Fluid systems and components for general use – Conclusion session

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HL-LHC Standards and Best Practices Workshop (11-13 June 2014)

The HiLumi LHC Design Study is included in the High Luminosity LHC project and is partly funded by the European Commission within the Framework Programme 7 Capacities Specific Programme, Grant Agreement 284404

Field global overview

Source: INTERNATIONAL CLASSIFICATION FOR STANDARDS, 2005 (ISO)

23 FLUID SYSTEMS AND COMPONENTS FOR GENERAL USE

**Measurement of fluid flow, see 17.120*

23.020 Fluid storage devices
**Small containers for transportation of fluids and bulk materials, see 55.140*
**Storage devices for petroleum products and natural gas, see 75.200*

23.020.01 Fluid storage devices in general
23.020.10 Stationary containers and tanks
23.020.20 Vessels and containers mounted on vehicles
**Tanker trucks, see 43.080.10*
**Tank wagons, see 45.060.20*
**Tankers, see 47.020.85*
**Small containers for fluids, see 55.140*
23.020.30 Gas pressure vessels, gas cylinders
**Steam pressure vessels, see 27.060.30*
**Steel for pressure purposes, see 77.140.30*
23.020.40 Cryogenic vessels
23.020.99 Other fluid storage devices

23.040 Pipeline components and pipelines
**Pipeline components and pipelines for petroleum products and natural gas, see 75.200*

23.040.01 Pipeline components and pipelines in general
23.040.10 Iron and steel pipes
**Steel pipes and tubes for specific use, see 77.140.75*
23.040.15 Non-ferrous metal pipes
**Non-ferrous metal pipes and tubes for specific use, see 77.150*
23.040.20 Plastics pipes
23.040.40 Metal fittings
23.040.45 Plastics fittings
23.040.50 Pipes and fittings of other materials
23.040.60 Flanges, couplings and joints
23.040.70 Hoses and hose assemblies
23.040.80 Seals for pipe and hose assemblies
23.040.99 Other pipeline components

23.060 Valves
23.060.01 Valves in general
23.060.10 Globe valves
23.060.20 Ball and plug valves
23.060.30 Gate valves
23.060.40 Pressure regulators
**Including pressure-reducers*
**Protection against excessive pressure, see 13.240*
23.060.50 Check valves
23.060.99 Other valves

23.080 Pumps
**Pumps for fluid power systems, see 23.100.10*
**Vacuum pumps, see 23.160*

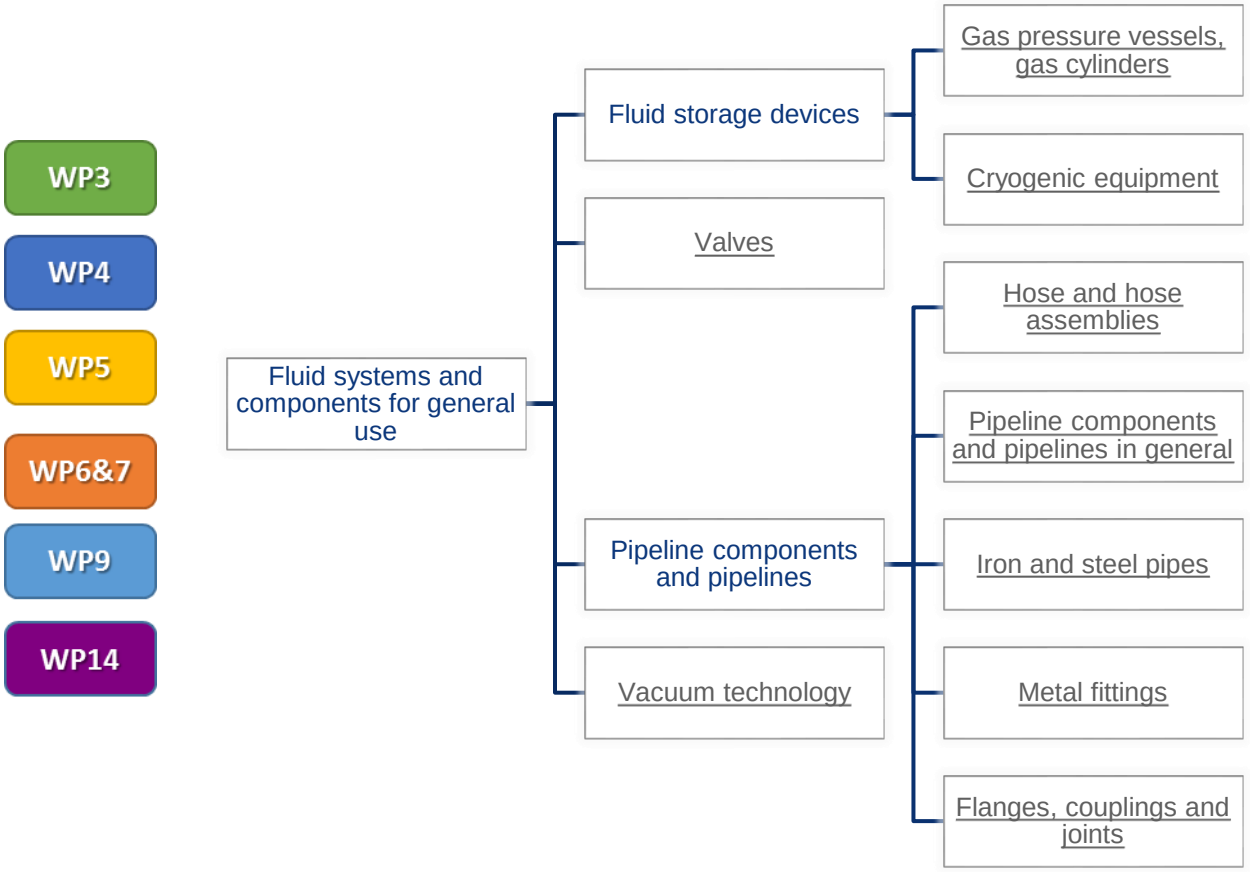
23.100 Fluid power systems
23.100.01 Fluid power systems in general
23.100.10 Pumps and motors
23.100.20 Cylinders
23.100.40 Piping and couplings
23.100.50 Control components
**Including valves*
23.100.60 Filters, seals and contamination of fluids
**Hydraulic fluids, see 75.120*
23.100.99 Other fluid power system components

