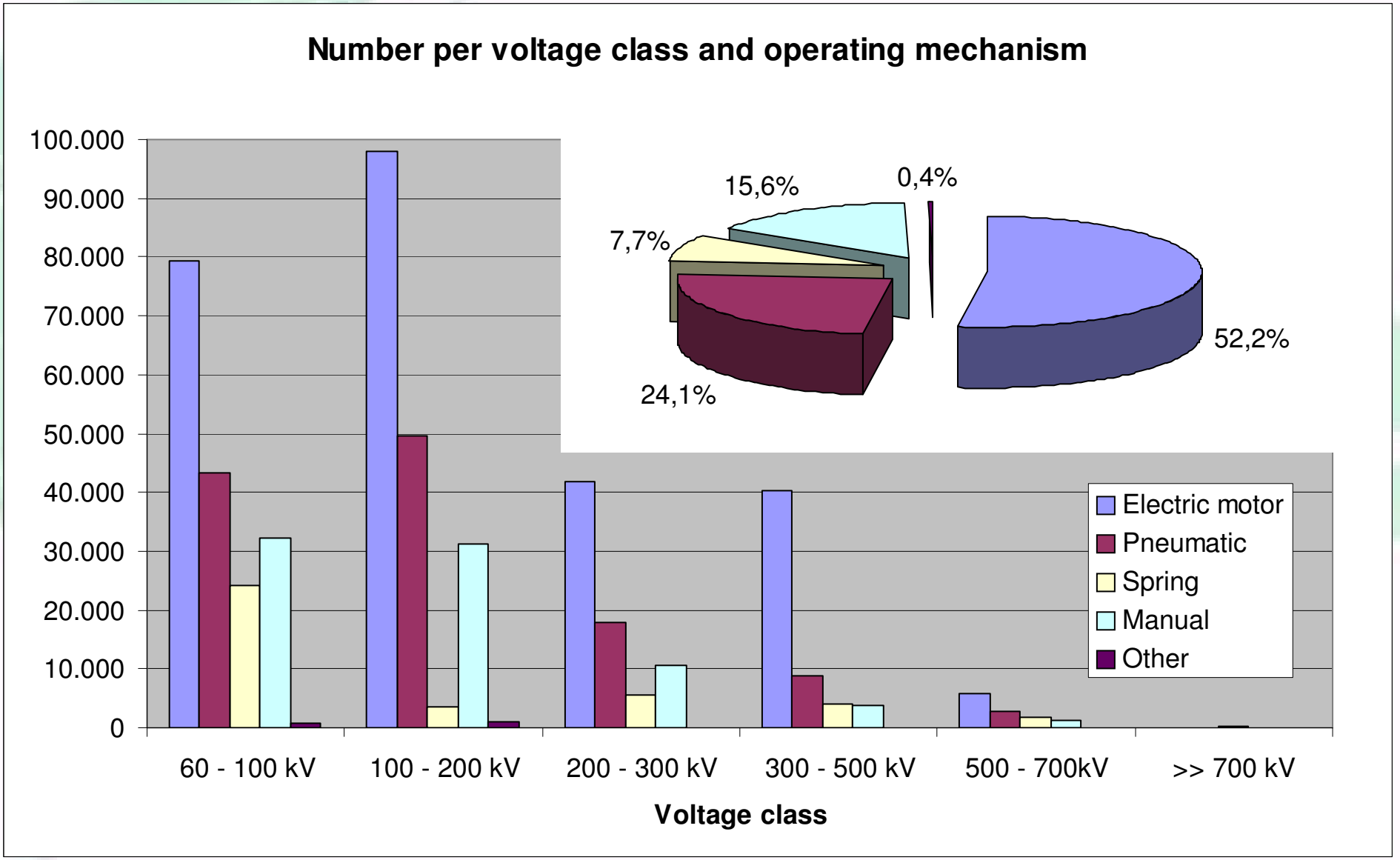
AIS
~ 360.000 DES-years



GIS
~ 150.000 DES-years



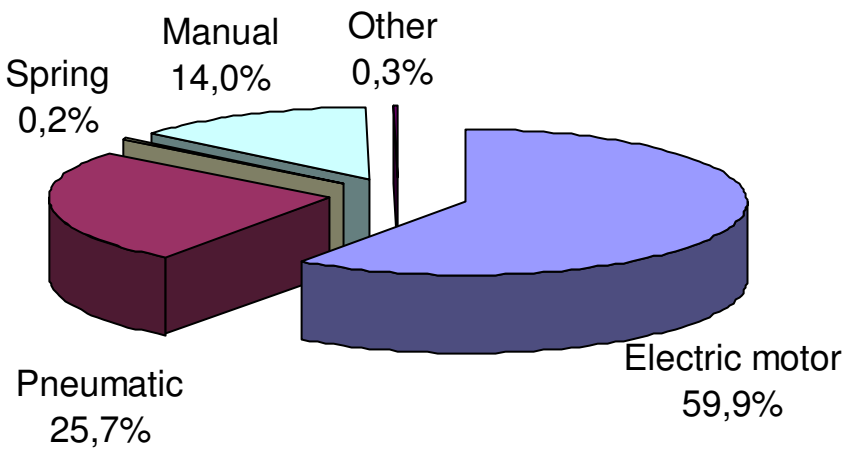
WG A3.06 - Reliability of HV equipment – DES population



