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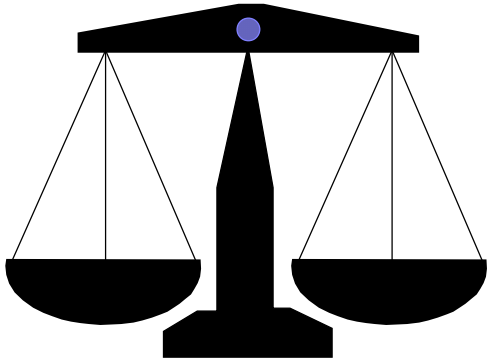
Get the right balance between Comfort and Protection

- **Weight**
  - Protection needs **higher** weight
  - Comfort strives for **lower** weight
- **Function / Protection**
  - Protection works from **outer** to **inner**
  - Comfort works from **inner** to **outer**
- **Moisture management**
  - Protection demands **NO** penetration of Water or Chemicals
  - Comfort demands **HIGH** water vapor transmission from the skin to the outside



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Norms and methods to substantiate Comfort

- **ISO-811** / measurement of hydrostatic Watertransmissionrate
- **ISO-11092** / measurement of water-vapor transmission rate RET on virtual skin simulation (sweating hot plate)
- **prEN469 appendix E, physiological Test** / Defined workout on testperson under monitoring of heartbeat, core-temperature to determine HeatStress
- **Weight of the PPE system** / less weight => more Comfort
- **Wear trials** / still best comparison and enduse-specific feedback
- **SAM** / "Sweating Articulated Mannequin". Developed by EMPA in Switzerland in co-operation with e.g.: DuPont and Gore

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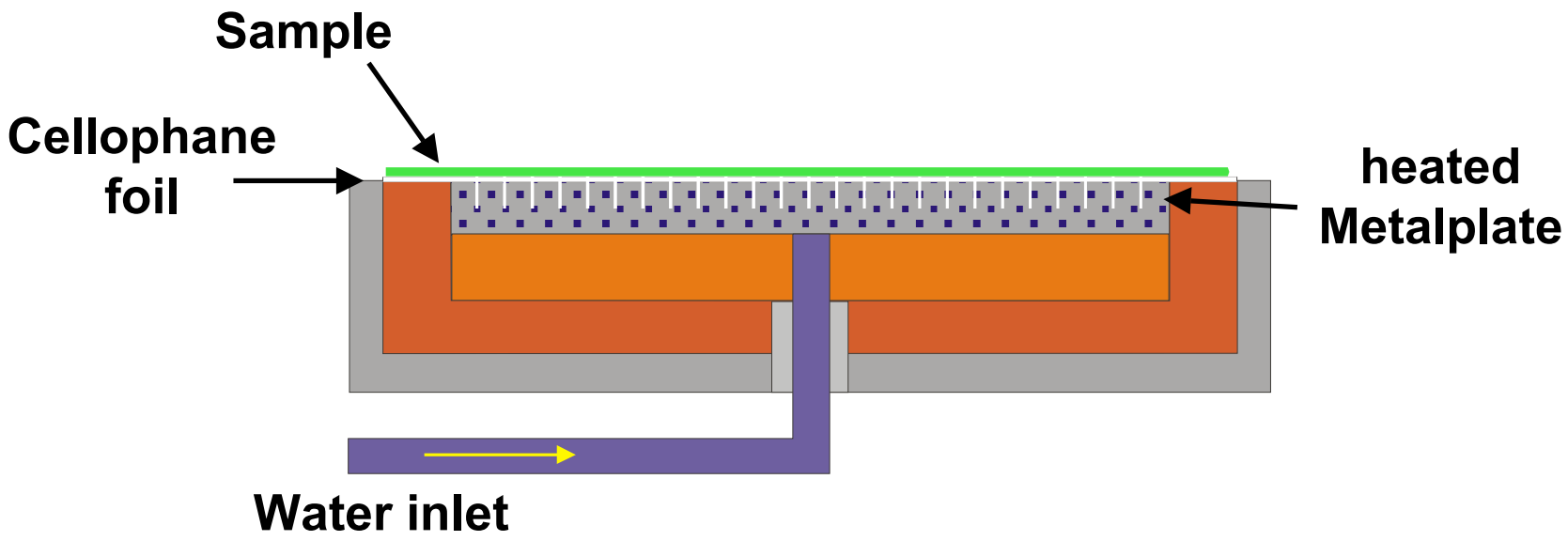
Hautmodell nach EN 31092, ISO 11092 (Water-vapor transmission resistance)



