

Needs for standardisation of condition monitoring methods

Kjell Spång

KS miltek

Strandskärsvägen 9

SE-42658 Västra Frölunda

Sweden

kjell.spang@swipnet.se

IAEA co-ordinated research programme 2

Round robin test 1998

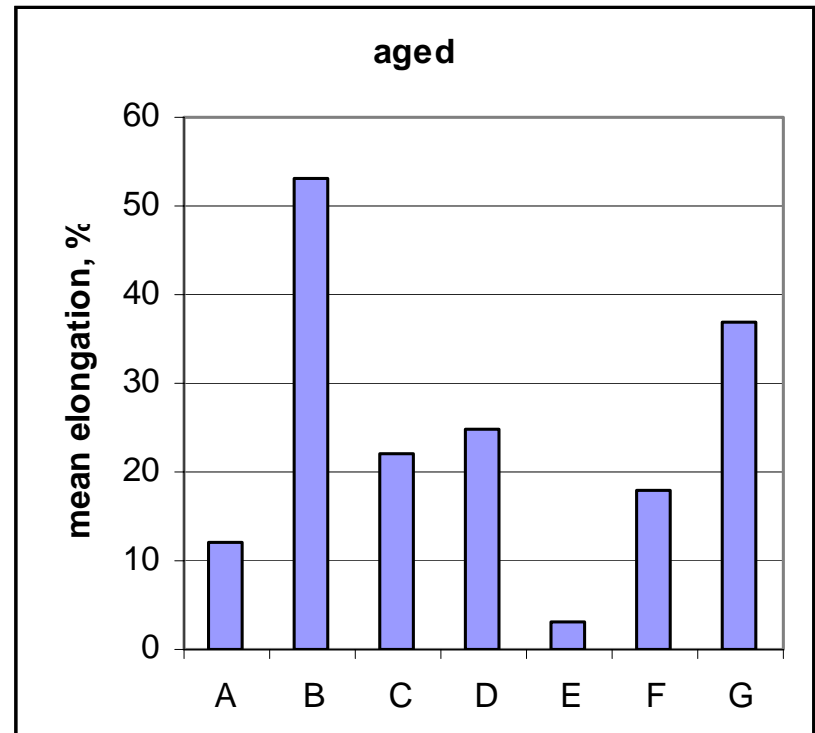
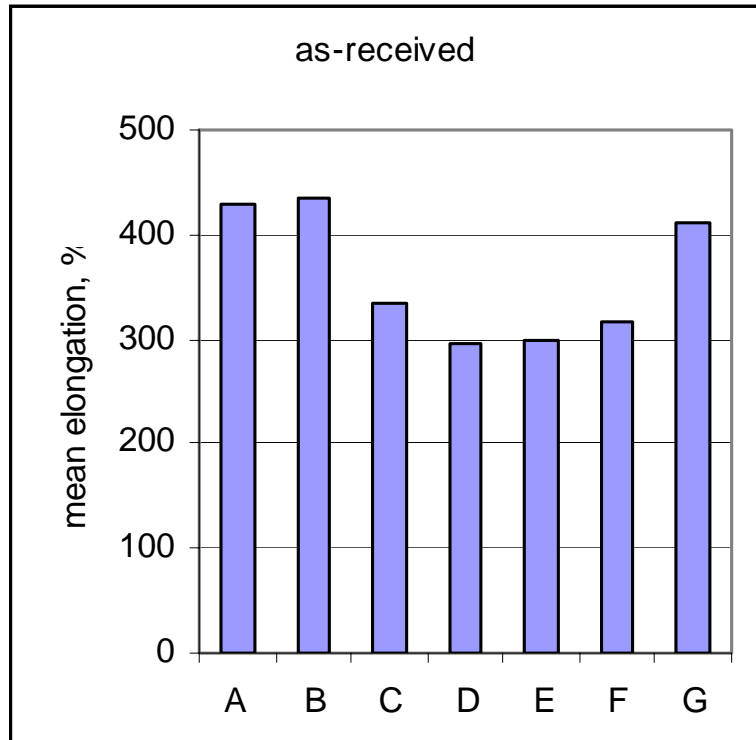
- 14 cable manufacturers
- Sheath materials: PVC, CSPE, EVA, SiR
- Insulation materials: PVC, PE, EPDM, EPR, CSPE, XLPE, EVA, SiR
- Unaged/ thermally aged identical samples sent to 12 laboratories for condition measurements
- Thermal ageing: PE 100°C, XLPE 110°C, others 120°C, ageing time 1008 hours

