

# SCM LABORATORY/ TEST

Presentation Systèmes et Connectique le Mans



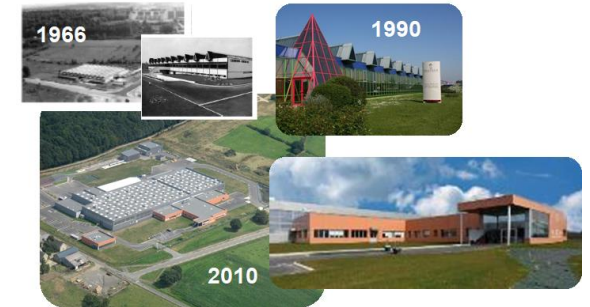
**SCM**

Systèmes et Connectique du Mans

# SCM: soon 100-year story

- 1925: Creation of Carrier Kheops
- 1976: Acquisition of BAC expert in Power
- 1981: Railway connectors
- 1990: CKB acquired by Deutsch
- 2001: Start of Oil & Gas business
- 2012: TE Connectivity acquire Deutsch
- 2021: Creation and takeover of SCM

**CKB**  
CARRIER KHEOPS BAC



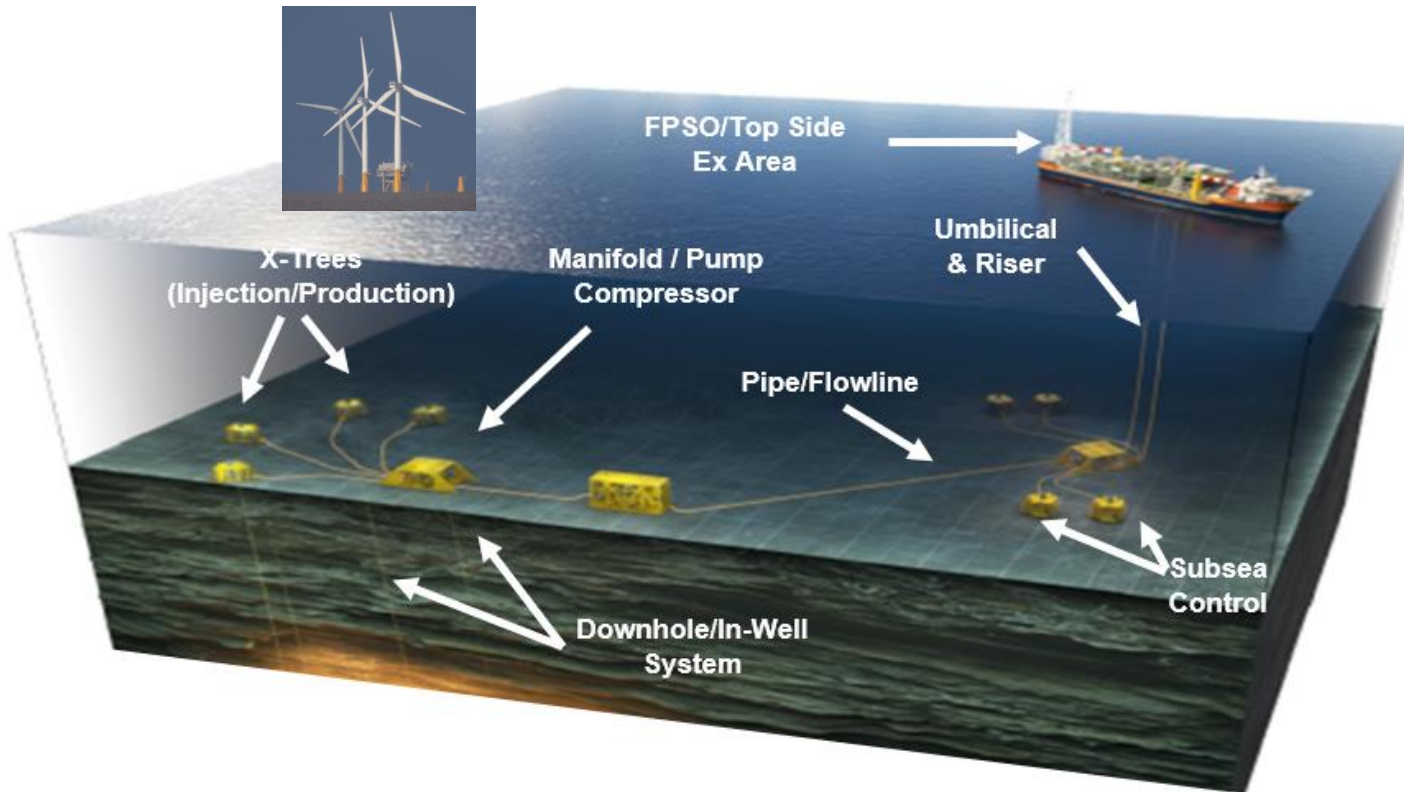
**TE**  
connectivity



**SCM**  
Systèmes et Connectique du Mans

# SCM Products

**Dual segmentation:** By area (Topside / Subsea / Downhole)  
By technology (Power / Optical / Signal)



## Key Customers applications

Reservoir research

FPSO Buoys  
Risers  
PLET / UTAs  
Flying leads

XMT  
Boosting & Compression  
Flow assurance  
Energy distribution  
Renewables

