Large Dripless Interoperable Quick Connectors

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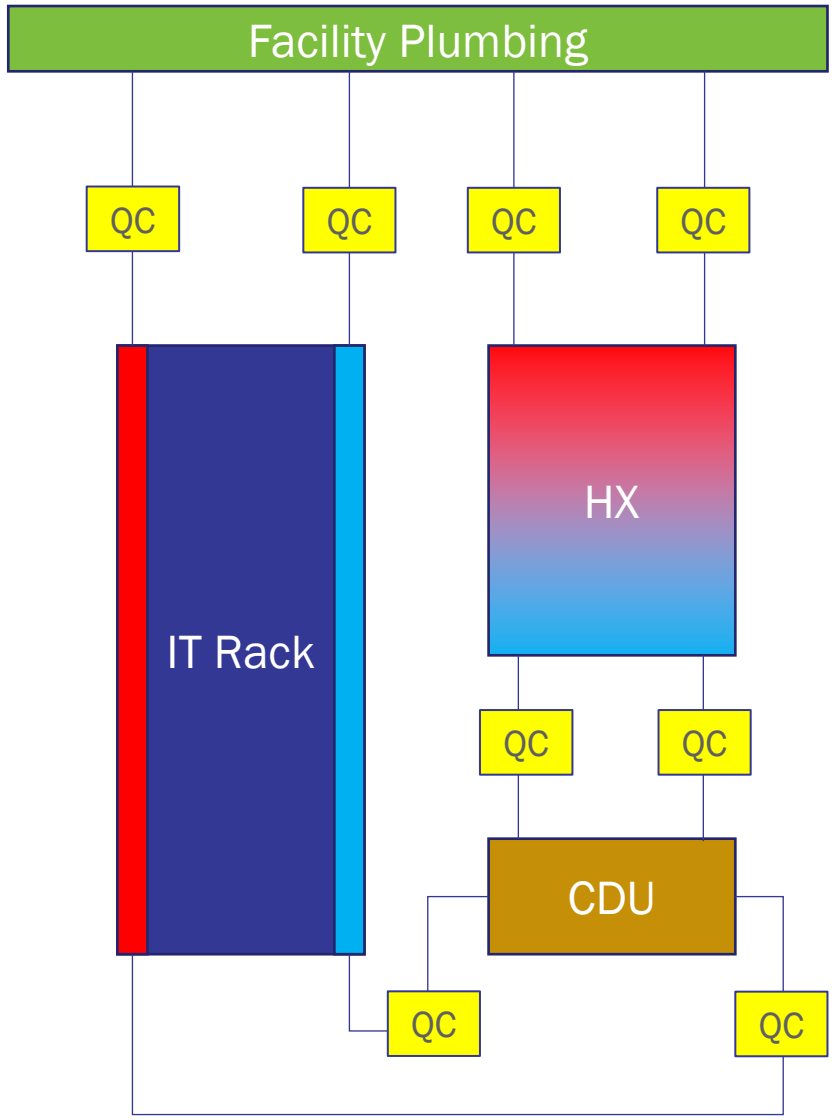
OPEN Compute Project®

Partners

Goal

- Develop large dripless quick connector spec that can be used by multiple vendors
  - *No interoperable QCs exist in ~1” size*
- Maintain vendor specific inner valve designs and IP, set valve and outer mechanism for interoperability
- Connection between IT gear manifold → CDU →heat exchanger → facility plumbing