Methods tested

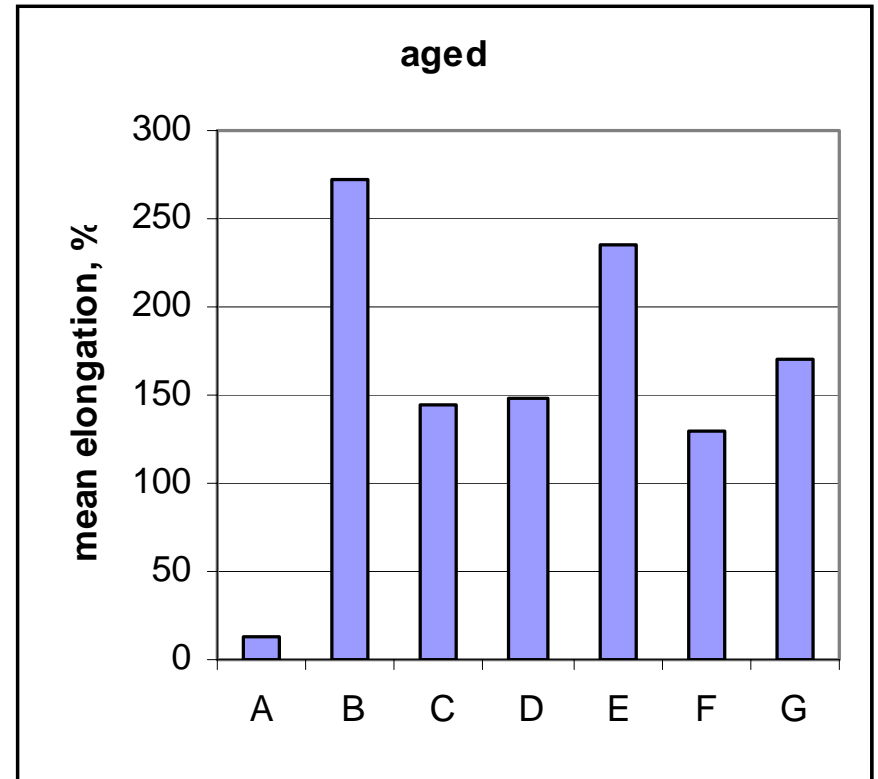
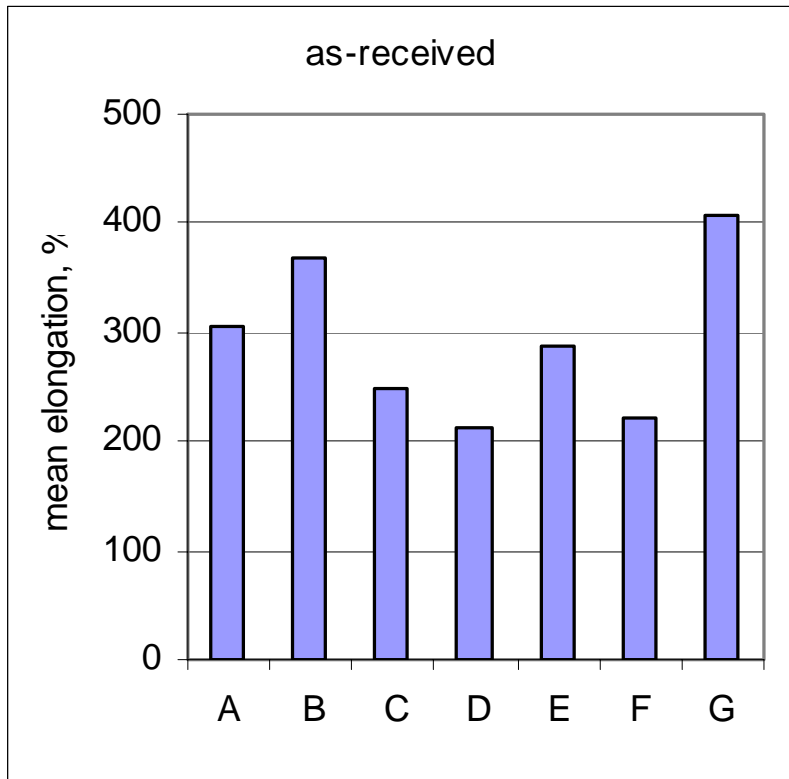
- Tensile (elongation at break): 9 laboratories
- Indenter: 6 laboratories
- OIT: 5 laboratories
- OITP: 4 laboratories
- TGA: 4 laboratories
- Torque: 1 laboratory

Laboratories noted as A,B,C,...

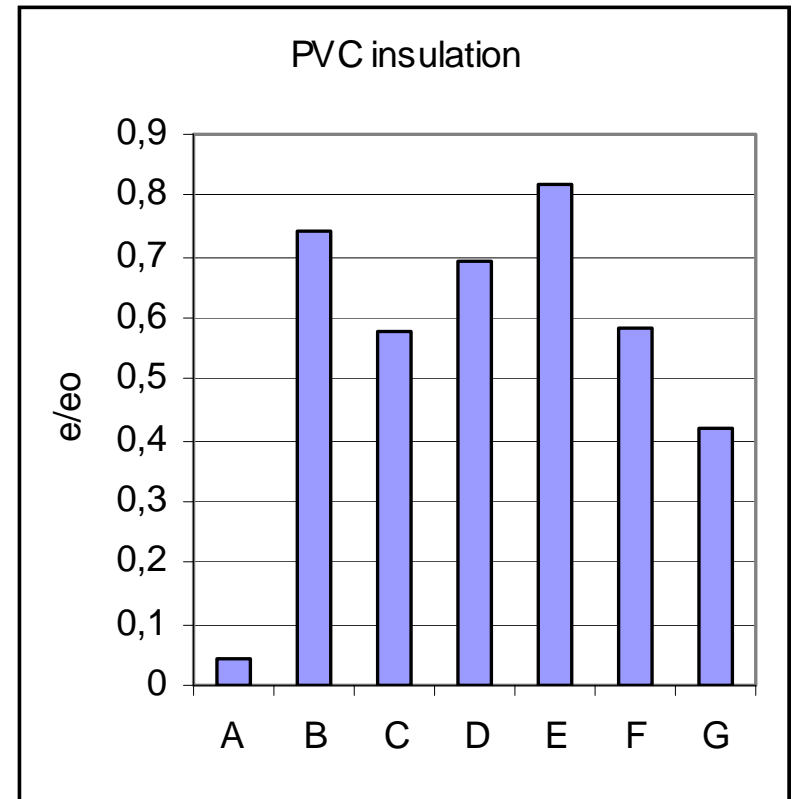
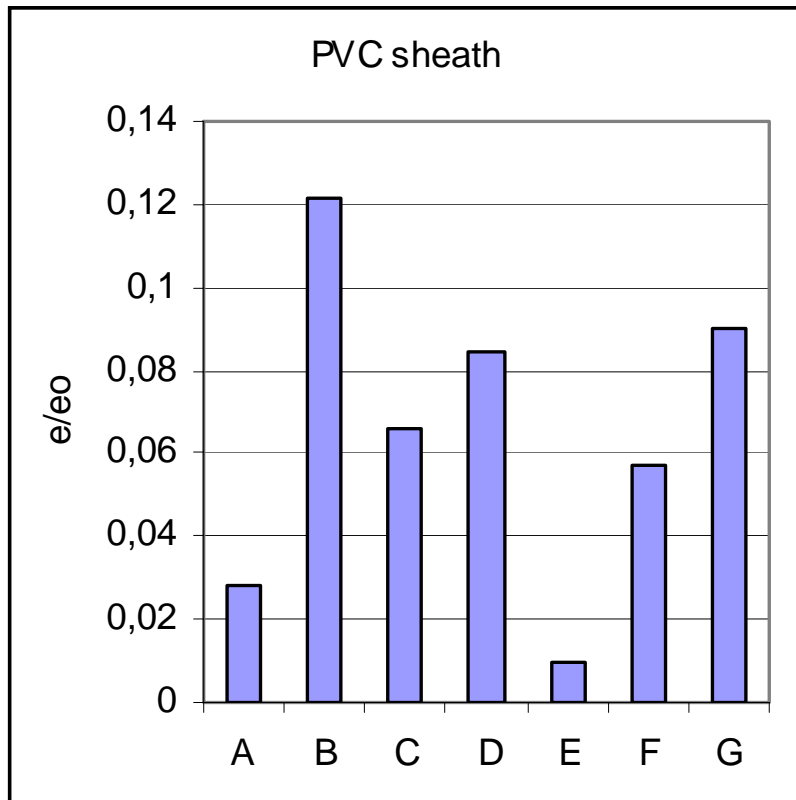
IAEA round robin test. Tensile test, PVC sheath