Reservoir monitoring

## SCM Products

Signal / Optical

Signal / Optical / Power

Signal / Optical / Power

Signal

# World Class Facility

- **Fully integrated operations**

- Certified & committed to safety & sustainability
- Large capacity 14,400m<sup>2</sup> (155,000sq.ft.)
- From Raw material to installed & commissioned products



- **Manufacturing:**

- Machining: 22 CNCs
  - Copper, SS & exotic alloys
  - 250+ material ref. in stock
  - Lathes w/ bar feeders
  - Milling centers
  - Electrical Discharge Machine
  - Thermal Treatments
  - Integrated Metrology
- Molding
  - Injection Press (PP, PA, PEEK,...)
  - Compression
  - LSR
- Fabrication & Testing
  - Clean rooms for <10g products
  - To 60m+ / 1tons+ Jumpers
  - 3 Oil treatment & filling Stations
  - Dedicated FAT vessel & ancillaries

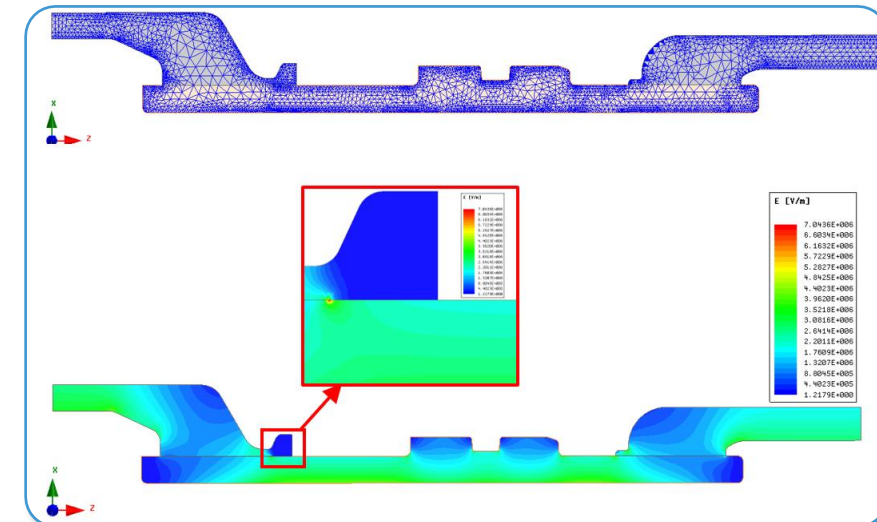
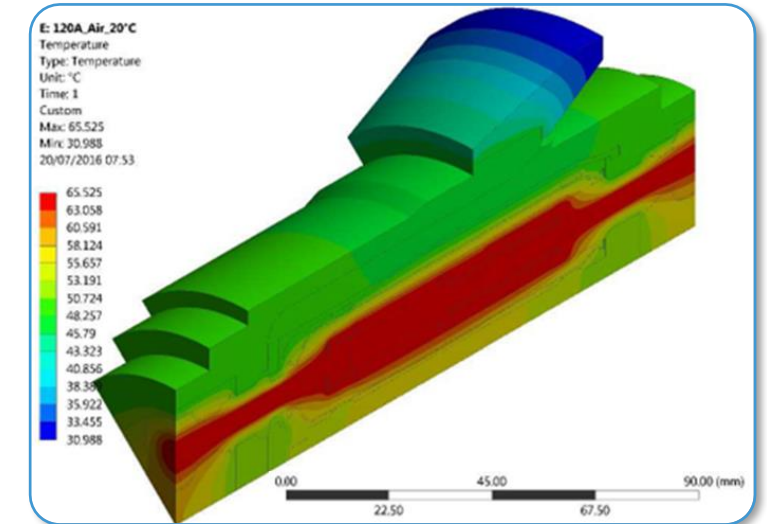




