PVC Reference Curve (MRS)

by

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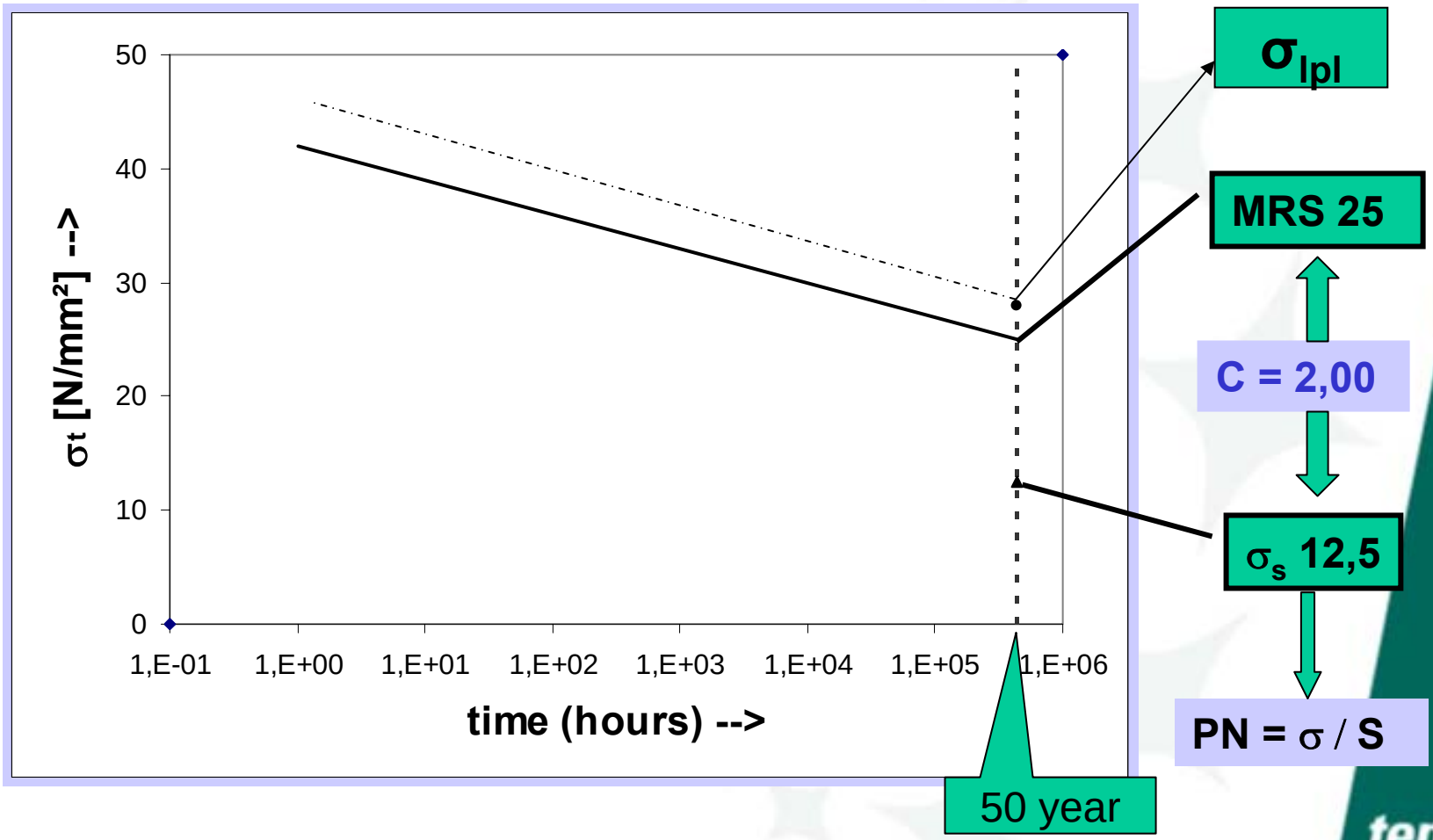
PVC-U material for pressure pipes applications need MRS evaluation

- **Rules**
  - **EN1452/1456 product standard**
  - **ISO 9080, regression analysis and extrapolation of pressure test data**
  - **ISO 12162, Classification of MRS and PN**

PVC regression curve



PVC reference curve (MRS)

- **Problem: certification consequences in case of change of type of stabiliser**

- **The aim of the Teppfa work (2002)**

  - **Reduce cost and time in substituting Lead stabiliser and finding possibilities to co-ordinate testing and approvals**

  - **What are the possibilities in present rules**

  - **How to achieve approvals with little repeating testing**

Rules of EN1452, PVC pressure pipes

- **EN1452-7, clause 4.2.2, Change of material**
  - **A change in chemical nature of the used stabiliser is considered as a change of material and consequently, in principle a full new MRS evaluation must be executed**