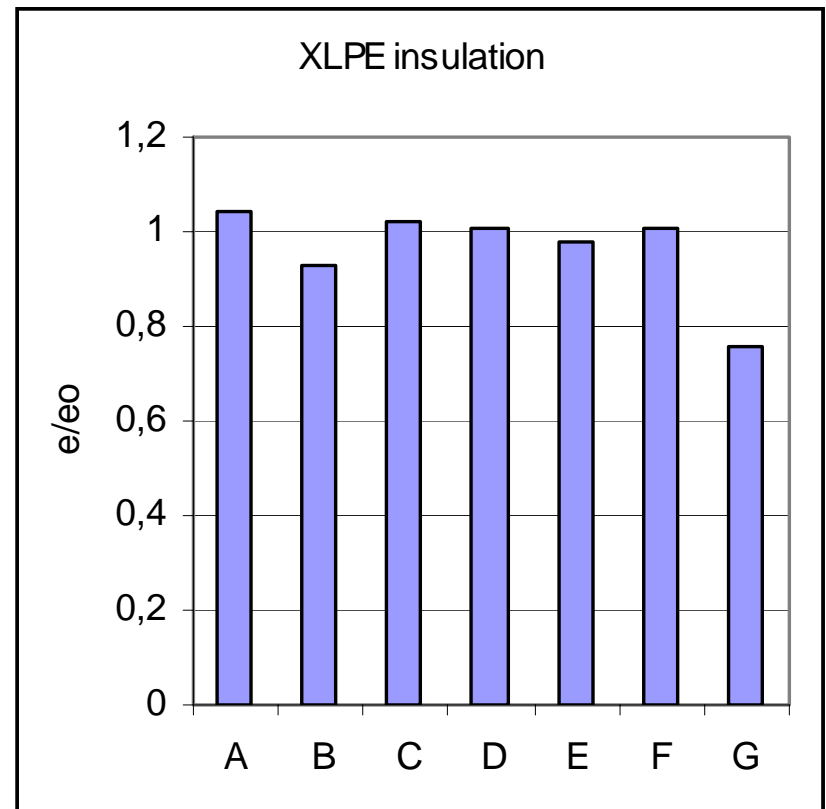
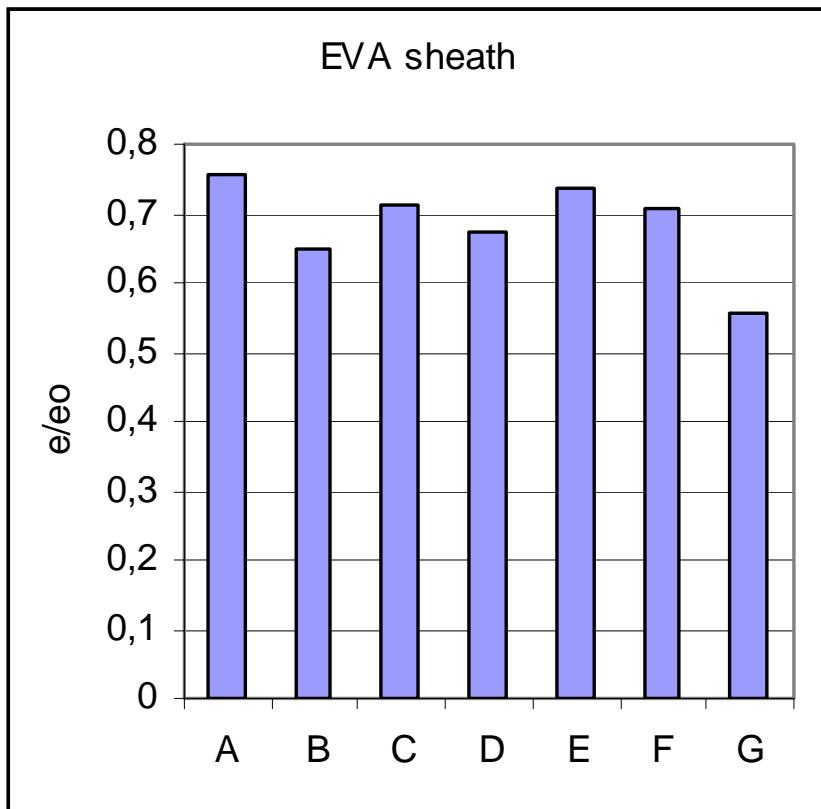
IAEA round robin test. Tensile test, PVC insulation