# World Class Engineering & Testing

## Full capability for Product development & Qualification

- Proven track record in product development for Harsh environment
  - MV/HV Connectors, penetrators, splices & terminations
  - Signal Connectors: controls, heating, sensing
  - Optical products: sensing & communications
- 16 people in Product Development w. combined 195 Years experience
  - In-house numerical analysis
  - In-house industrialization from raw material to installed product
- On-site Qualification Testing
  - Pressure Testing: 20 units up to 2500 bars from -20°C to +200°C
  - Electrical testing up to 2000A & 200kV, w/ Faraday Cages
  - Optical Testing: SM & MM OTDRs, Power Sources & Meters incl. micro cut detection
  - Mechanical testing: tensile, torque, endurance, IPK
  - Salt spray testing & Thermal chambers -50°C to +200°C
  - Material Testing & Analysis



# Vision: Why, How, What?

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- Help reduce Green House gas emissions.
- Provide energy providers solutions for their energy transition through their « **low carbon electricity** » programs and develop **obsolescence** management.
- Leverage strong track record in **harsh environment (P, T °, high voltage...)** on gas compression and pipe heating.
- Become a European independent Leader for the design and manufacture of signal & power interconnexion and transfer systems by 2025 for energy transfer and transportation.
- Diversification (Rail, MilAerospace, Military, Energy...) via Agents and partners

# SCM LABORATORY/ TEST

Presentation Laboratory



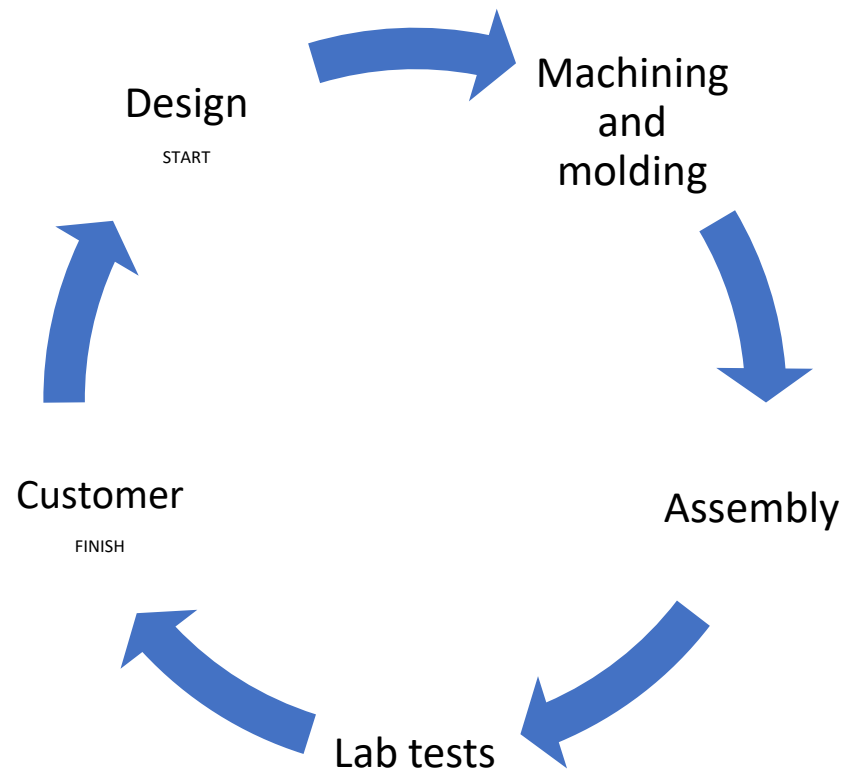
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# Laboratory overview

SCM design, engineers, manufactures, tests, and installs Connection Systems for Harsh Environment. Our product range covers Optical, Signal and High Voltage Connectors for a variety of applications: Subsea, Offshore, railway, explosive atmospheres, nuclear...

The laboratory is one of the key to valid design and insure reliability of the manufacturing process.