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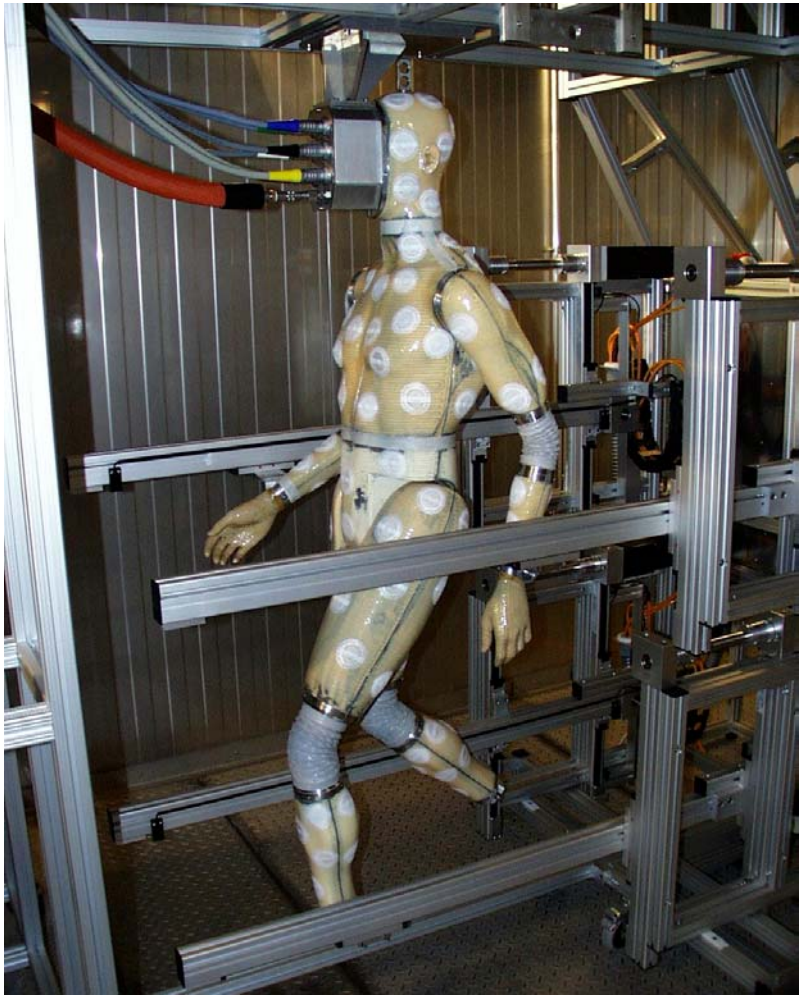
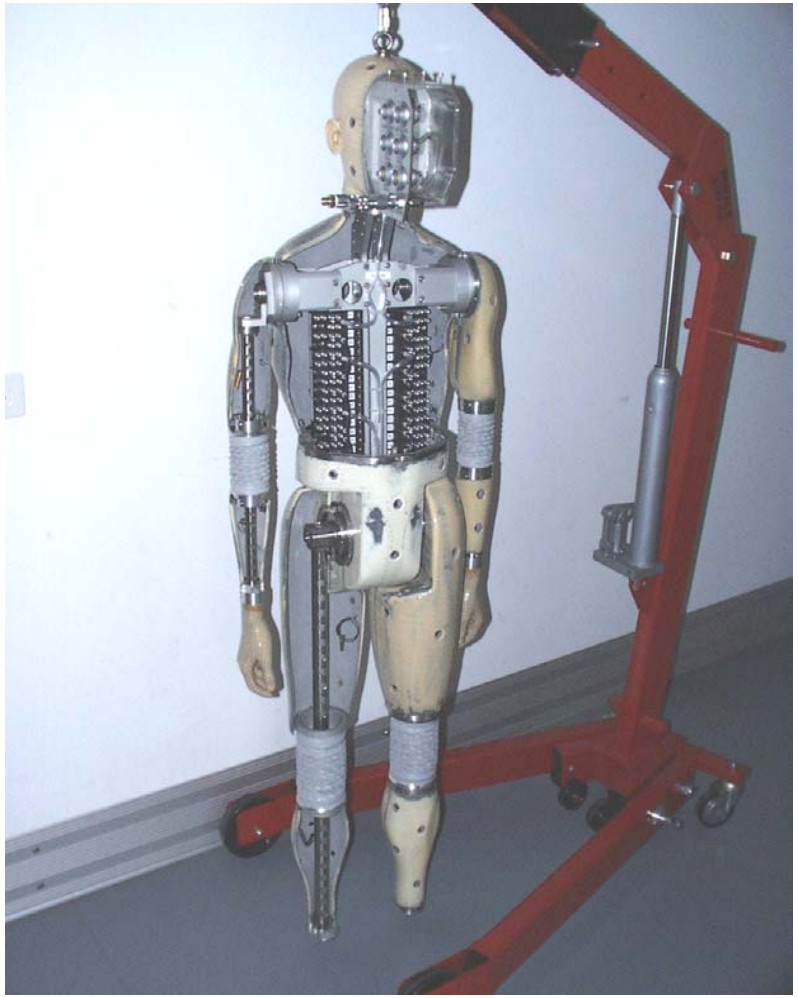
Sweating Articulated Manikin (SAM) by EMPA