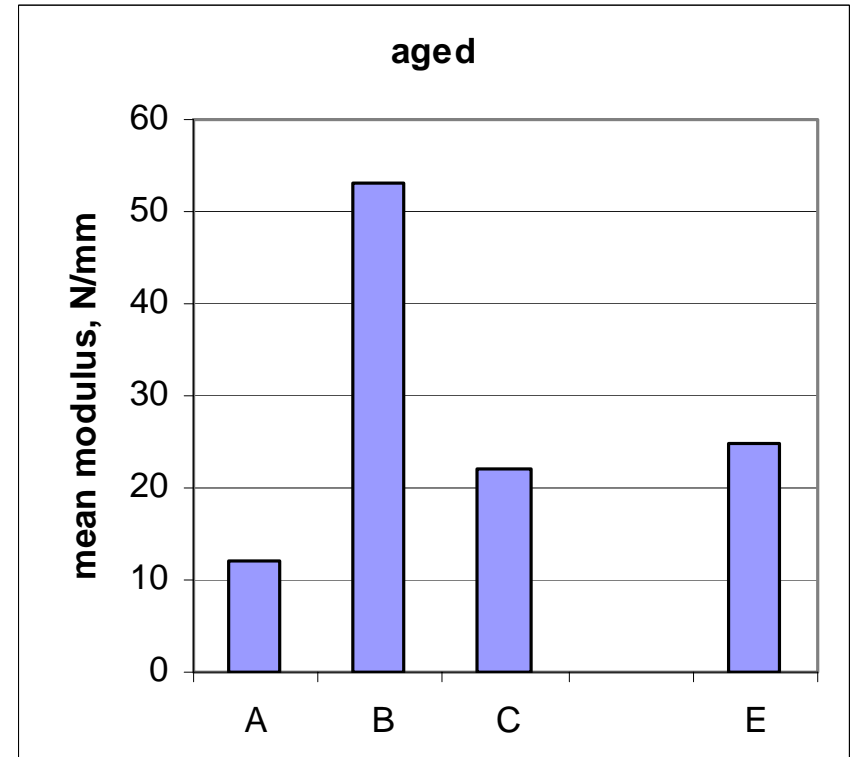
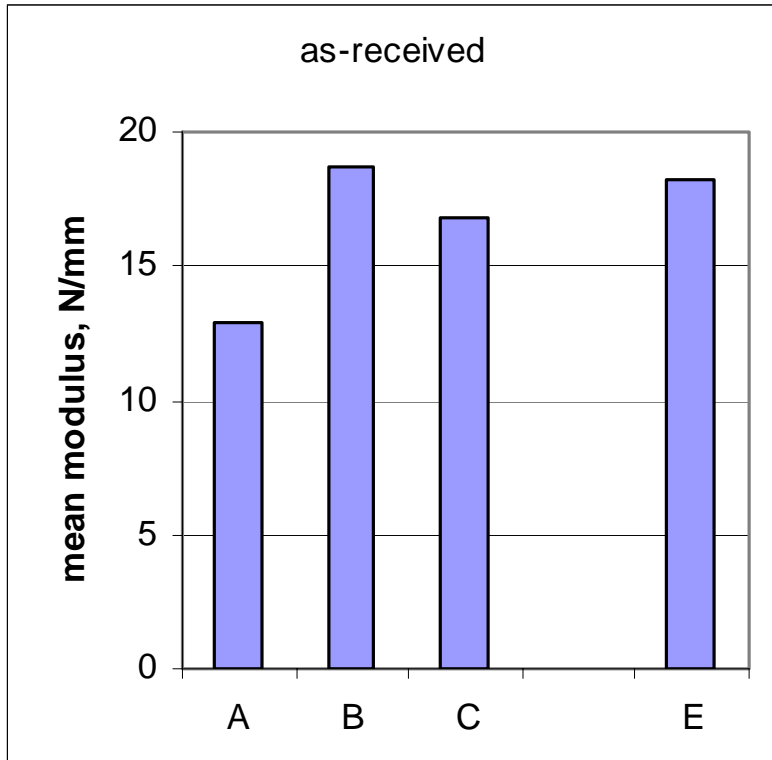
IAEA round robin test. Tensile test, PVC, ϵ/ϵ_0



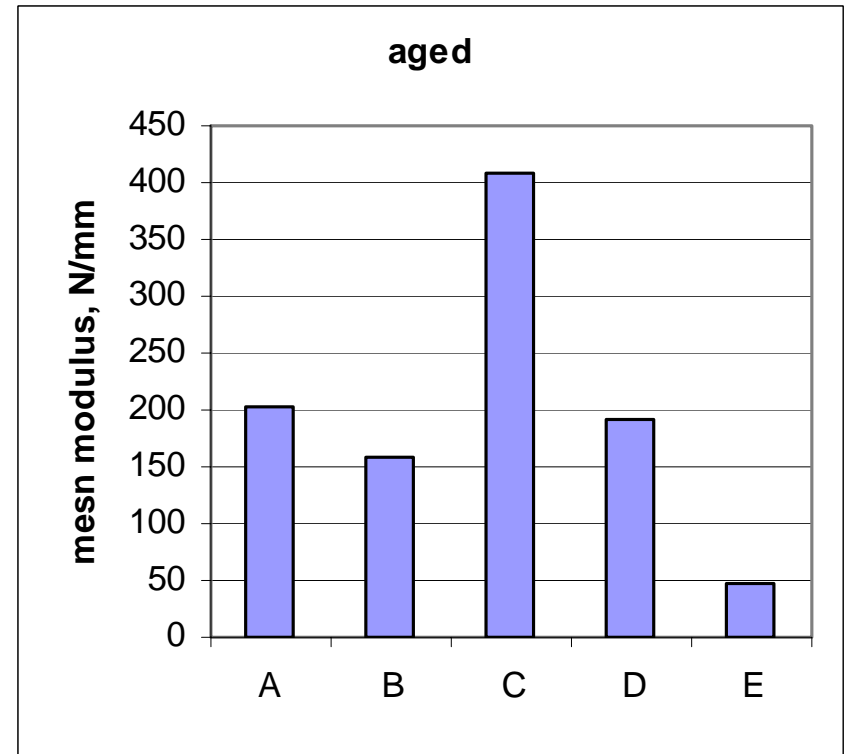
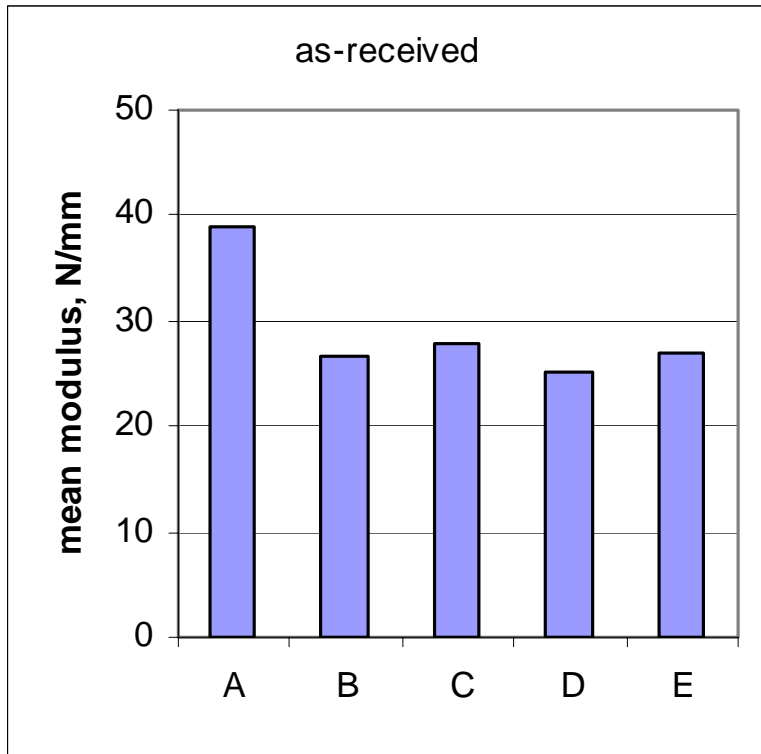
IAEA round robin test. Tensile test, e/e_0 EVA sheath/XLPE insulation