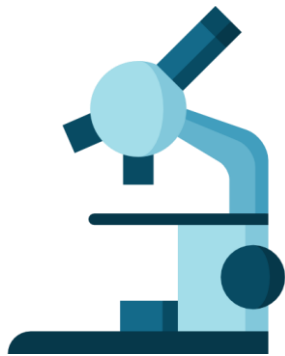


- Tools and interface design
- Editing the test procedures
- Qualification and FAT tests
- Report



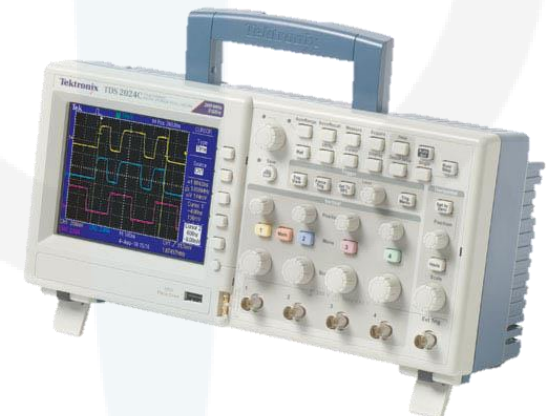
# Laboratory organization

- A workshop of 1000 m<sup>2</sup> and an office of 100 m<sup>2</sup> with access control.
- An outdoor test platform for the big pressure vessel and the gaz equipments.
- 2 engineers for the tool design and the writing of the test procedures.
- A team of 13 technicians for the product qualifications and the FAT.
- Equipments that meets current standards.
- ISO 9001 quality system and HSE policy.
- Formations and regulatory approvals.



# Acquisition and signal analysis

- Several sensors to record temperature, humidity, voltage, current, load....
- Reliable DAQ for long recording periods.
- High frequency acquisitions for transient signals.
- Isolating sensors for HV environment.
- Various oscilloscopes.



# Optical performances capacity

- OTDR SM and MM. IL and BR measurement at 0.1 dB accuracy.
- Optical sources SM et MM for continuous measurement.
- High Speed Multichannel Optical Power Meter for micro cut detection.





# Electrical measurements

- Continuity: Up to 600 A with  $\mu\Omega$  accuracy per IEC61238-1
- Insulation: Up to 10 kVDC for IR measurement up to 15 T $\Omega$ .
- Voltage withstand test : Up to 25 kV DC and up to 10 kV AC (200 kV with HVAC generators).



# HV PD Free generators w/ Large Faraday cage

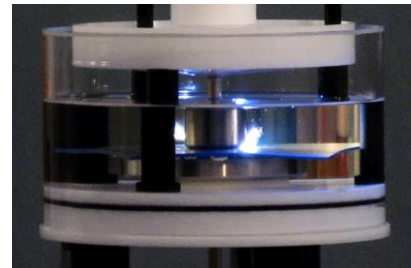
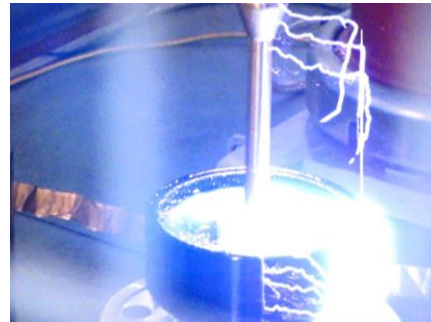
- Generator 75 kV AC / 90 kVA / 50 Hz programmable
- Measurement with accuracy  $< 0.2$  pC per IEC 60270
- Dimensions : 8x8m Door opening for large DUT.
- Safe, Open Door testing option available for high length DUT (BGND  $< 2$  pC)
- Safety equipment and trained technicians