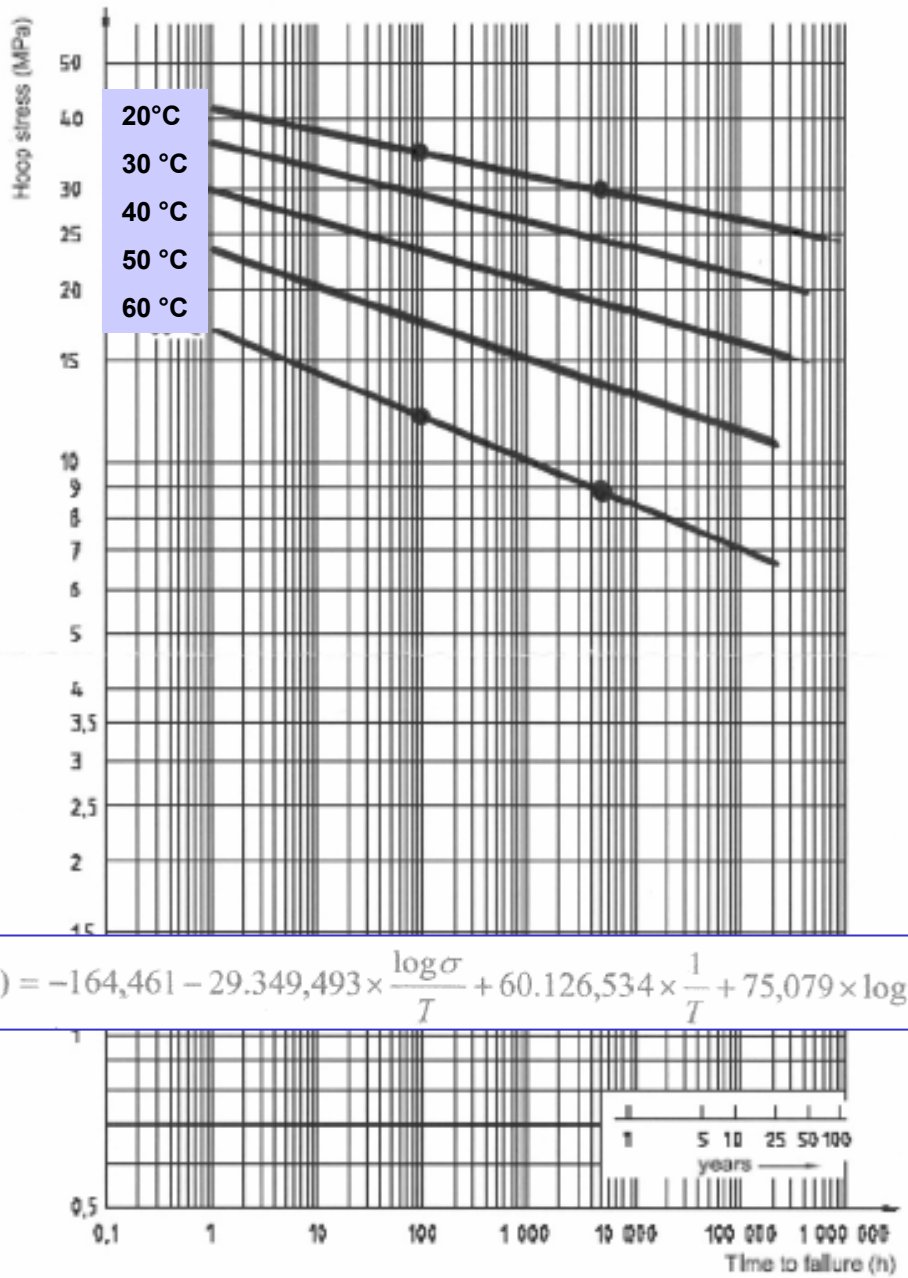
But

- **EN1452-2, clause 4.3**
  - **Where there is available long-term experience with the effect of a change in material/compound, it is not necessary to re-evaluate the MRS. In this case the values determined with 5 test pieces at 20 °C and 60 °C during 1000 h to 5000 h shall be located on or above the 97,5 % LCL long-term characteristic curve established prior to the material/compound change.**

PVC reference curve (MRS)

- **TEPPFA approach for pressure applications**
  - **Substitution of Lead in AT, DE, ES, IT, IR, NL, PT, UK.**
  - **To set up a European reference MRS curve representative for all PVC-U material, based on existing data sets**
  - **Use for new Type Tests only a few check points to confirm the validity of the reference curve as basis for certification**
  - **Contact to certification bodies shows, that the MRS evaluation of the used PVC compound by checking some control points of the reference curves will be accepted**

European PVC-U Reference Curve



$$\log(t) = -164{,}461 - 29.349{,}493 \times \frac{\log\sigma}{T} + 60.126{,}534 \times \frac{1}{T} + 75{,}079 \times \log\sigma$$