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NOMEX® Comfort

Design for best Balance between Protection and Comfort

- **Finefibre of 1.4dtex enable manufacture of leight weight fabric with good textile hand**
- **Thermal Protection improved over NOMEX® III @ similar weight**
- **Permanent/inharent antistatic**
- **Very good moisture transport**
- **Excellent thermal insulation behavior**
- **Available in fabrics, woven, knitted fleece and in many colours**

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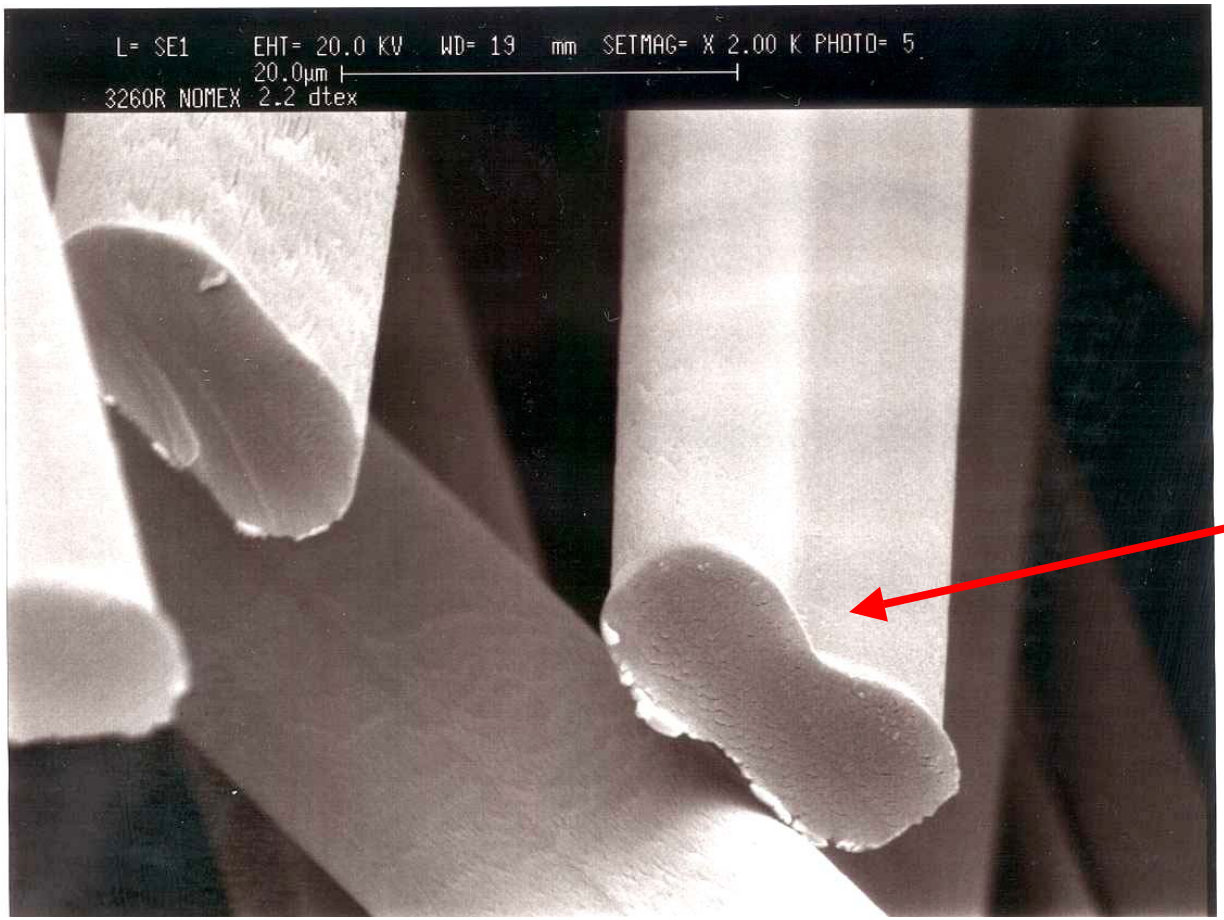
Fibre cross-section of NOMEX®



