Progress with European sprinkler pump standards

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Introduction to FFSB

- Specialist engineering consultancy firm – Fixed Firefighting Systems:
  - Specification
  - Hazard review
  - Design review
  - Inspections

Also:

- Expert witness / failure / independent investigations
- Standardisation ***(in this case as a contractor/consultant to BRE Global)***

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Introduction to FFSB

- Specialist engineering consultancy firm – Fixed Firefighting Systems:
  - Specification
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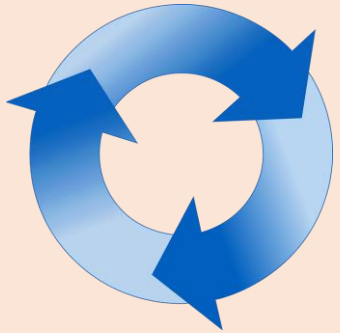
Preventative



Also:

- Expert witness / failure / independent investigations

after-the-event

- Standardisation

capturing knowledge & lessons learned

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Some background

- EN 12845 Sprinkler Systems may utilise pumps to provide pressure and flow to the system
- A **core objective** in designing sprinkler components and systems is **"RELIABILITY"** *(i.e. expected performance when required - CRITICAL)*
- Envisaged model is:
  - EN 12845 specifies **system** requirements (including for pumps)
  - EN 17451 specifies more detailed **sub-system** (pump set) requirements
  - EN 12259-12 specifies more detailed **component** (bare shaft pump) requirements

All intended to help optimise: Availability, Reliability and Maintainability [at the right price]

European committee for standardisation (CEN)

- Two CEN *Fixed firefighting systems* standards currently in development:
  - EN 12259-12 *Components for sprinkler and water spray systems - Part 12:* ***Pumps***
  - EN 17451 *Automatic sprinkler systems - Design, assembly, installation and commissioning of* ***pump sets***

Both are non-harmonised standards (no CE marking to these standards)
NOTE that CE marking to other standards may/will still be required

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European committee for standardisation (CEN)

- Objectives of CEN standards:
  - Some deal with safety only (i.e. is the product safe, rather than does it do what it needs to do)
  - Some deal with functional objectives only (i.e. does the product do what it needs to do, rather than safety of the product)
  - Some deal with both (to some extent)

  - **Can be confusing.** Be aware multiple Standards, Directives and Laws might be applicable.

EN 12259-12 Pumps

- Has been in development for a long time (~20 years!) [difficulty achieving consensus, difficulty with CEN processes]
- Applicable various types of pump:
  - end suction pumps (close coupled or long coupled) of the back pull-out type pump;
  - axial horizontal split case pumps;
  - ring section pumps;
  - inline pumps (vertical line shaft pump with inlet and outlet in line);
  - vertical turbine pumps;
  - multistage inline pumps;
  - multi stage-multi outlet pumps;
  - submersible motor borehole pumps.

EN 12259-12 – Pumps
What has been standardised?

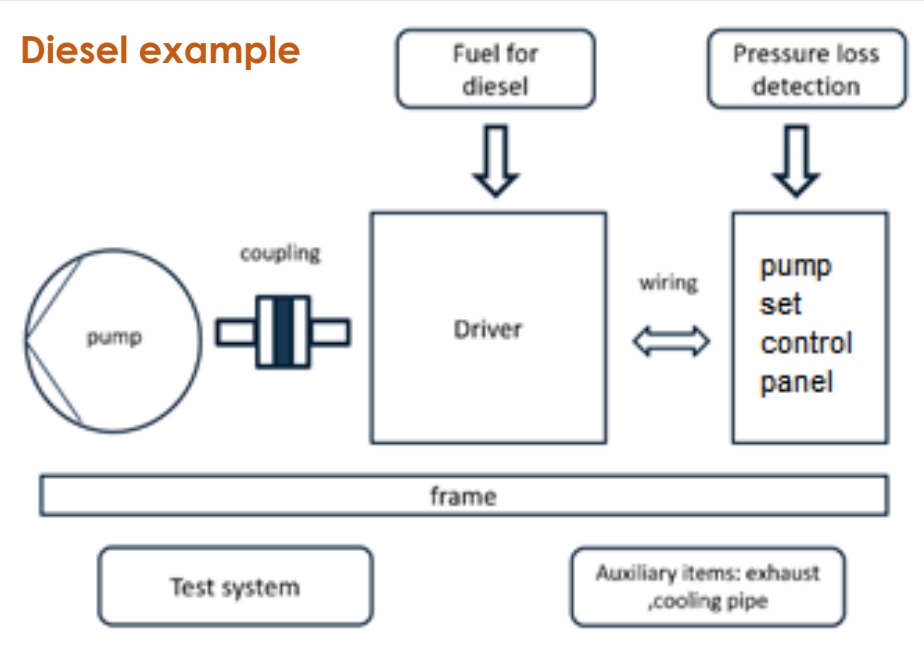
- Materials of construction
- Connection sizes
- Access for maintenance
- Methods of measuring hydraulic performance
- "Grade" of pump (tolerances of hydraulic performance)
- Temperature of test water
- Continuously declining pressure (as flow increases)
- NPSHr and power characteristic requirements
- Maximum rated speed (3600 rpm)
- Adequacy of closed head bypass cooling flow
- Casing strength
- Leakage resistance
- Shaft stress loadings (calculation review)
- Marking and data label
- Documentation