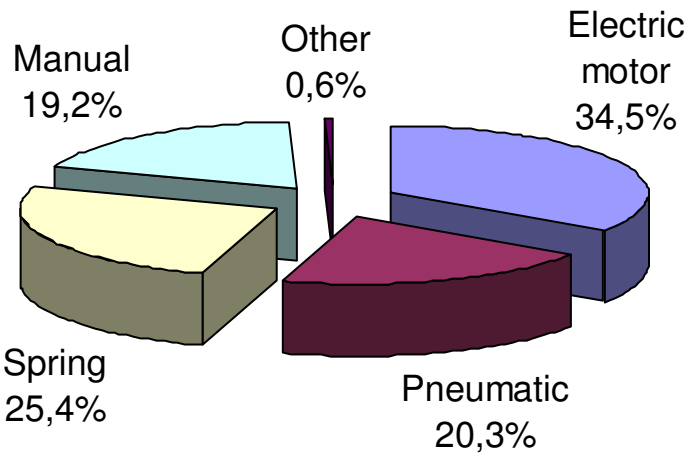
WG A3.06 - Reliability of HV equipment – DES population

Distribution per application and operating mechanism

AIS
~ 360.000 DES-years



GIS
~ 150.000 DES-years



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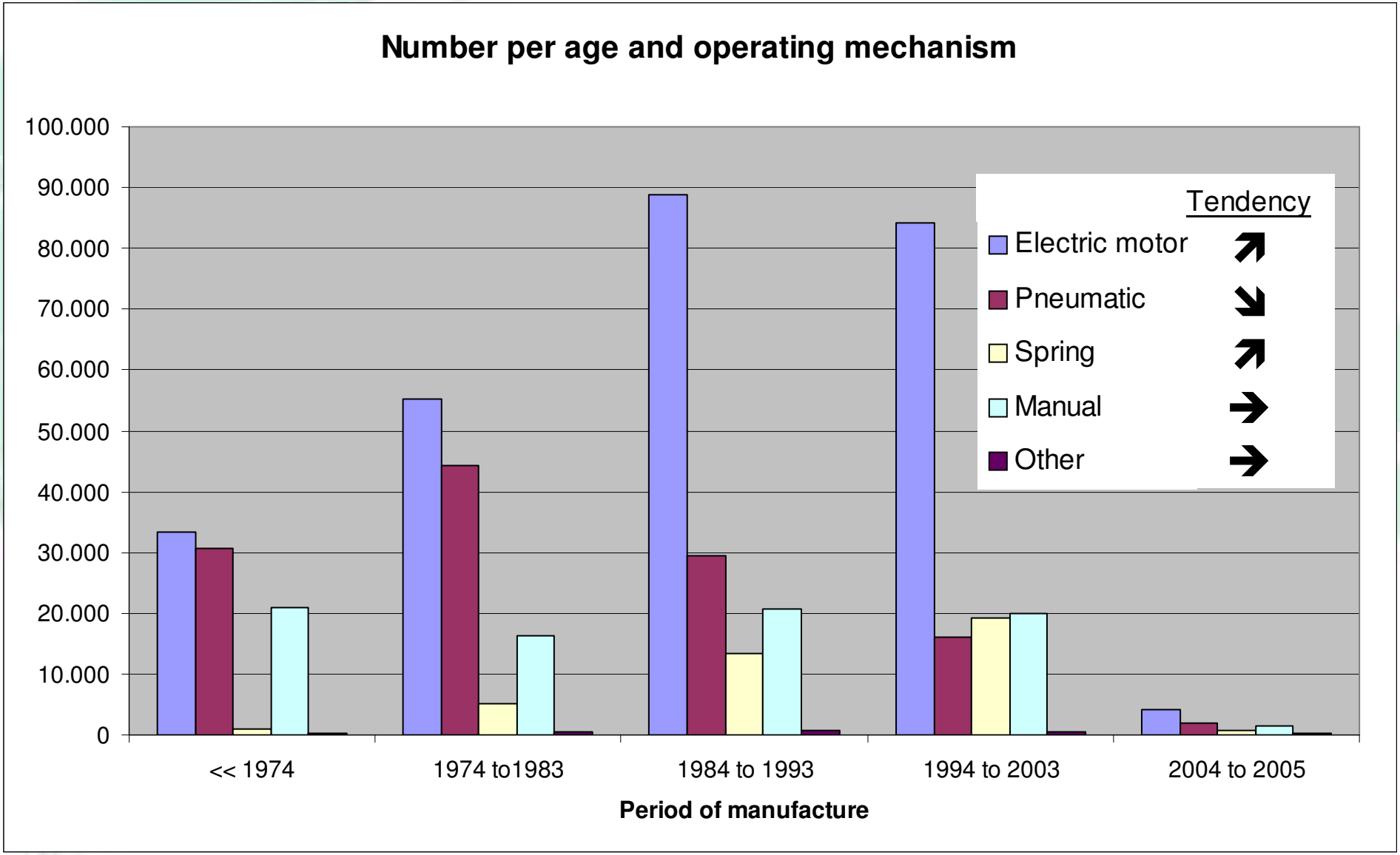
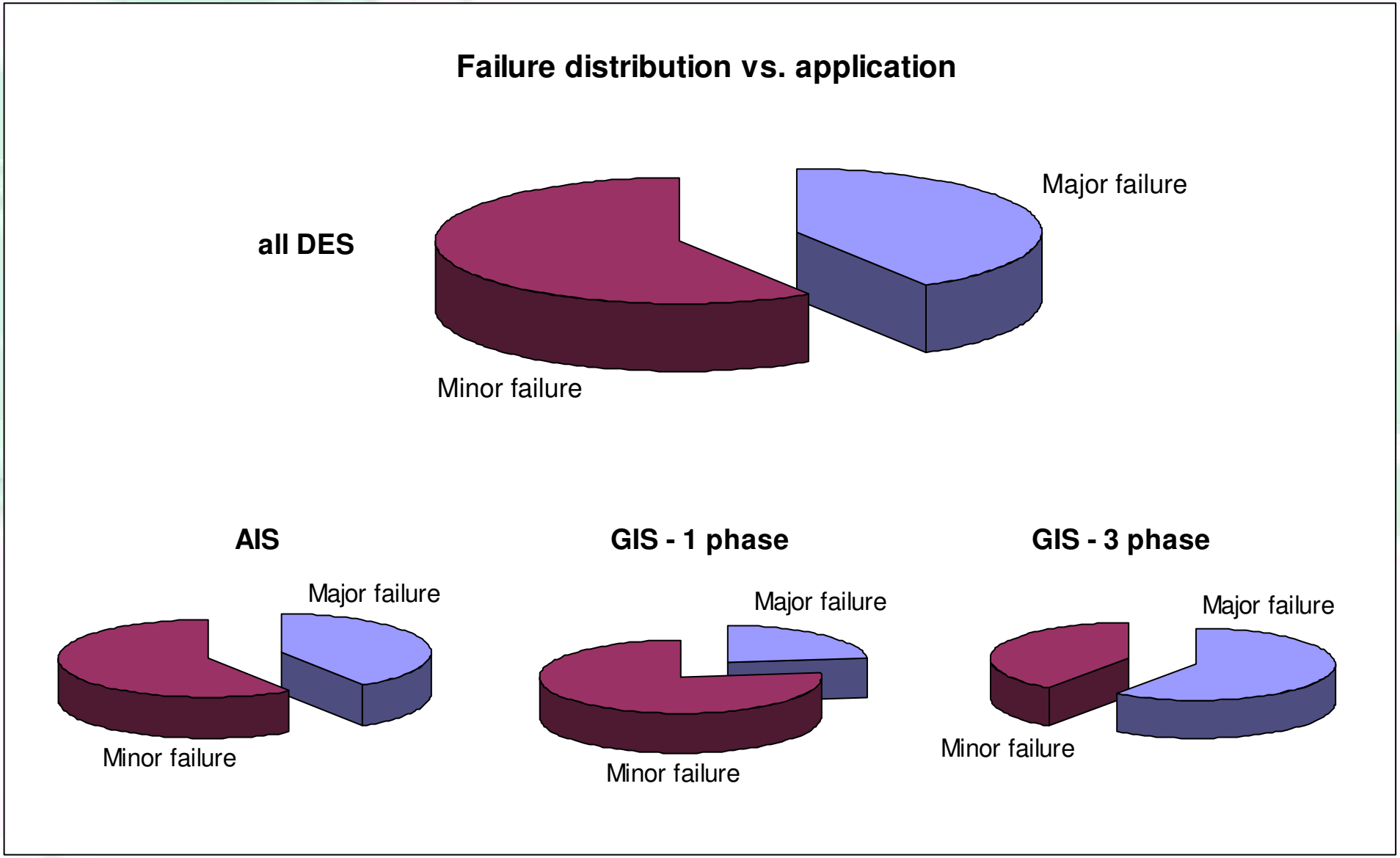