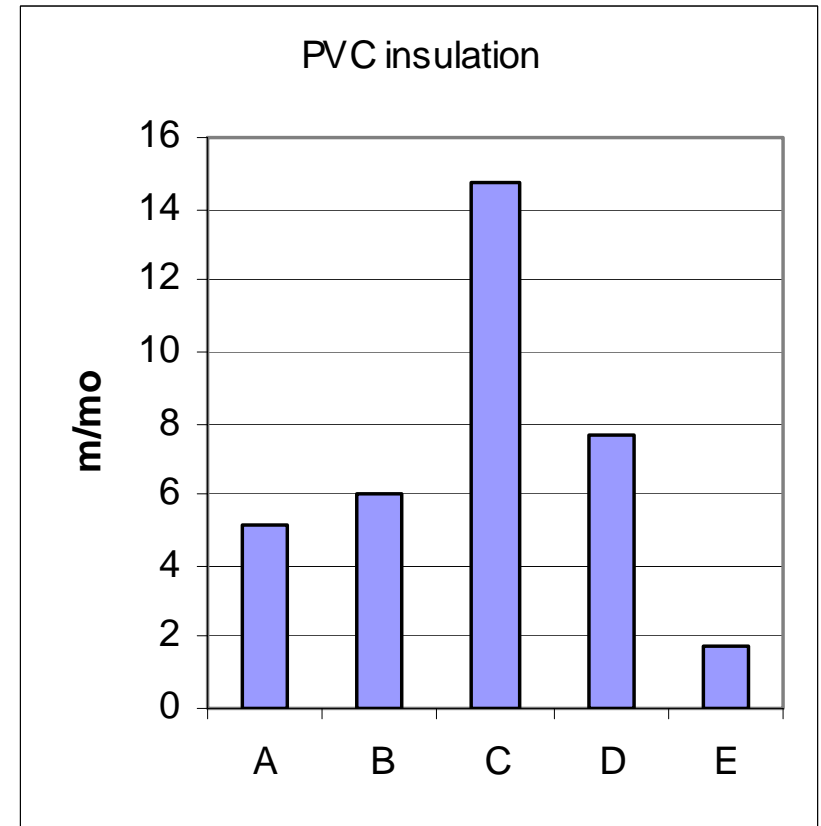
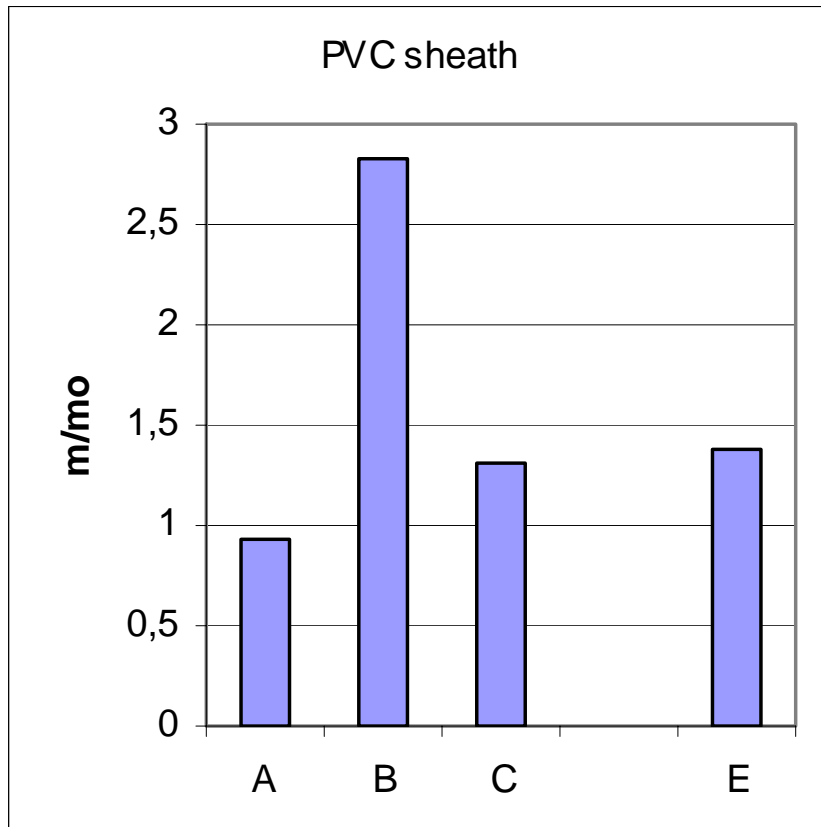
IAEA round robin test. Indenter test, PVC sheath



