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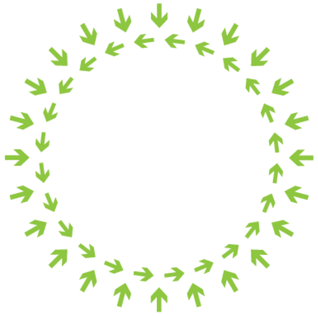
ACS Immersion Standards

Rolf Brink, Immersion stream leader, OCP



ACS Immersion goals

Define standards to allow immersion technologies in OCP

Most immersion technologies are unique in shape, size and solution approach

Standards must be inclusive to most solution types

Prevent limitations on new innovations

Contributors

Rolf Brink, Asperitas

Jessica Gullbrand, Intel

Nigel Gore, Iceotope

John Bean, Schneider Electric

Rick Payne, Flex

https://docs.google.com/document/d/1gsil4JE8BFKZEXUTiCmoJODc69q_UkqCVP1lq1CfO5k

ACS intention:

No recommendations

Minimum requirements for OCP

In-depth session from 3:30pm onward

Technology differentiation

Single phase

- Hydrocarbons
- Fluorocarbons

Dual phase

- Fluorocarbons only

Characteristics

Design considerations

Technology styles

Immersion styles

- Enclosed chassis
- Open bath
- Hybrid

Related characteristics

Cooling circuit

- Direct or closed secondary

Connection types

Requirements

Certification compliancy (UL/FCC/CE etc.)

Safety

- Safety for **non-skilled** operator
- Maintenance accessibility

Liquid management

- Risk assessment and management
- Liquid containment standards (chemical industry!)

Feature classification compliancy

Defined/specified feature packages

- Standard (minimum requirements)
- Thermal optimized
- High safety

Upcoming classifications to be defined:

- Serviceability

DCIM/Redfish integration

Statistics reporting (facilitate logging)

Alarming

Control setpoints

Solution description specs

- Style
- Solution type
- Liquid category
- Liquid type
- Feature compliancy

Comparable metrics based on SI

Density per square meters: kW/m^2 @ #°C

- Compute density
- Solution density
- Solution footprint
- ***ASHRAE W3 solution footprint:** kW/m^2 @ 32°C

Power/fluorocarbon volume (kW/m^3)

Facility design information

- Static load, height clearance, dT, cooling tolerance, etc.

Other data

Non-IT power/kW

Non-IT power overhead

Thermal loss to air

IT chassis type

Chassis size

IT brand compatibility

Dielectric requirements

Property	**Minimum req**	**Common**
Dielectric strength over lifetime	**>3 kV/mm (air)**	>30 kV/mm
Flash point	**>150°C**	>200°C
Fire point	**>200°C**	>250°C
Auto ignition point	**>250°C**	>300°C
Odour (unsealed solutions only)	**None**	Slight
Sulphur content	**<0,01 ppm**	<0,001 ppm
Safe handling training level	**Novice**	Varying
Classification	Equal or less than H304 *(May be fatal if swallowed and enters airways)*	Equal or less than H304

Required documentation

Liquid

- Full specifications (see standards document)
- MSDS & TDS
- Liquid management procedures
- Fire management procedures

Solution

- Certification compliance documentation (UL, FCC,CE etc.)
- User & Service manual

Upcoming ACS Immersion activities

IT Gear

- Design guidelines for IT
- Liquid compatibility
- Thermodynamics
- Immersion components
- Future designs

Immersion systems

- New technology reviews
  - Solutions
  - Liquids

Industry standards optimization

Documents

Submitted spec

https://docs.google.com/document/d/1gsil4JE8BFKZEXUTiCmoJODc69q_UkqCVP1lq1CfO5k

Change/update suggestions

https://docs.google.com/document/d/1vXaiFskJUy1zsOZZ8OsPFXnQw4xF08ZLYOlRiftcpc0

Standards refresh schedule each 6 months

In-depth session from 3:30pm onward

ACS – Immersion workstream

Join the immersion workstream and contribute!