WG A3.06 - Reliability of HV equipment – DES failures



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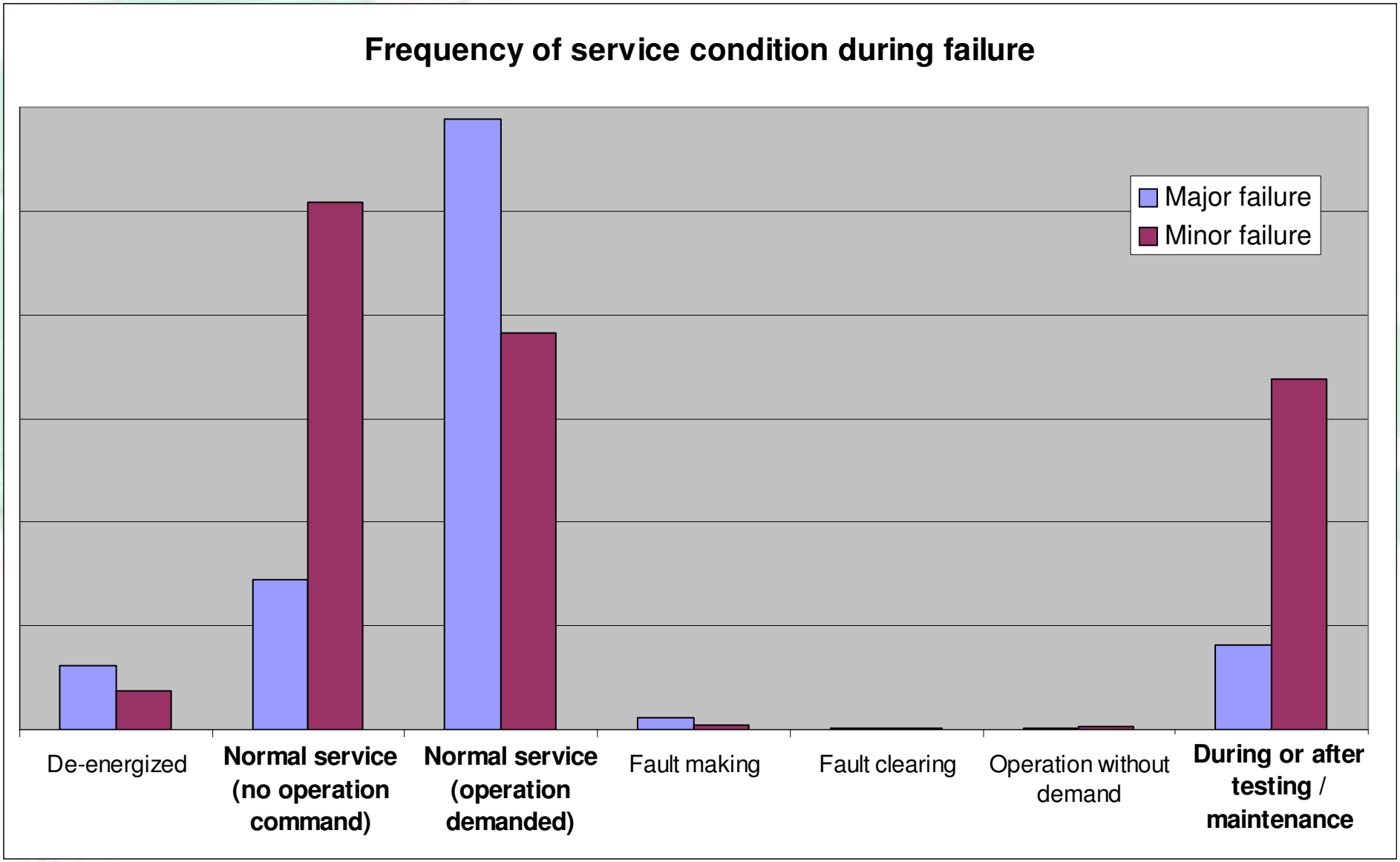

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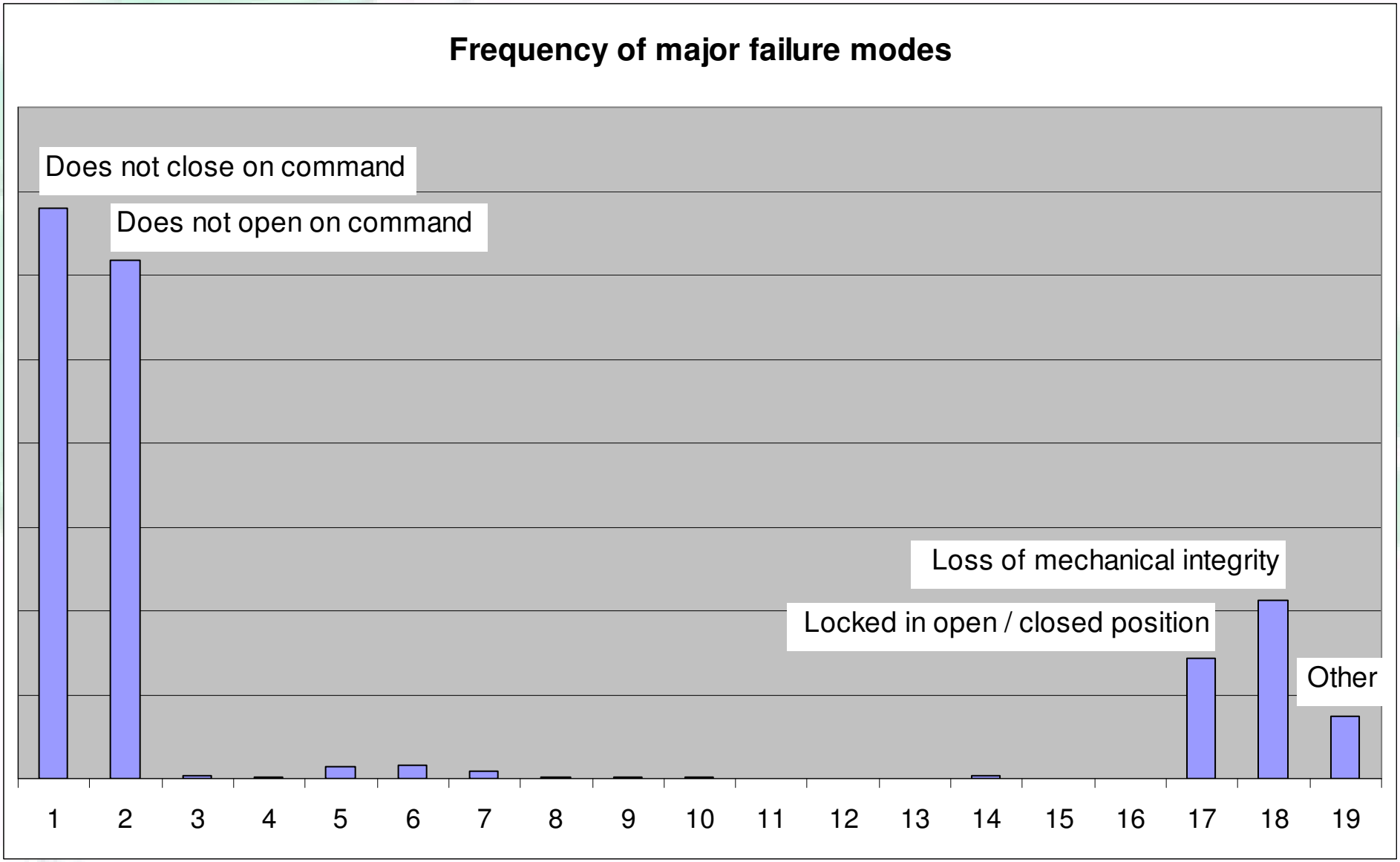