EN 12259-12 Pumps Summary

- A basic specification establishing some commonality and capturing some knowledge
- Is it perfect? Of course not
  - Expected to be supplemented by national/regional requirements in some areas for the foreseeable future
- Hopefully a good starting point for incremental improvement
- Next steps: Translation -> Enquiry (start ~2nd June 2022 close ~25th August 2022) -> resolve comments
  - ACTION (ALL): contribute to the Enquiry (if you wish)
- Long term: Are there any important knowledge / lessons learned that can be fed into future versions? (identify, resolving and agreeing will be the challenge)

Sprinkler pump sets

- A complicated sub-system



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Pump sets – experience

- Generally very reliable but there have been some failures:
  - Coupling failures, engine failures

    ⚠ Heavy metal parts ejected at speed ⚠
  - Problems with other components: control/panels logic, batteries (selection and chargers).
- Causes have included:
  - Cooling system problems
  - Maintenance
  - Alignment
  - Design problems
- Design philosophy is "run to destruction" in the event of a fire (i.e. functionality to preserve the pump set is secondary to fighting the fire)
- 30 min weekly test has the effect of making it much more likely that a failure (if any) will occur on test rather than in a fire.

EN 17451 Pump sets

- Complications to the standardisation process:
  - Some countries/specifiers prefer absolute minimal, basic configurations in pursuit of reliability
    - no Variable Speeds, no Circuit Breakers, no 'Black boxes', no Shared Power Supplies etc.
  - Some countries prefer to use more sophisticated functionality in pursuit of optimal design
  - Some countries prefer to use some but not others….
- Resolved by the introduction of various 'types' of pump set; then falls to the specifier to know what type they want (may not be easy and a potential contractual liability)

EN 17451 Pump sets

- Complications to the standardisation process:
  - Are we writing EN 17451 for:
    - EN 12845 (2015) + A1(2019) ? [the current EN 12845]
    - EN 12845-1 (20xx) ? [the future EN 12845]
  - There are some significant differences

  Currently we are trying to accommodate both (?)

Also: Where applicable, this standard can also be used for pump sets for other water-based fixed firefighting systems

EN 17451 Pump sets

What is covered in the standard?

- Definitions of key terms (and roles) e.g.
  - pump set installer
  - pump set manufacturer
- Fuel tank sizing
- Fuel tank low level drain (drain and fuel condition check)
- Basic water quality requirements
- Details of information to be supplied to the pump set manufacturer
- Pump (per EN 12259-12)
- Cooling system requirements (configuration and includes option to return water to tank)
- Maximum driver speed (3600 rpm)
- Coupling types (fail-safe: drive and rupture)
- Baseplate/mounting frame
- Control panels (shared functions, basic operating logic/functionality, alarm and fault signalling)
- Pressure sensing equipment specifications
- Electrical design requirements (Fuse or CB protected or VFD pumps)
- "Pump running" condition (derived from a pressure switch, as opposed to motor running)
- Batteries and chargers (types, sizes, independence location)
- Driver sizing (methods, temperature, altitude etc)
- Cables (sizing, shielding, routing)
- Engine Control Modules (ECM) (duplications, independence, fail-safe, logic)
- Testing and commissioning requirements (documentation, testing and handover processes outlined)
- Information material (Electrical start methods, installation and fixing, H(Q) consideraions)

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Timescales: 1st enquiry comment resolution, then 2nd enquiry, then resolution….