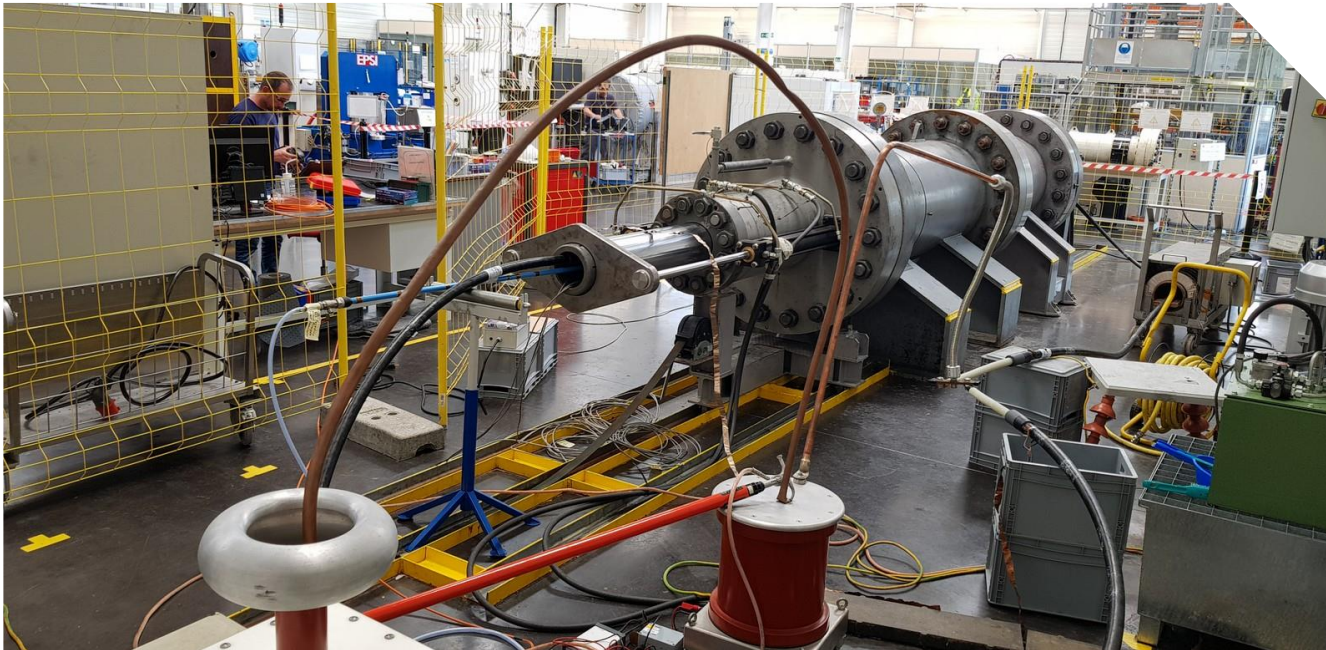
# HV generator - PD measurement - Small faraday cage

- Generator 200 kV AC / 90 kVA / 50 Hz programmable.
- Measurement with accuracy  $< 0.5$  pC per IEC 60270.
- Dimensions : 4x3.5 m for components or material testing.
- Safety equipment and trained technicians



# HV generators - Mobile benches for combined tests

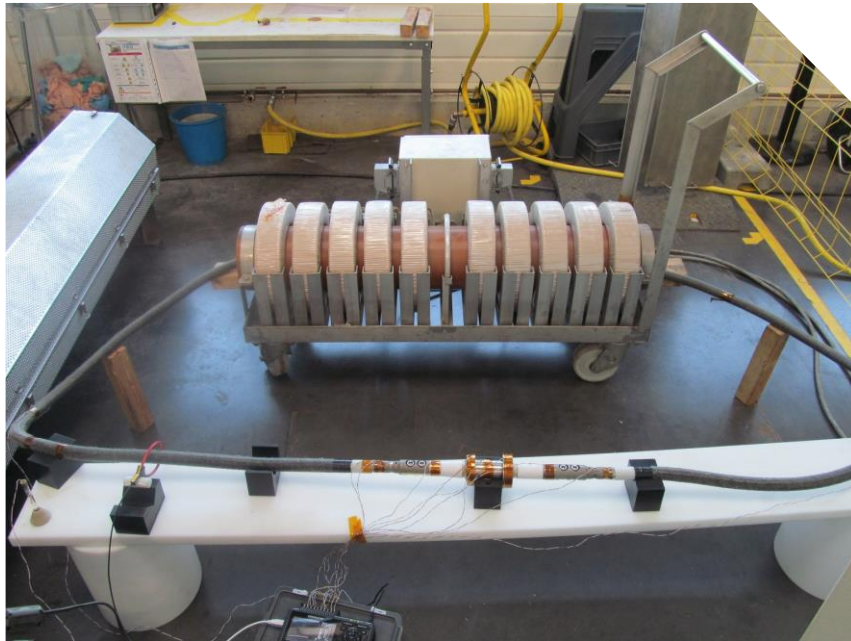
- 3 mobile generators (25, 30 and 75 kV) with PD acquisition systems.
- Filtering capacity for an optimal outside PD measurement (BGDN < 2 pC)
- PD measurement on DUT subjected to severe environment (hydro or gas pressure, vacuum, humidity, temperature...)