This reference curve is the same as from ISO15493 and is identical as DIN8061

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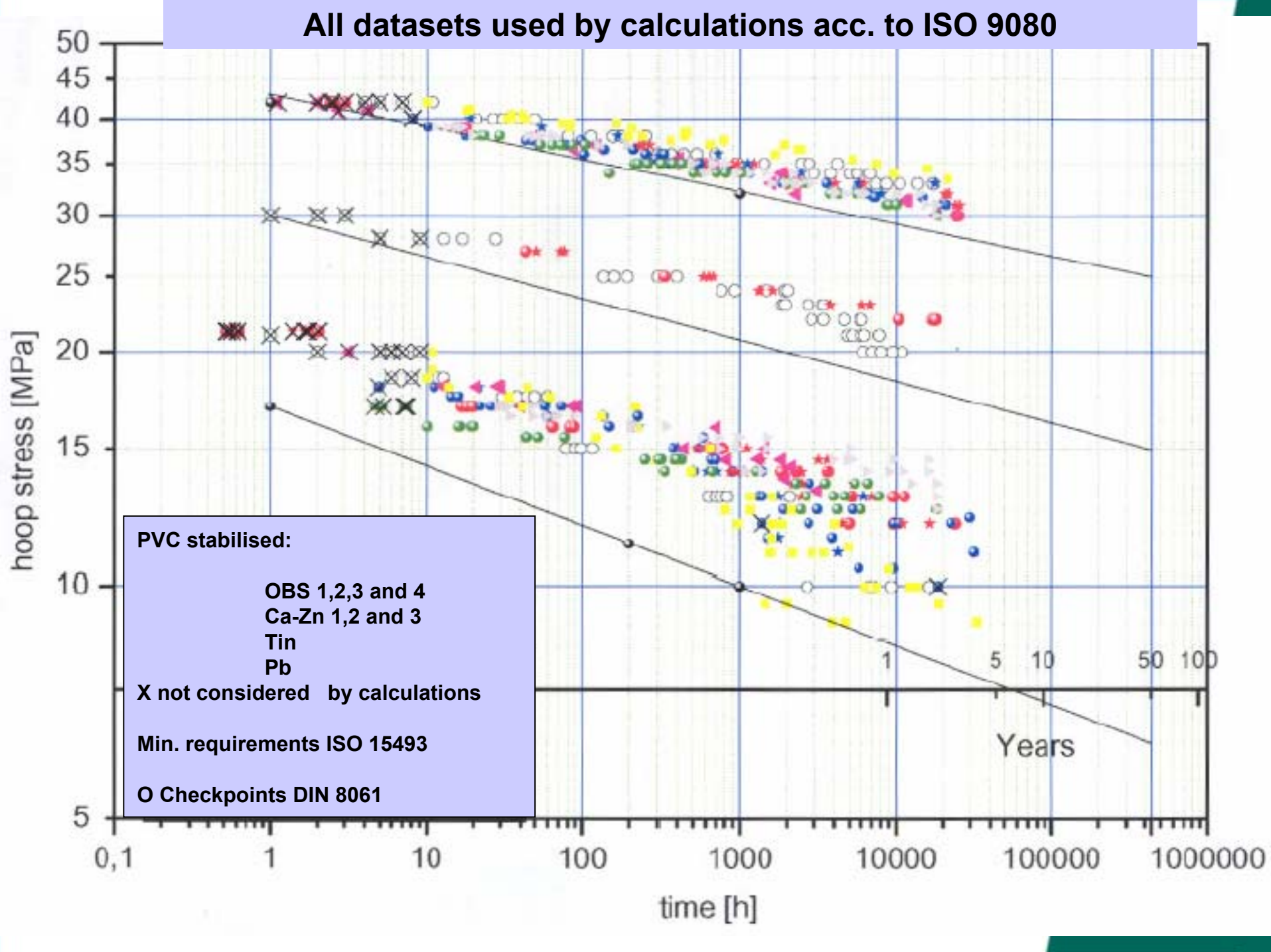
All datasets used by calculations acc. to ISO 9080



Calculated MRS values

- **PVC - OBS** **26,1 – 26,5**
- **PVC - CaZn** **26,0 – 29,8**
- **PVC Sn stabilised** **25,3 – 25,8**
- **PVC Pb stabilised** **26,5**

PVC reference curve (MRS)

- **Conclusion of Ofi/TGM**
  - **Analysis of the data sets, clearly shows that the minimum required strength level of 25Mpa as published in existing ISO standards is always met, whatever the type of stabiliser**

Proposed test parameters to validate conformity to reference curve in line with EN1452-2

Time [h]	Temperature [°C]	Stress [MPa]
100	20	35
100	60	11,95
5000	20	29,90
5000	60	8,85

Conclusion

- **In case of replacement of Pb stabiliser in PVC-U pipes for pressure applications a full evaluation report regarding the MRS reference curve is available at TEPPFA**

- **To limit testing costs, this independent scientific study can be used towards national certification bodies.**