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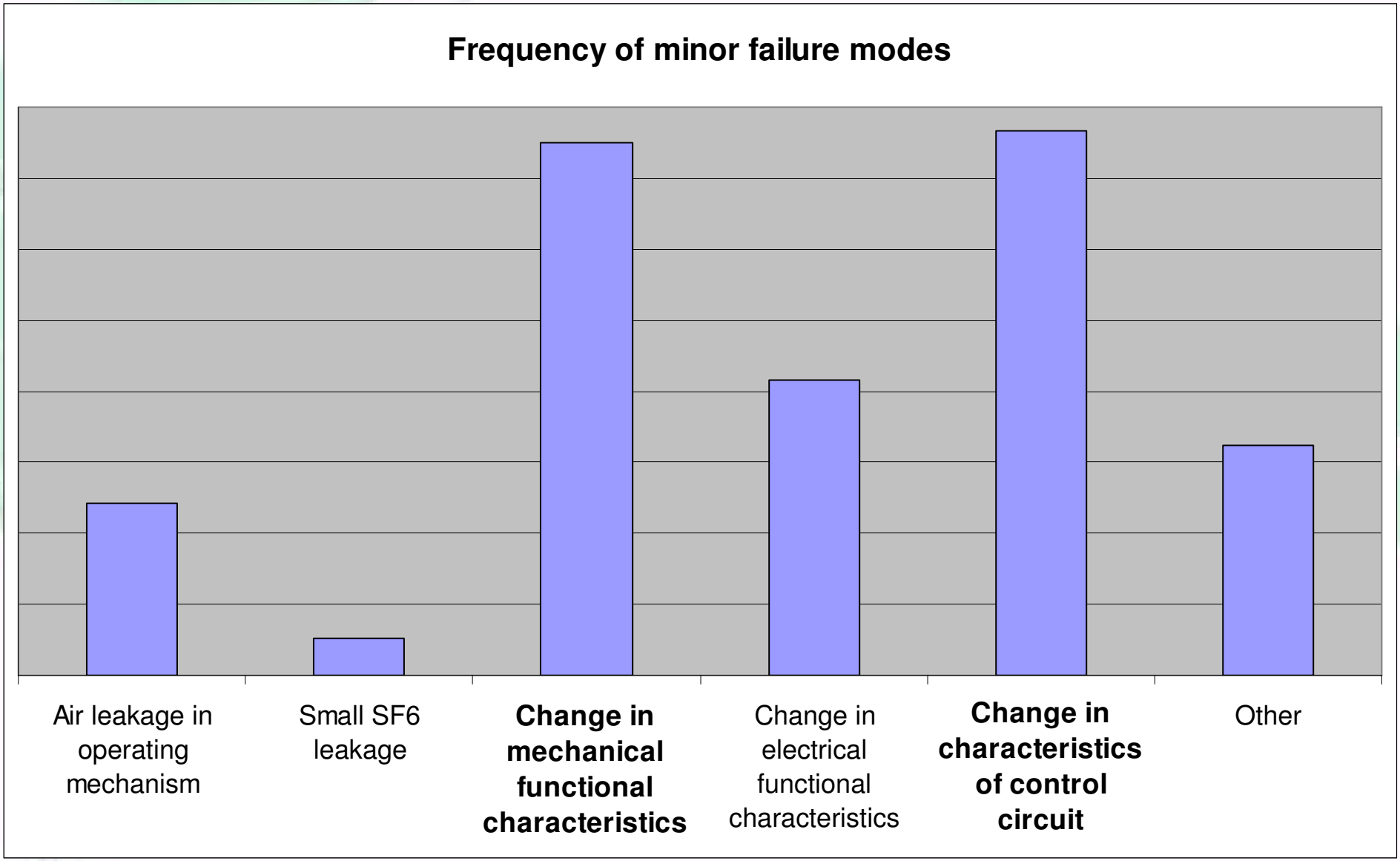