# Temperature rise test for cables or connectors

- Induced current generators up to 2000 AAC from 50 to 200 Hz
- 50 hz 2000 AAC with heating room for relative measurement.
- Temperature and current recording capacity



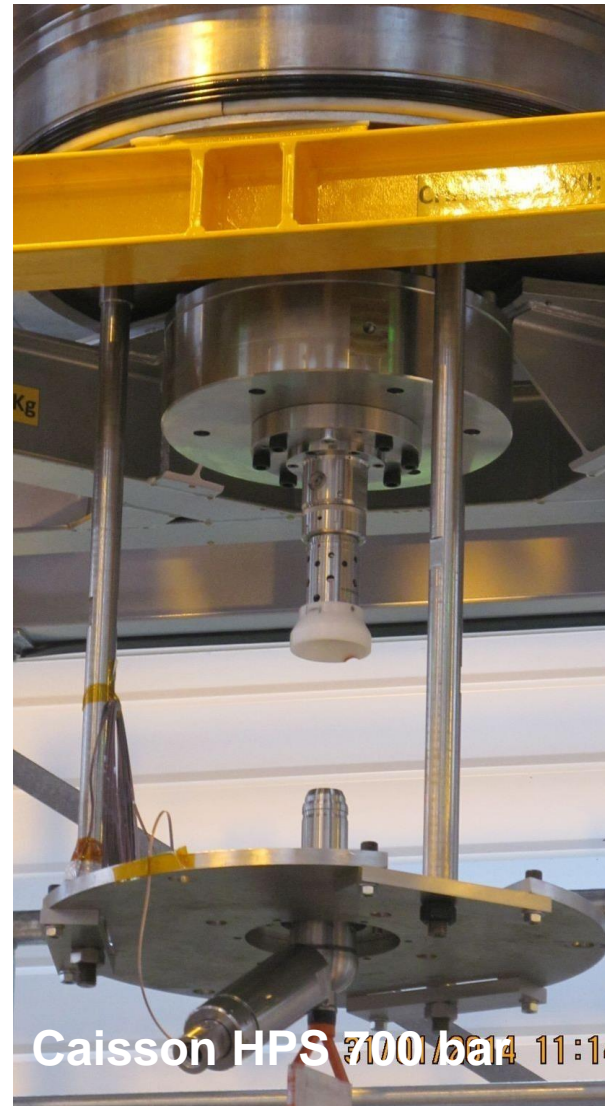
# High pressure vessel : Connection tests under pressure

Name	Fluide	Volume (L)	Pressure max (bar)	T° max (°C)	Length (mm)	Diameter (mm)	Actuator stroke (mm)	Closing system
Caisson DEUTSCH 60 bar	water (turbide)	1 600	60	ambient	2 500	900	270	bolted
Caisson HPS 700 bar	water	1200	700	ambient	3 000	700	700	quarter turn
Caisson Nova Swiss 2500 bar	water	41	2 500	200	1 300	200	300	quarter turn
Caisson CMCTSS 500 bar	water	1050	500	ambient	4 400	580	800	bolted
Caisson EPSI 2000 bar Turbide	water (turbide)	42	2 000	ambient	780	250	250	quarter turn
Caisson CMI 200 bar DN 900	water (glycol)	16 000	200	100	26 000	900	600	bolted