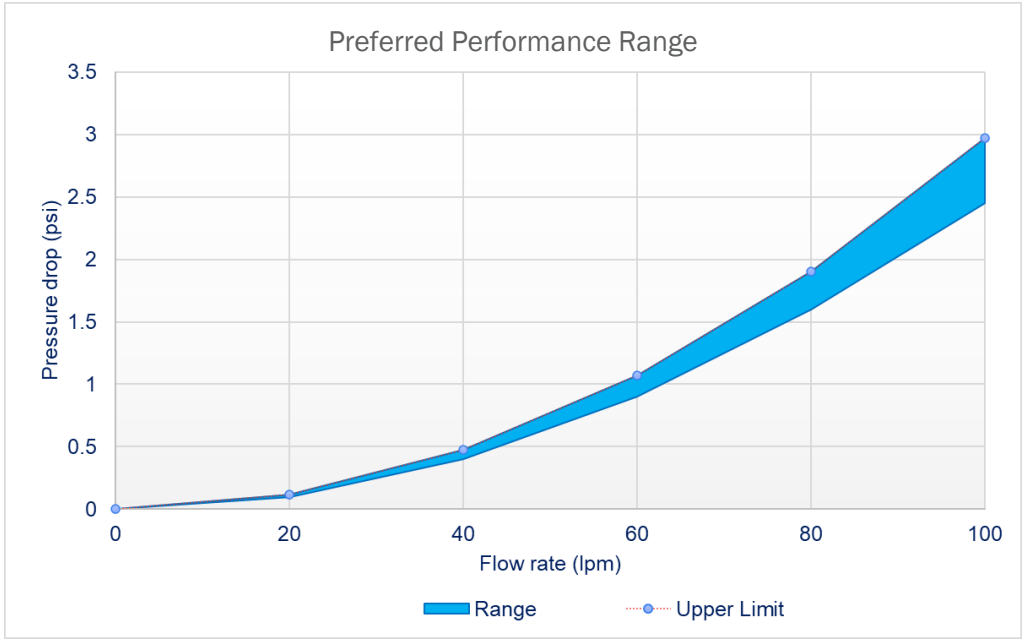


Basic Requirements

- 1” flow diameter
- Interoperability: internal valve and outer mechanism
- Low mate force/torque
- Common end termination
- Drip free
- Wetted materials compatible with PG25

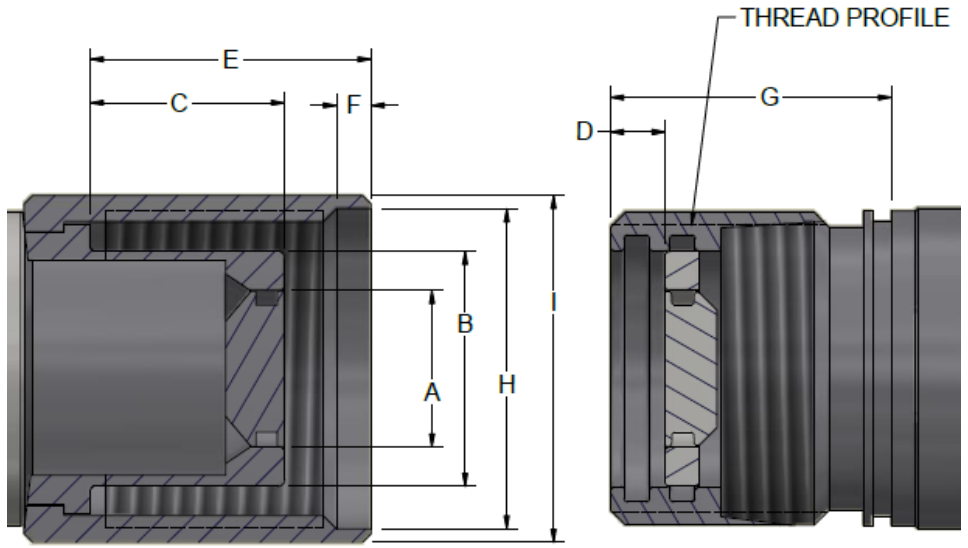
Basic Requirements

- Working pressure: 35psi @ 60C, 175psi max
- Temperature: 60C max operating, -20C to 70C non-operational
- Max flow rate: > 100 LPM
- Spillage: < 0.15 mL per connect/disconnect
- Air Inclusion: < 0.1 mL per connect/disconnect
- Max force to mate: < 175 N
- Max torque to mate: < 4 Nm



Design

- Internal valve interface dimensions agreed upon while leaving other details up to suppliers
  - Similar to existing valve interfaces
- Decided screw to connect mechanism would be most ergonomic and lower mate force required
  - Tested different thread pitches and profiles to determine best balance of turns and mate force