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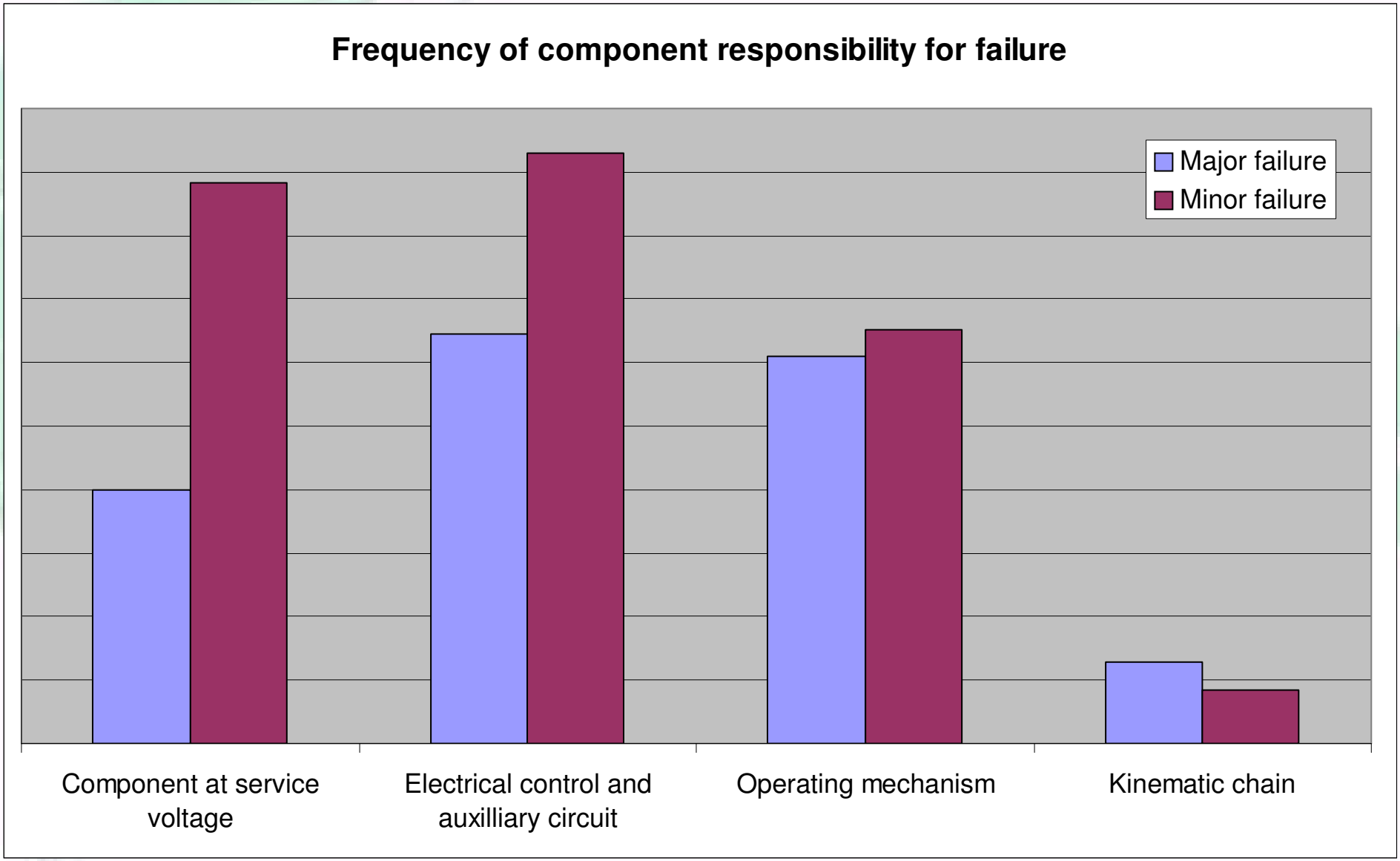