Docs: https://www.opencompute.org/wiki/Rack_%26_Power/Advanced_Cooling_Solutions

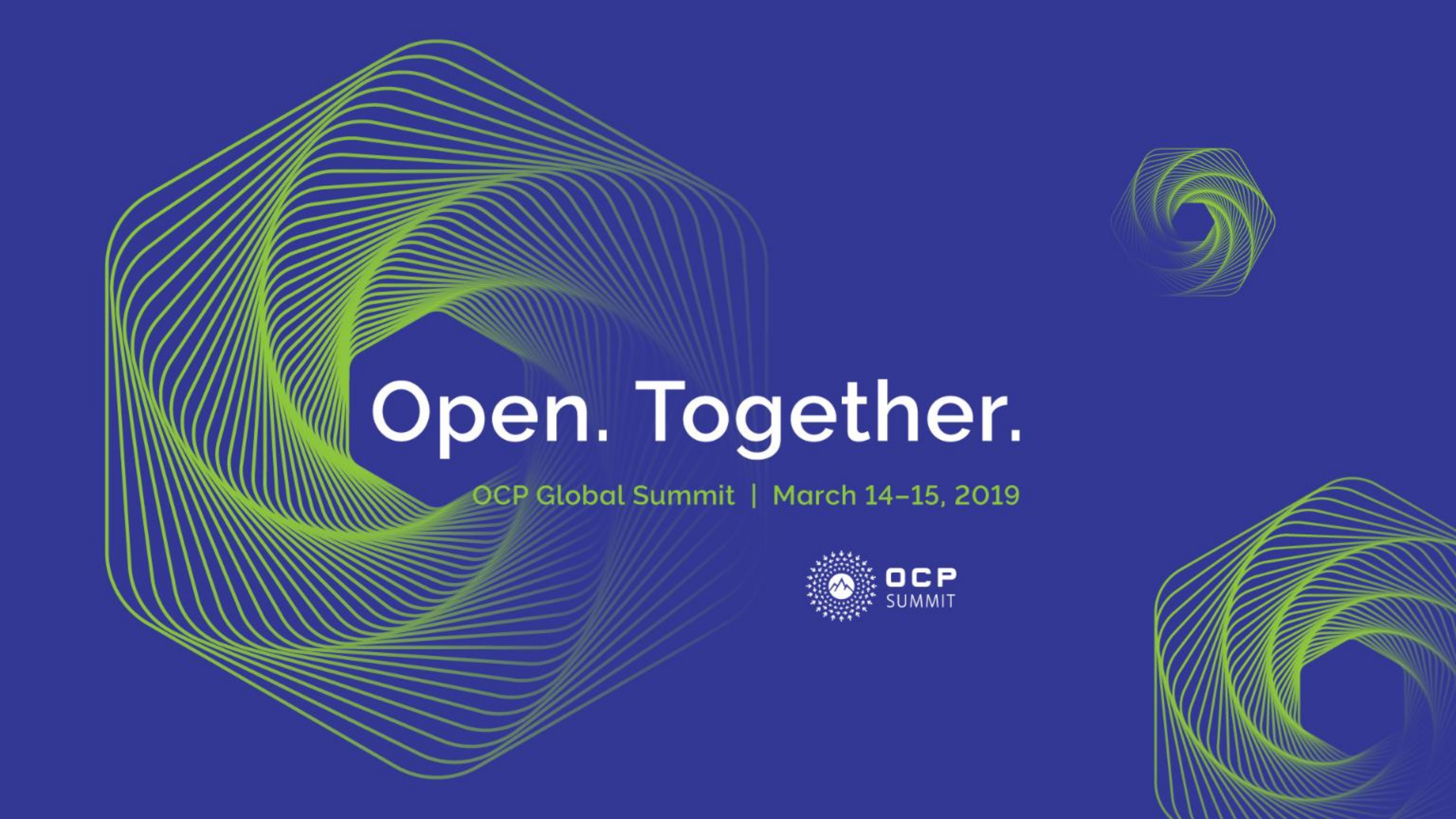
Mailing list: http://lists.opencompute.org/mailman/listinfo/opencompute-acsimmersion

Email: Rolf.Brink@OCProject.net

Bi-weekly, 10:30-11:30am ET, (next call March 19th)

Reschedule coming up

Next project: IT Gear specs, guidelines and best practices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