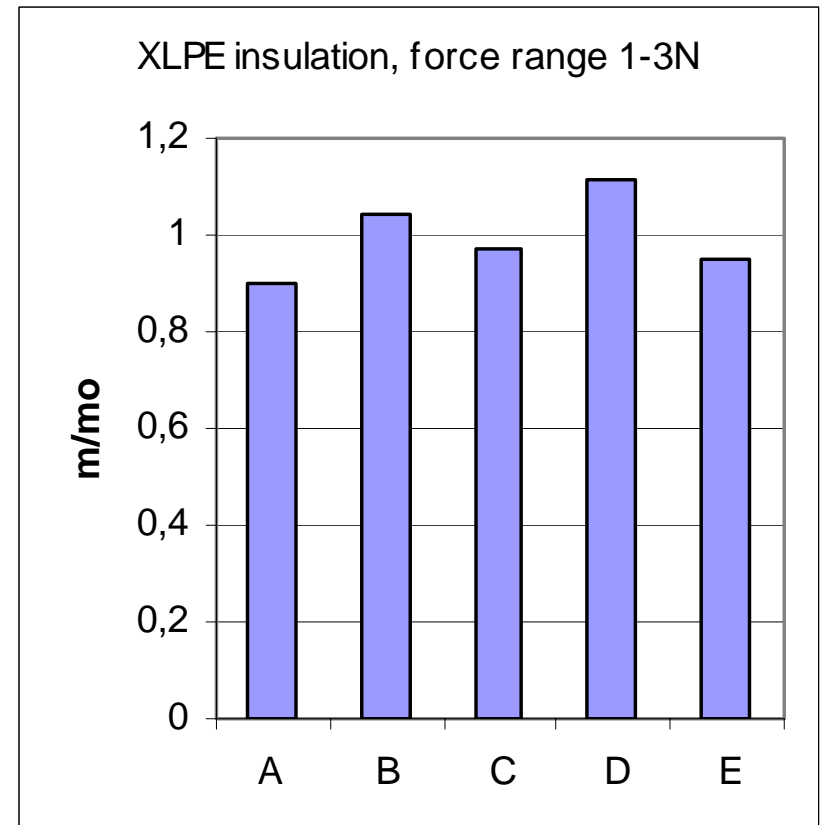
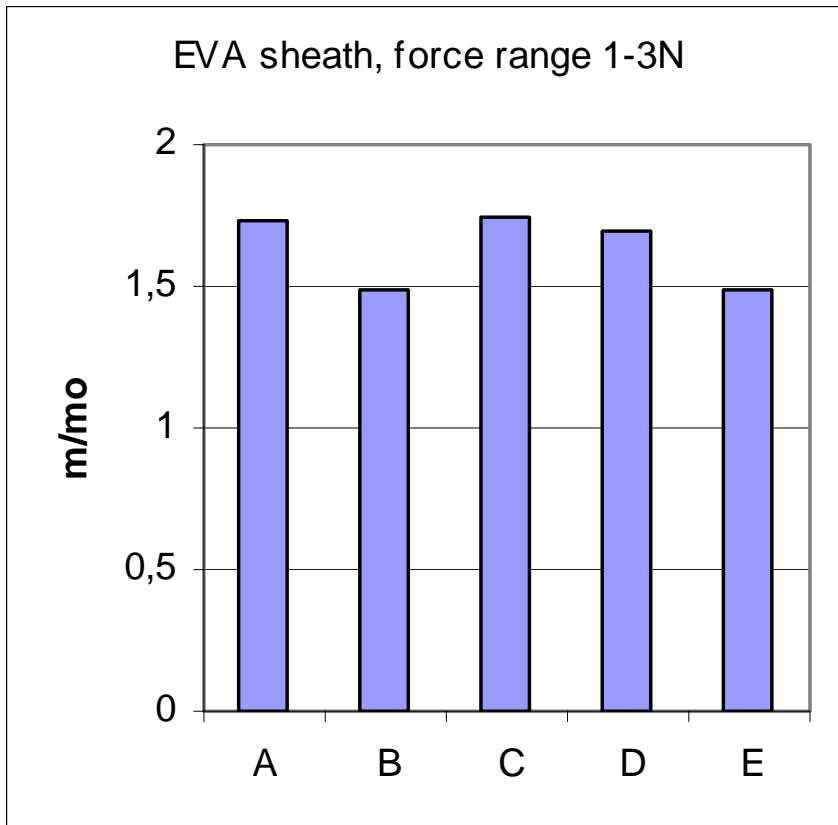
IAEA round robin test. Indenter test, PVC insulation



