Heat Pump Water Heaters: Path to Harmonisation of Test Standards:

Session 2: Existing Test Standards

Dr George Wilkenfeld

George Wilkenfeld & Associates

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This session

- Review test standards
- Common aspects
- Differences
- Conclusions about standards

Overview of 7 test standards

Country/Economy Test Standard (a)	**Physical testing**	**Derivation of COP/SCOP**	**Requirements in standard**	**Requirements outside standard**
Australia & New Zealand (b)	No draw-off (e)	Seasonal Performance modelled (but not reported as SCOP)	Proposed - MEPS, labelling standard under development	Voluntary – eligibility under Renewable Electricity Act
Canada (c)	Draw-off	EF calculated	Proposed – will impact HPWHs from April 2015	Voluntary – Energy Star endorsement energy label
China	No draw-off	COP calculated	Yes	No known program for HPWHs

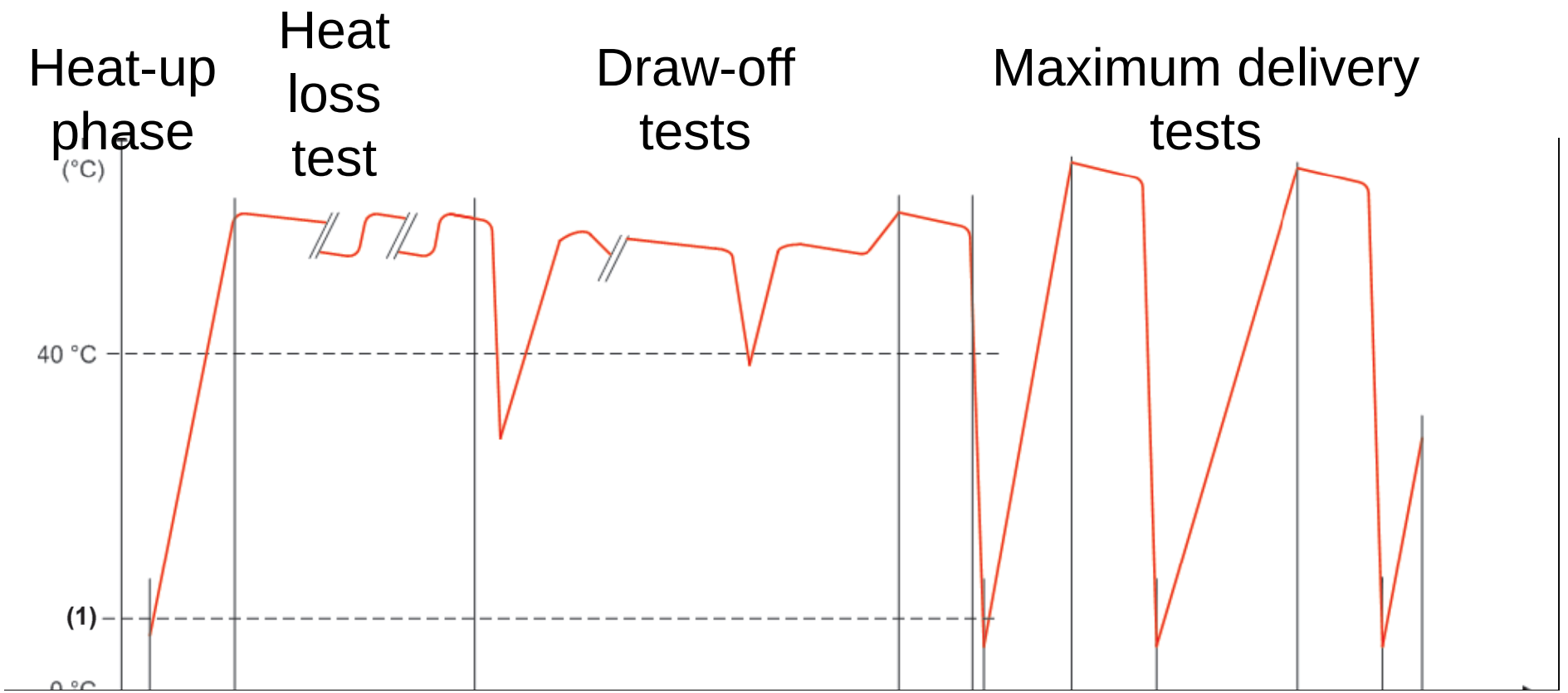
Overview of 7 test standards (continued)

Country/Economy Test Standard (a)	Physical testing	Derivation of COP/SCOP	Requirements in standard	Requirements outside standard
Europe (b)	Draw-off	COP calculated	No	Voluntary – Top Ten endorsement Proposed – mandatory energy labelling and MEPS
Japan	Draw-off	SCOP calculated	No	TopRunner standards
Korea (d)	No draw-off	COP calculated	No	No known program for HPWHs
USA (c)	Draw-off	EF calculated	Proposed – will impact HPWHs from April 2015	Mandatory – EnergyGuide label Voluntary – Energy Star endorsement energy label

Similarities

- All need a climate-controlled test room
- All specify the ambient conditions of test
  - » Air temp, humidity, inlet water temp
- All involve heating water from cold to hot
- All measure electricity used
- All measure thermal energy added to water

Typical test sequence



Key differences

- Definition of terms, categories, configurations
  - » Same products described differently in different standards
  - » Some test standards include dual-mode (space heating)
- Draw-off (or not), pattern/s of draws, flow rates
- Ambient test conditions (temp, humidity, airflow)
- Cold water temp, upper t/stat settings
- Instrumentation – number, placement, accuracy
- Whether elements are connected
- Heat loss/standby testing (or not)
- MEPS, safety, durability etc requirements

Efficiency can be determined as:

- Instantaneous COP
- COP (or EF) over the entire test period
- COP over a whole year
  - » Takes into account seasonal climatic changes
  - » Sometimes called ‘Seasonal COP’ or SCOP

Some observations

- A fairly dynamic picture:
  - » Korean standard under development
  - » AS/NZS test being revised to support MEPS
  - » EN test may be reviewed after ecodesign decision
  - » AHRI proposals to DOE for new US draw-off test
- May give opportunity to align some requirements
  - » E.g. converge on 7°C DB/6°C WB and 20DB/18WB
- Some standards have ambiguities, limitations
  - » EN test specifies different ambients for tank, evaporator
  - » AS/NZS test unclear on disconnection of elements

Conclusions on test standards

- Results from one test method cannot be used to predict results under other methods
  - » Data collection, calculation methods different
- No ‘one best’ approach – all have strengths and weaknesses
  - » Some more reproducible, others more realistic
- More test points better, but tests cost more
- No sequence of draws can represent actual use, but draws can give data for simulation