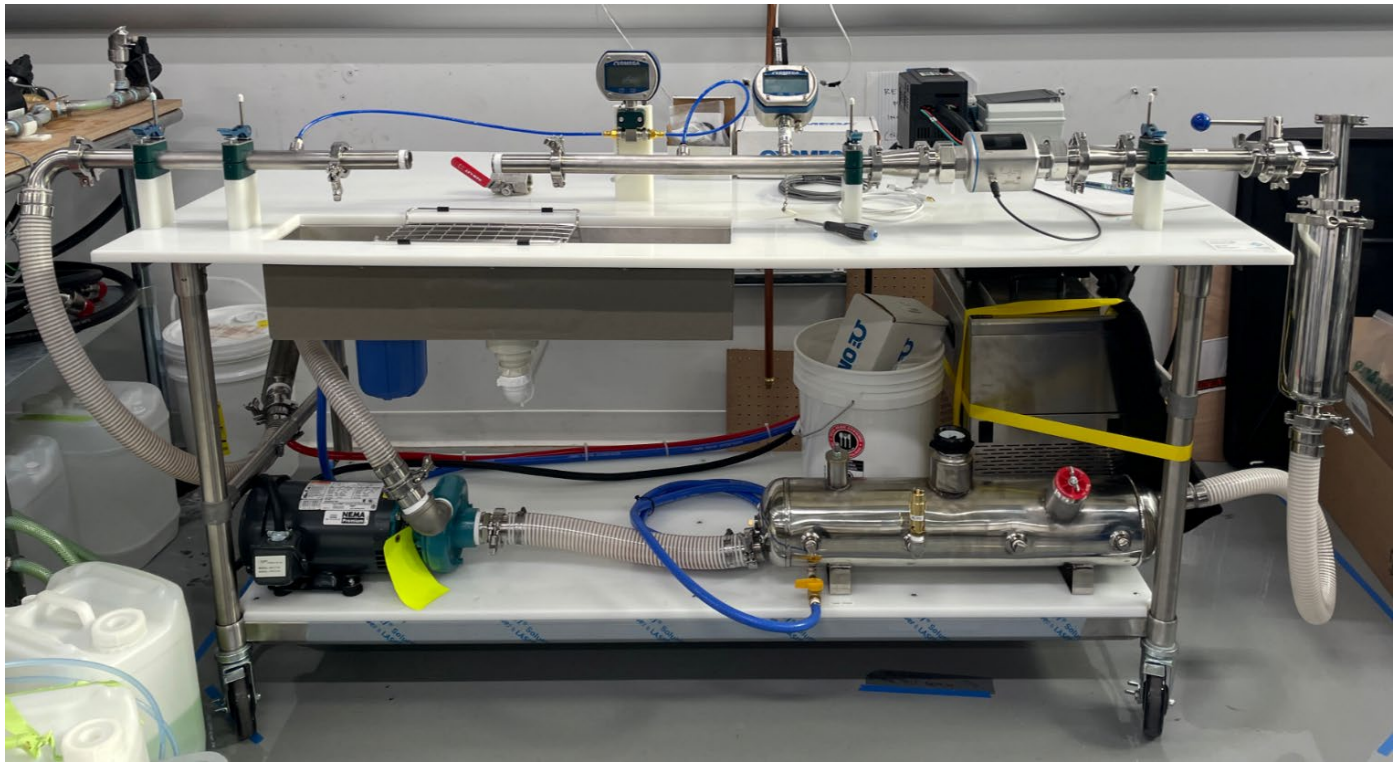


Prototyping & Testing

- Team agreed on preliminary spec and built prototypes
- Meta built flow impedance test fixture to evaluate valves and interoperability between vendors
- Lessons learned from first round of testing being applied to second round of prototypes:
  - *Tuning thread profile for easier mating*
  - *Consensus on end terminations*
  - *Material choices for compatibility and ease of manufacturing*

Prototyping & Testing

Working on bringing in all supplier valves to controlled range of outer dimensions



Flow impedance test fixture: tests pressure drop with different valve combinations as a function of system pressure and flow rate

Next Steps

- Ongoing: Complete Round 1 flow and mate force testing
- Q2 ‘22: Design freeze for Round 2/EVT
- Q3 ‘22: Test EVT samples and validate performance
- Q4 ‘22: Confirm test results and finalize spec
- Q4 ‘22: Contribute spec to OCP
- Early ‘23: Mass production

Call to Action

Join the mailing lists

- Advanced Cooling Solution: https://ocp-all.groups.io/g/OCP-ACS

Project Wiki:

- Main ACS Wiki