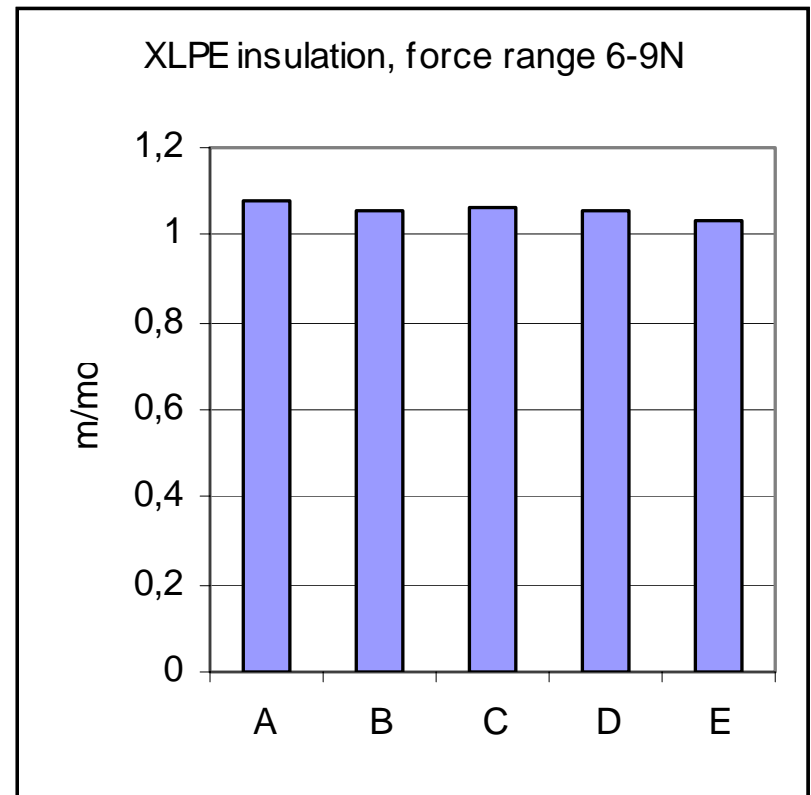
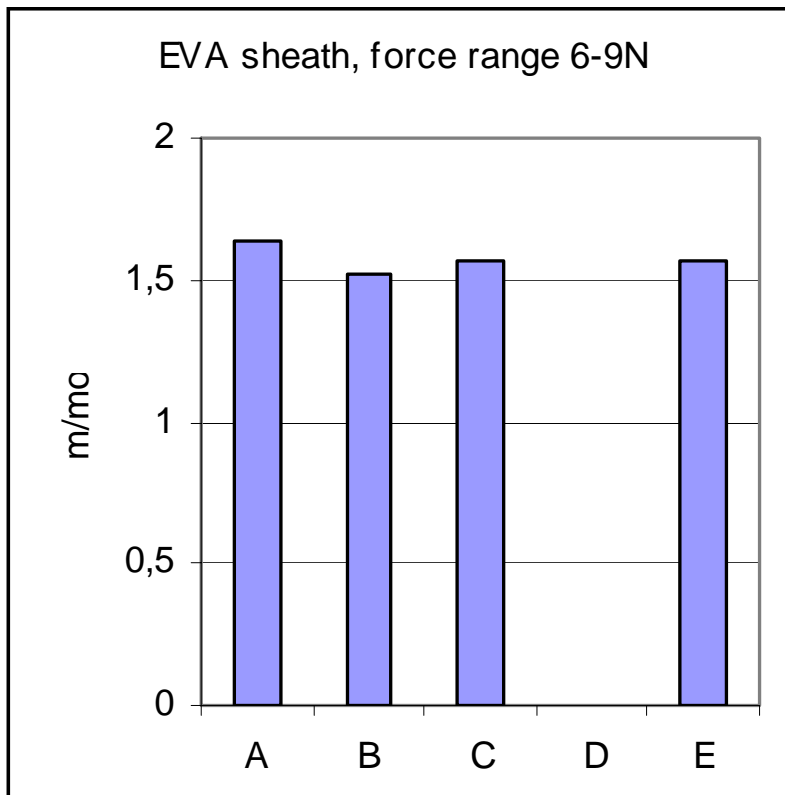
IAEA round robin test. Indenter test, PVC, m/m_0



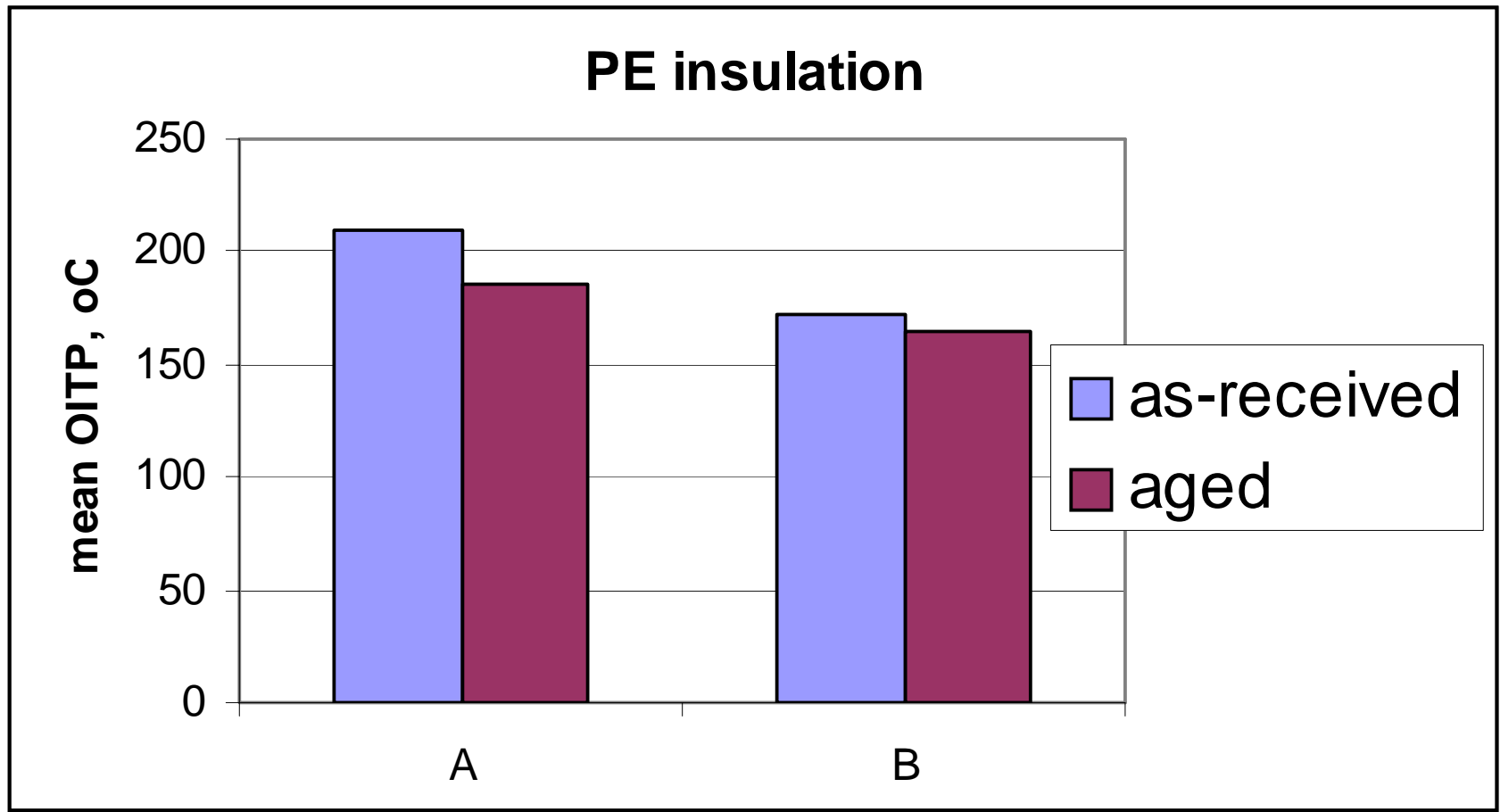
IAEA round robin test. Indenter test, m/m_0 EVA sheath/XLPE insulation