Capillary effect due to dog-bone shaped fibres

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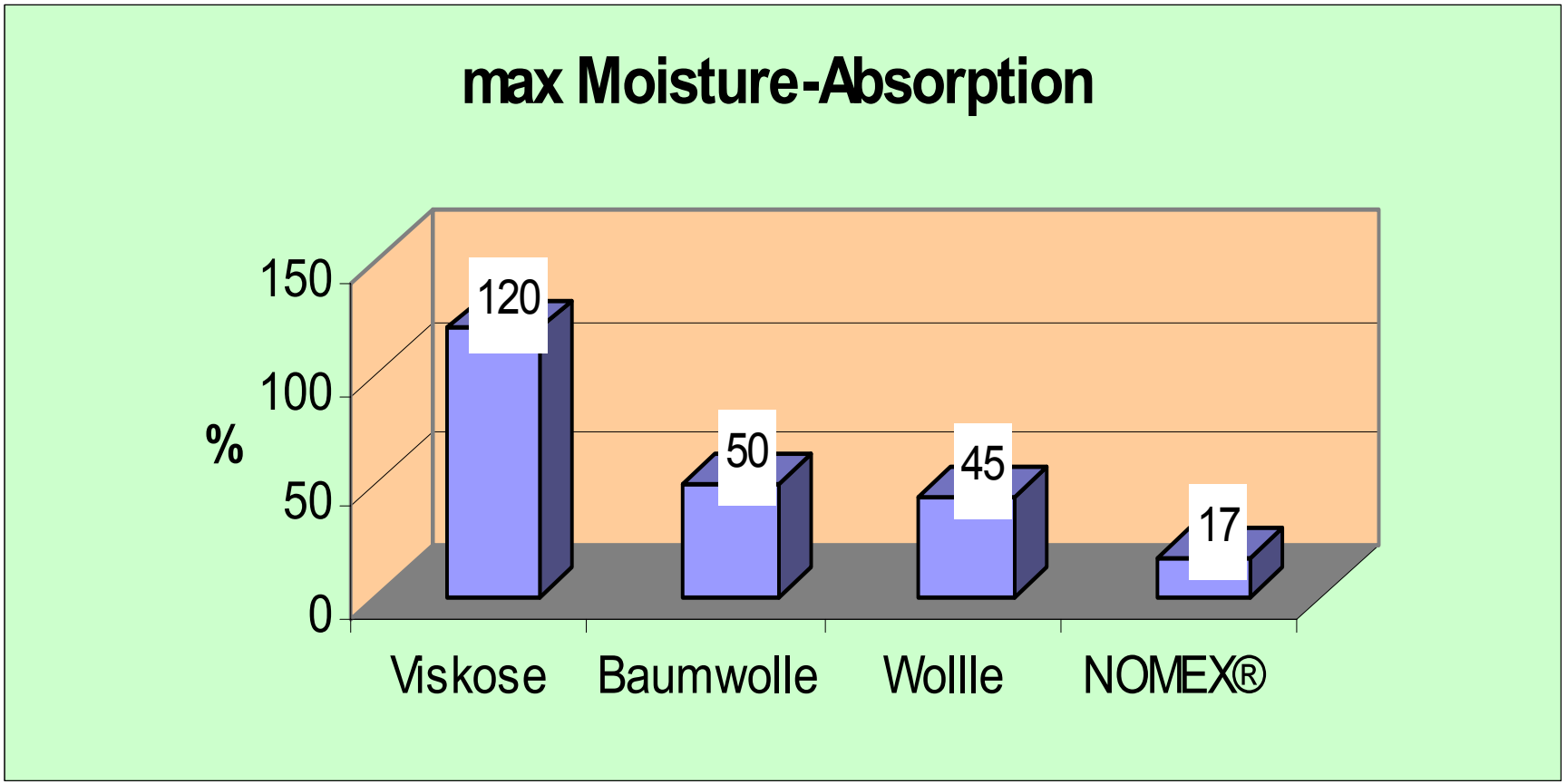

Very low moisture absorption leads to drier feel and limits the risk of steam burns.