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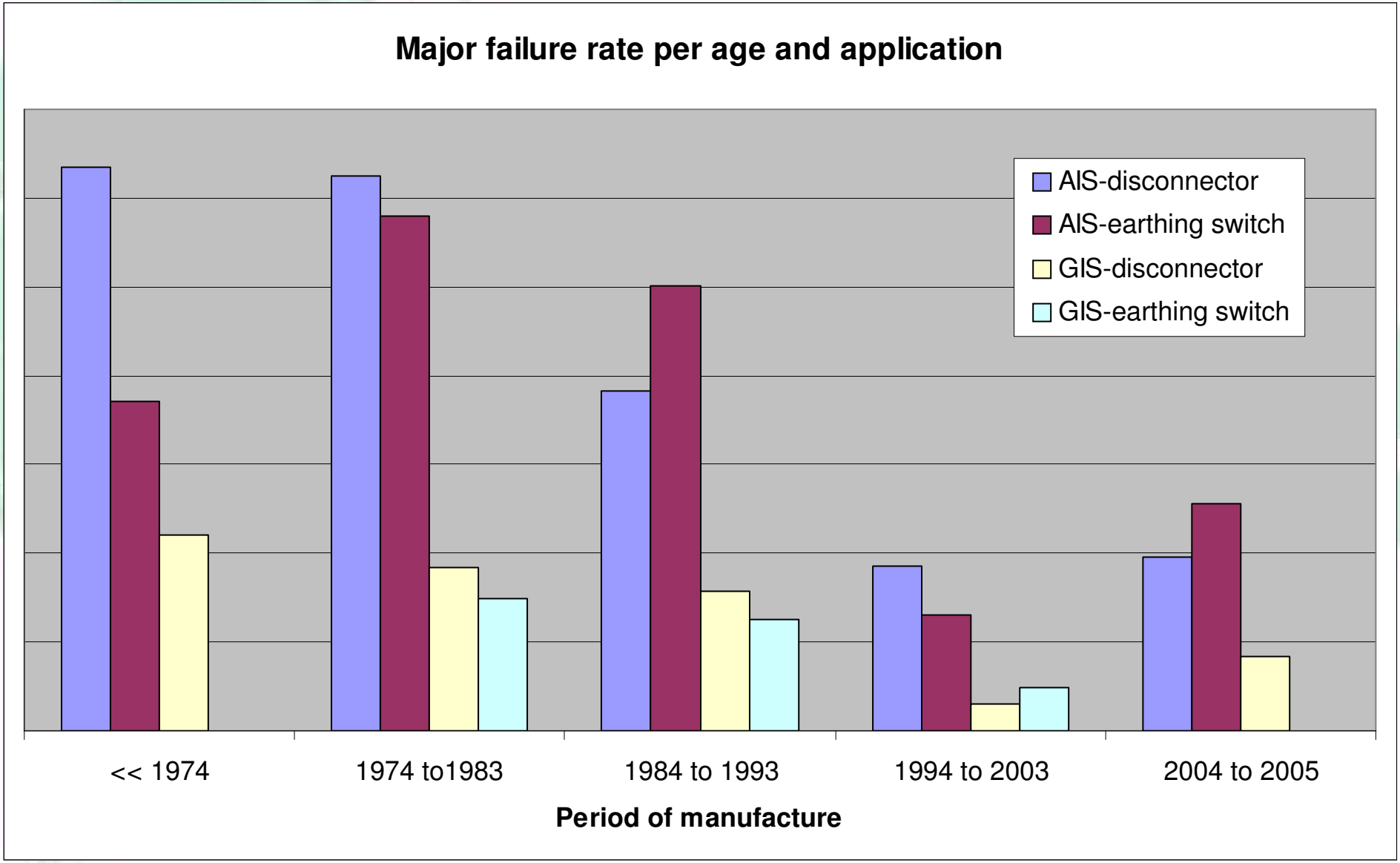

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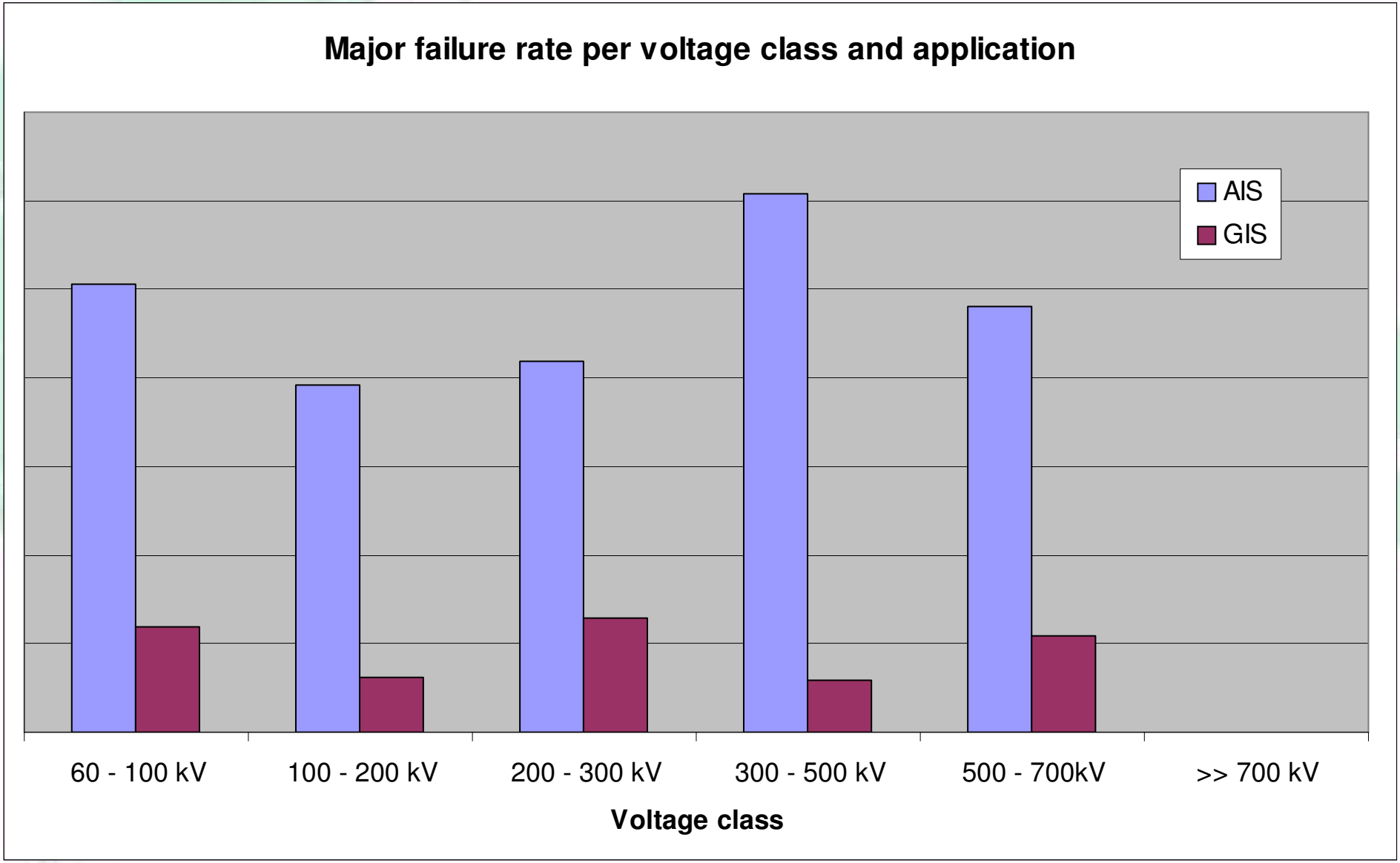