23.120 Ventilators. Fans. Air-conditioners
**Marine ventilation and air-conditioning systems, see 47.020.90*
**Mining ventilation and air-conditioning systems, see 73.100.20*
**Ventilation and air-conditioning in buildings, see 91.140.30*

23.140 Compressors and pneumatic machines
**Compressed air, see 71.100.20*

23.160 Vacuum technology
**Including vacuum pumps*

Identified specific groups



Global overview
EDMS: 1376815

Which technical subjects, within the fluid systems field, should be covered by standards (existing or not)?

1. Technical groups/sub-groups field related
2. Specific know-how and best practices related
3. Standardization related
4. General/project coordination related
5. Other subjects (not field related)

1) Technical groups/sub-groups field related

- Cryogenic pressure vessels (incl. cryostats)
- Pipelines (incl. cryogenic lines, piping in valve boxes and cryostats)
- Pressure fittings
- Flanges, couplings and joints
- Valves
- Vacuum technology
- Final testing of pressure equipment
- ASME BPVC vs EN 13445 for the construction of pressure equipment – a few discussions
  - Both codes are acceptable. EN 13445 has the advantage of providing presumption of conformity with PED Essential Safety Requirements
  - Consistent use of one single code from design to manufacturing and testing is required (complemented eventually by more stringent requirements specified by CERN for specific cases)
  - If PED is applicable
    - Notified bodies have to be involved from the beginning to provide assistance on the conformity assessment and for CE-marking of the equipment (case of risk categories ≥ II)

2) Specific know-how and best practices related

- Bellows / flexibles hoses requirements for standard, and non-standard, applications (e.g., using non-standard materials – Ti – and specific types of bellows – edge welded)
- Sizing of safety devices for cryogenic equipment
  - Protection of cryogenic volumes + vacuum jacket
  - Two-phase flow discharge (e.g., inlet supercritical conditions)
- Cleanliness requirements for different types of equipment
- Welding of cryogenic equipment (welding techniques specified in standards are not adapted to cryogenic applications, e.g., lip-welding)
- Qualification of non-standard materials for low temperature applications (minimum guaranteed mechanical properties, etc)

3) Standardization related

- Standardization of components (reduce variants)
  - Valves
  - Pumps
  - Vacuum components
  - Flanges types – standardization between US-EU
  - Fittings
  - Vacuum sealing of static vacuum insulated equipment
- Interfaces types limitation

4) General/Project coordination

- Top-bottom system requirements propagation and bottom-top verification of compliance is needed
  - Avoid over constraining a system (examples)
    - Baking (for vacuum): the equipment with the minimum heating speed constrains the operation/conditioning of the whole sector
    - Cooling water installations: cooling temperature defined at 10°C for one small client while all the other clients require only 25°C ! -> big impact on global price
  - System overview is required to identify discrepancies on limiting, sizing, testing, operation, values
  - Definition of relevant parameters (not only beam related) to be validated by top management → parameters derived from beam requirements and that impact variables such as, for example, pressure, temperature, mass-flows, heat loads, required to perform the design of systems, sub-systems and equipment
  - Define key performance parameters for acceptance of systems (at top-level)
- Interfaces and corresponding interface data identification is required
- Management of the information of the equipment in view of operation and maintenance (as-built documentation, main parameters, operation and maintenance manuals,…)

5) Other subjects (not field related)

- Guidelines for equipment handling
- Space constraints
  - Environment around the equipment (survey, alignment, removable collimators…)
  - For remote handling
- Standardization between experiments and HL-LHC
- Standardization on remote handling
- Factory acceptance criteria
- Site acceptance criteria
- Commissioning tests

Thank you for your attention
and to all who contributed to the discussions:

L. Alberty, G. Apolunari, V. Baglin, A. Ballarino, I. Bejar Alonso, Y. Body, O. Capatina, S. Giannelli, R. Carcagno, L. Dassa, J. Gascon, M. Juchno, Y. Muttoni, S. Pattalwar, G. Perinic, O. Pirotte, F. Sanchez Galan, G. Volpini, Z. Zaharieva

Questions?