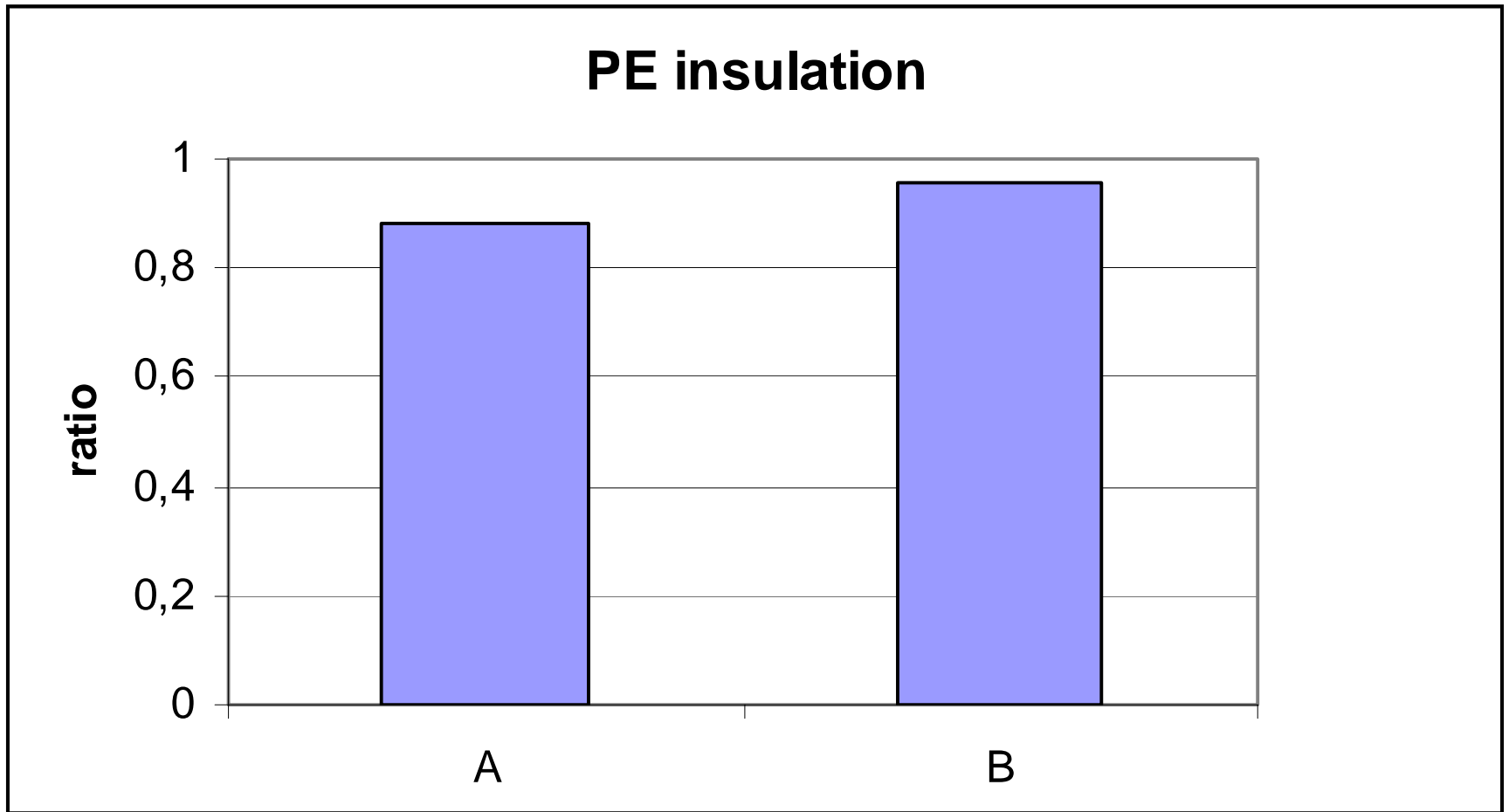
IAEA round robin test. Indenter test, m/m_0 EVA sheath/XLPE insulation



IAEA round robin test. OITP measurements



IAEA round robin test. OITP measurements



IAEA-TECDOC-1188

Volume II p. 68:

”The main conclusion that has come out of this series of round-robin tests has been the need for more detailed specification of the test procedures for condition monitoring methods”

IAEA TECDOC 1188 Recommendations on parameters needed to be specified/standardised

Tensile tests

Type of test machine used

Calibration procedure

Method of gripping samples and type of grip face

Test temperature

Cross-head speed

Method of measuring elongation

IAEA TECDOC 1188 Recommendations on parameters needed to be specified/standardised

Indenter tests

Test temperature

Probe speed

Force range used for analysis (standard ranges)

Calibration procedure

(Grip force?)

IAEA TECDOC 1188 Recommendations on parameters needed to be specified/standardised

OIT tests

Type of instrument used

Method of calibration

Sample weight and preparation method

Type of sample pan (open or closed)

Oxygen flow rate used

Temperature profile used to reach oxidation temperature

Method of establishing baseline (data plot)

Method of establishing oxidation onset

IAEA TECDOC 1188 Recommendations on parameters needed to be specified/standardised

OITP tests

Type of instrument used

Method of calibration

Sample weight and preparation method

Type of sample pan (open or closed)

Oxygen flow rate used

Temperature ramp rate and starting temperature

Method of establishing baseline (data plot)

Method of establishing oxidation onset

IAEA TECDOC 1188 Recommendations on parameters needed to be specified/standardised

TGA tests

Type of instrument used

Method of calibration

Sample weight and preparation method

Type of sample pan (open or closed)

Oxygen flow rate used

Temperature ramp rate and starting temperature

Method of establishing oxidation onset

Where to find IAEA-TECDOC-1188

- www.iaea.org
- Click on Publications
- Click on Scientific & Technical Publications
- Write under Search: Assessment and management of ageing of major
- Find TECDOC 1188 part I as item 6 and part II as item 5. The full text can be opened