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Comfort vs Heat-Stress

- Heavy exercise
- Hot environment, heavy equipment high concentration level
- Even small increases of body core temperature are dangerous
- 38°C- Reducing of clear mindset, 36% more errorneous decisions
- 39°C- risk to collapse
- 39.5°C - 50% possibly deadly effects
- **More Comfort leads to higher safety level and more efficicent work !**

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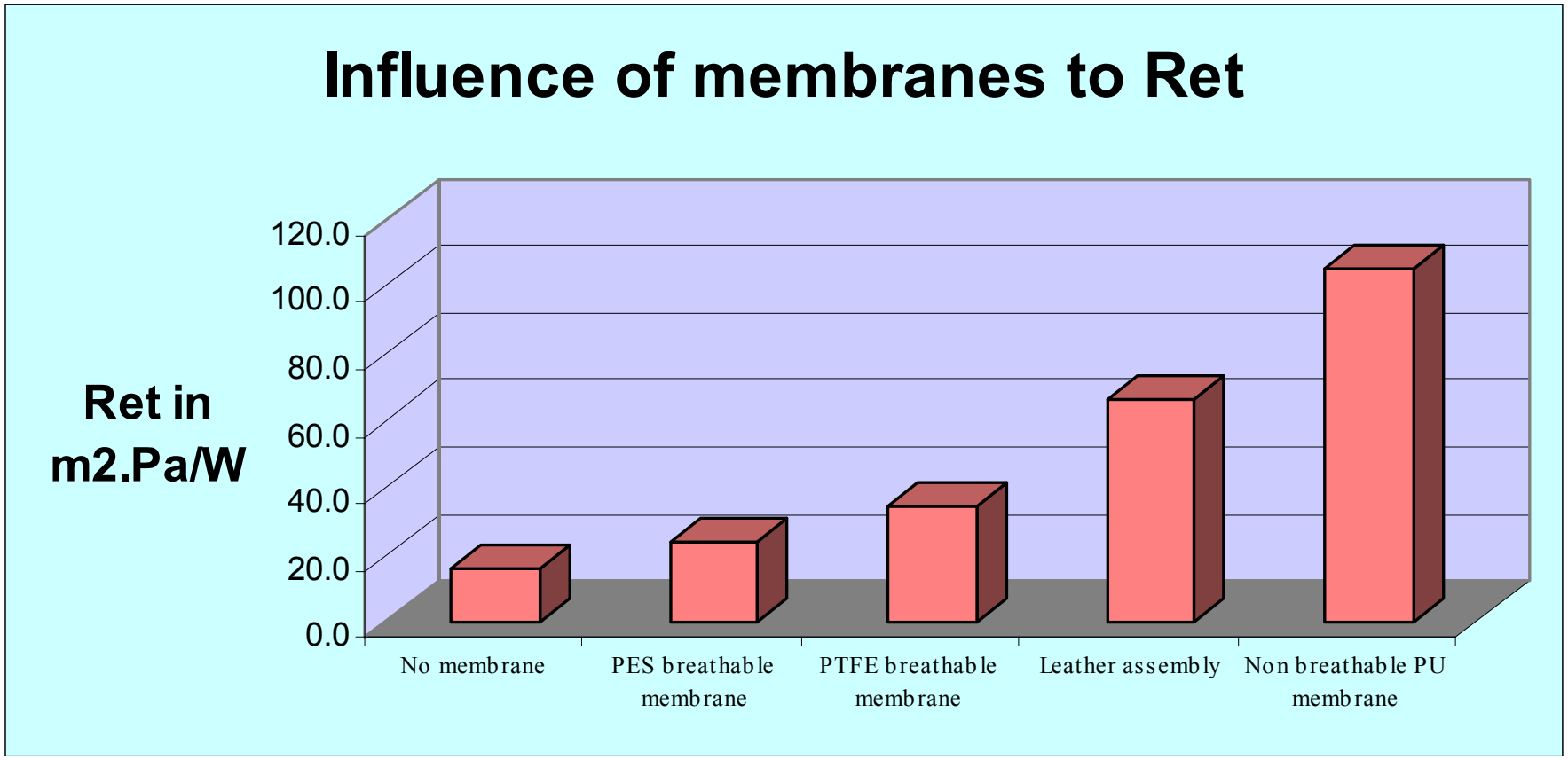
Influence of membrane on breathability



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Steam heat transfer test

Measures time to pain and 2nd degree burn against hot steam under pressure