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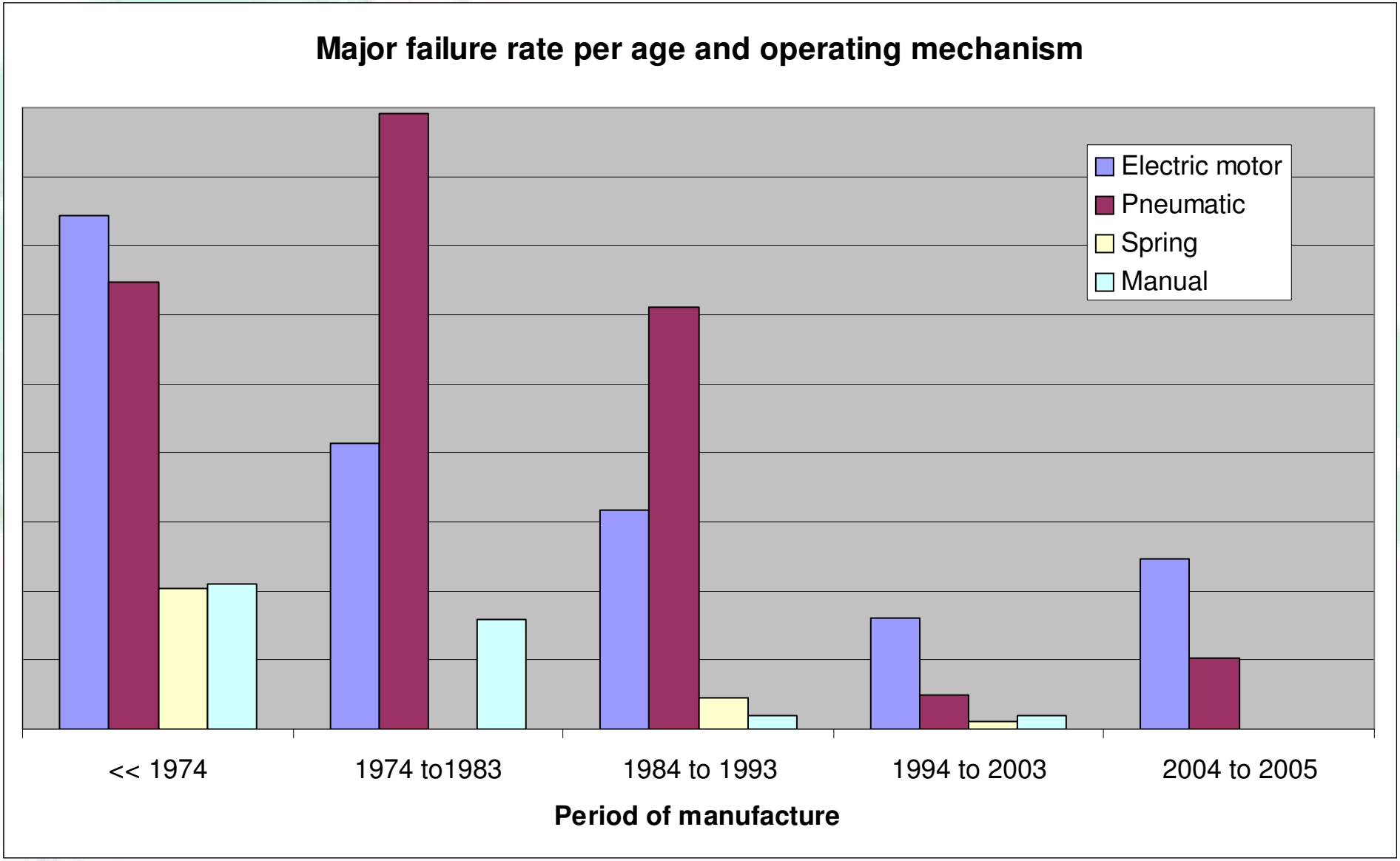

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Main conclusions

- 70% of DES's are used at service voltages between 60 and 200 kV.
- 70% of DES's are air insulated.
- 85% of DES's are installed outdoors.
- The mainly used type of operating mechanism is an electric motor drive.
- Most of the failures happen during normal service.
- Operating mechanism and control circuit are the most reported components responsible for major failures.
- After the first time in service the failure rate increases by age of DES's.
- The failure rate seems to be nearly independent of service voltage.
- The average failure rate of air insulated DES's is approx. 4…5 times higher compare to the failure rate of gas insulated DES's.

Thank you for your kind attention!