# High pressure vessel : Connection test under pressure





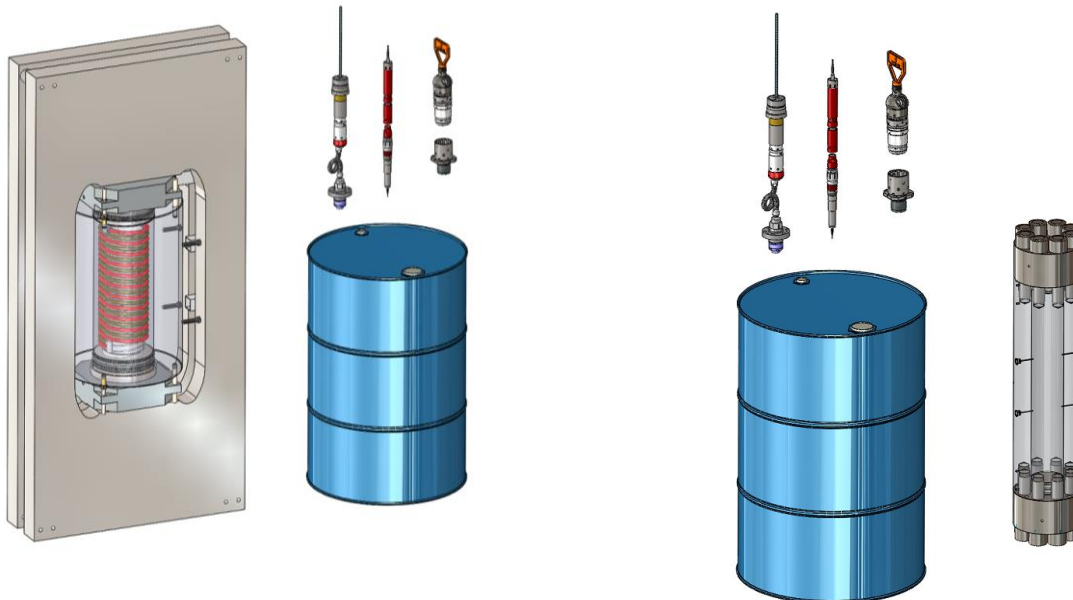
# High pressure vessel : Temperature and pressure



Name	Fluide	Volume (L)	Pressure max (bar)	T° max (°C)	Length (mm)	Diameter (mm)	Closing system
Caisson COMEX 2000 bar Haskel	water	18	2 000	200	780	175	bolted
Caisson NS 2500 bar	water	41	2 500	200	1 300	200	quarter turn
Caisson ESPI 2000 bar Température	water glycol	20	2 000	-20 / +200	355	250	Frame closure
Caisson HPS 1800 bar	water glycol	11	1 800	-5 / +121	850	127	Frame closure
Caisson SMB 520 bar Biz-biz	water glycol	13	600	80	500	127	bolted
Caisson DEUTSCH 2000 bar Optique	water	1.2	2 000	200			bolted
Caisson CMI 200 bar DN900	water glycol	16 000	200	100	26 000	900	bolted
Caisson NS 350 bar	Salt water					500	bolted
Caisson HPS 1034 bar							

# High pressure vessel : Gaz pressure test

Name	Fluide	Volume (L)	Pressure max (bar)	T° max (°C)	Length (mm)	Diameter (mm)	Closing system
Caisson COMEX 1300 bar Gaz	Azote / Nitrogen	49	1 600	110 *	623	99	bolted
Caisson HPS 2000 bar Gaz	Azote / Nitrogen	16	2 000	-20 / +200	530	150	Frame closure



# High pressure vessel : factory acceptance tests

Name	Fluide	Volume (L)	Pressure max (bar)	T° max (°C)	Length (mm)	ID(mm)	Closing system
Caisson CMCTS 500 bar	eau	1050	500	ambient	4 400	580	bolted
Caisson SMB 350 bar	Eau / azote	120	300	ambient	560	506	bolted
Caisson CMCTS 450 bar Deep Vision	eau	123	450	ambient	1 470	326	bolted
Caisson CMI 300 bar 60 mètres	eau	4 500	300	ambient	62 000	300	bolted
Caisson HPS 500 bar Jumper	eau	400	500	ambient	1 000	700	Frame closure





# Thermal tests

- Damp heat tests : max 680 L
- Salt Spray test: 400 L, 20 to 50°C
- Material ageing : max 972 L, 350°C
- Enclosure of 4 m<sup>2</sup> and ice water tank for thermal shocks.
- Air/Air thermal shock chamber : 200 L, -50 to 180°C
- Vacuum ovens for material testing



Air / water thermal shocks



Thermal shock chamber



Electrical test under vacuum

# Mechanical tests and degree of protection

- Mating force tests : max 50 kN on the mating table and 100 kN on the tensile machine.
- Mechanical endurance tests
- Tensile test, torque measurements....
- IK Pendulum hammer, IK1 / IK3 / IK5 / IK7 / IK9
- Access protection IP1X to IP6X; Watertightness IP X5 to IPX8





# Lifting and handling equipments

- 3 bridges (16T, 10T and 2\*5T)
- Several handling equipments (forklifts, workshop crane, tractors...)
- torque tightening Tools



THANK YOU

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