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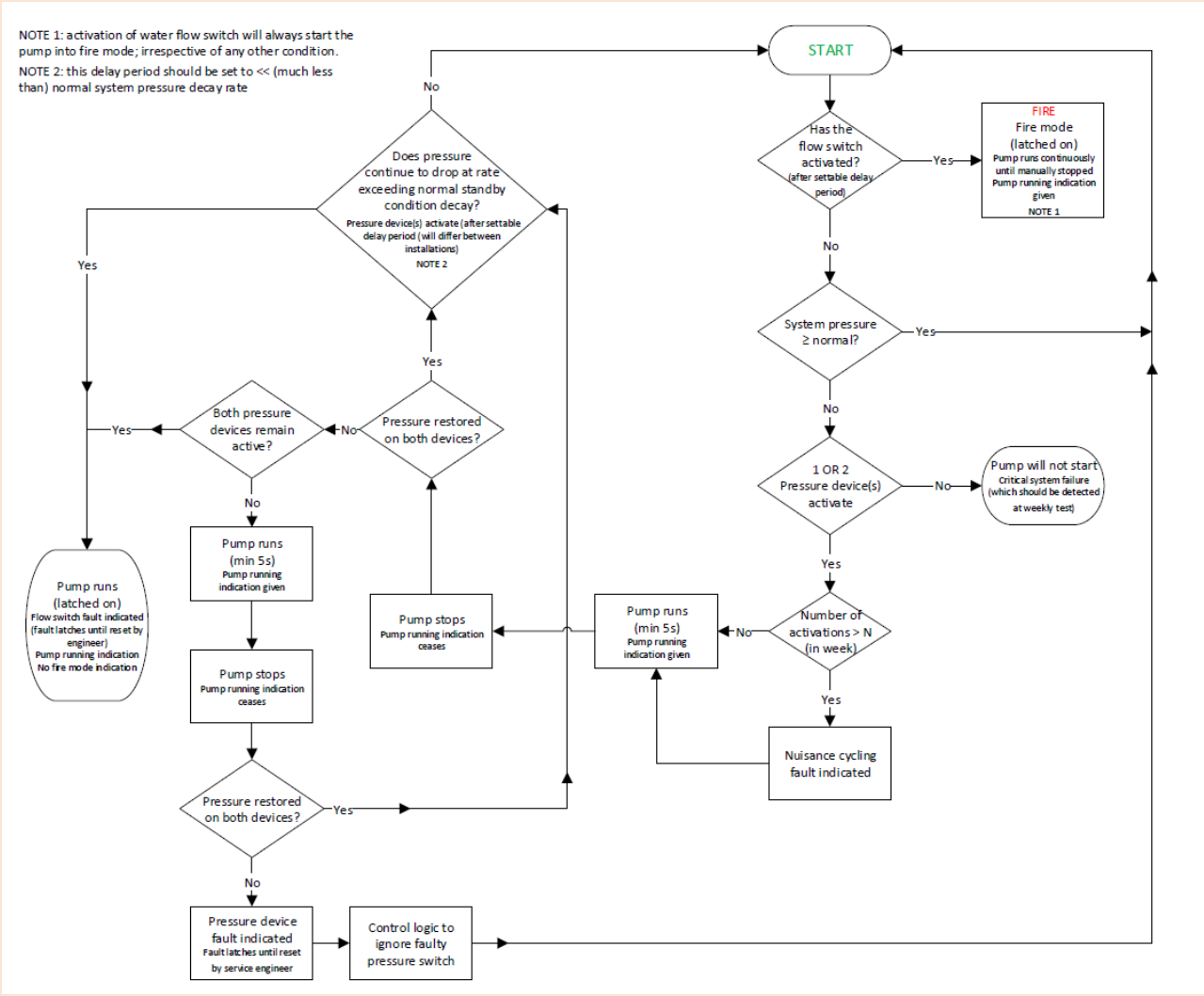
BRE Global / LPCB LPS 1667

- A pump set standard for Domestic and Residential sprinkler systems
  - EN 16925
  - BS 9251:2021
- These are different/complicated because they include automatic start/stop functionality (self-testing)

Example of the required prescribed operating logic (start / stop control)



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Conclusions

- Two detailed pump standards are in preparation at CEN:
  - These are the 1st versions; this is a long term strategy
  - Repositories for knowledge about best practice
  - Should be updated with new lessons learned and updated practices as they emerge
- Other private standardisation initiatives are afoot, which support innovations.
- They exist to help balance the equation of "cost vs performance" *[will it work in a fire and it is reasonably affordable, for what it is?]*

END

Thank you

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