

Chiller design and purchase

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EN/CV/DC

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19/11/2010

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Introduction

The chiller is a **CRITICAL** part of the Thermosiphon installation.

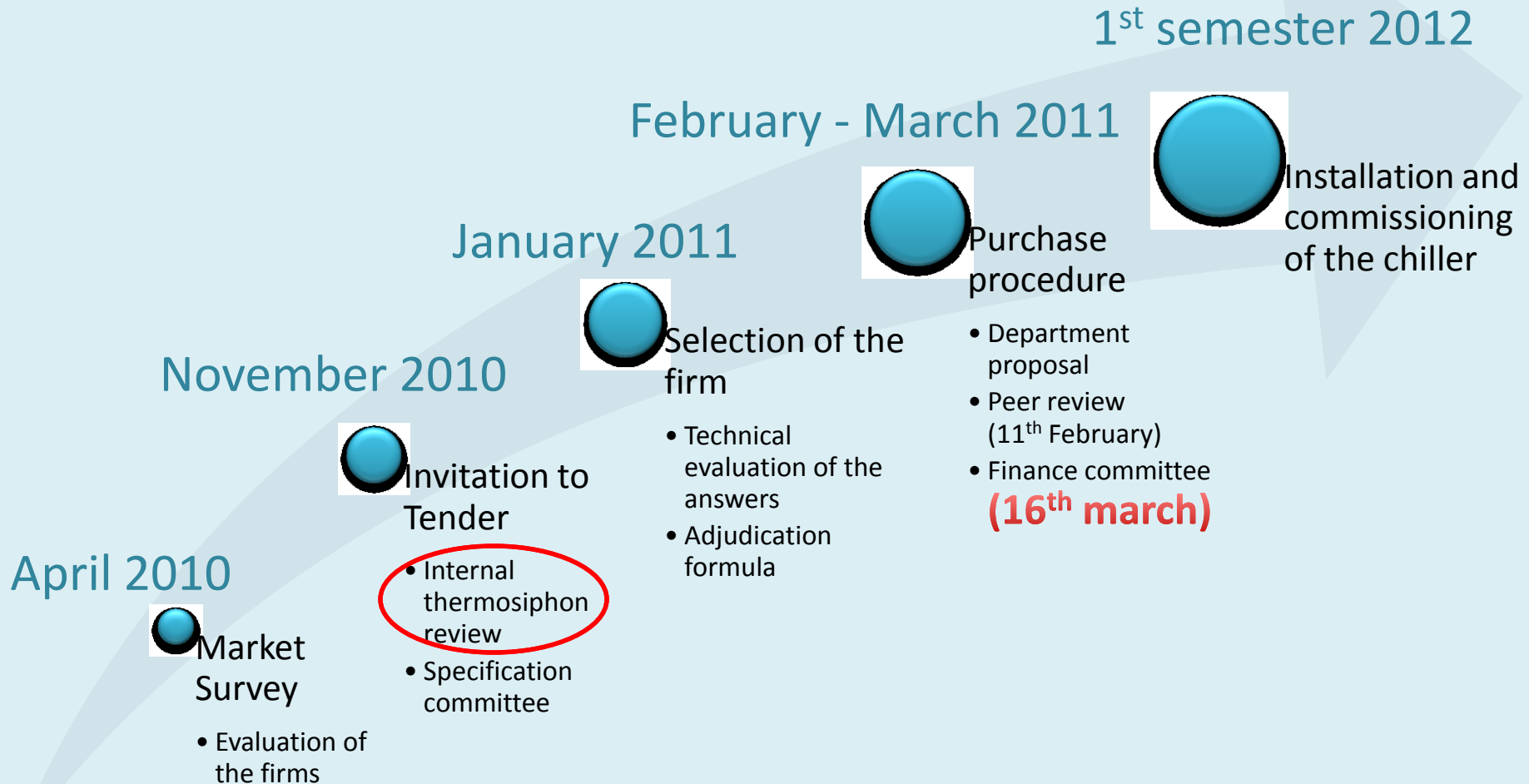
- In terms of cost
- In terms of reliability and maintenance



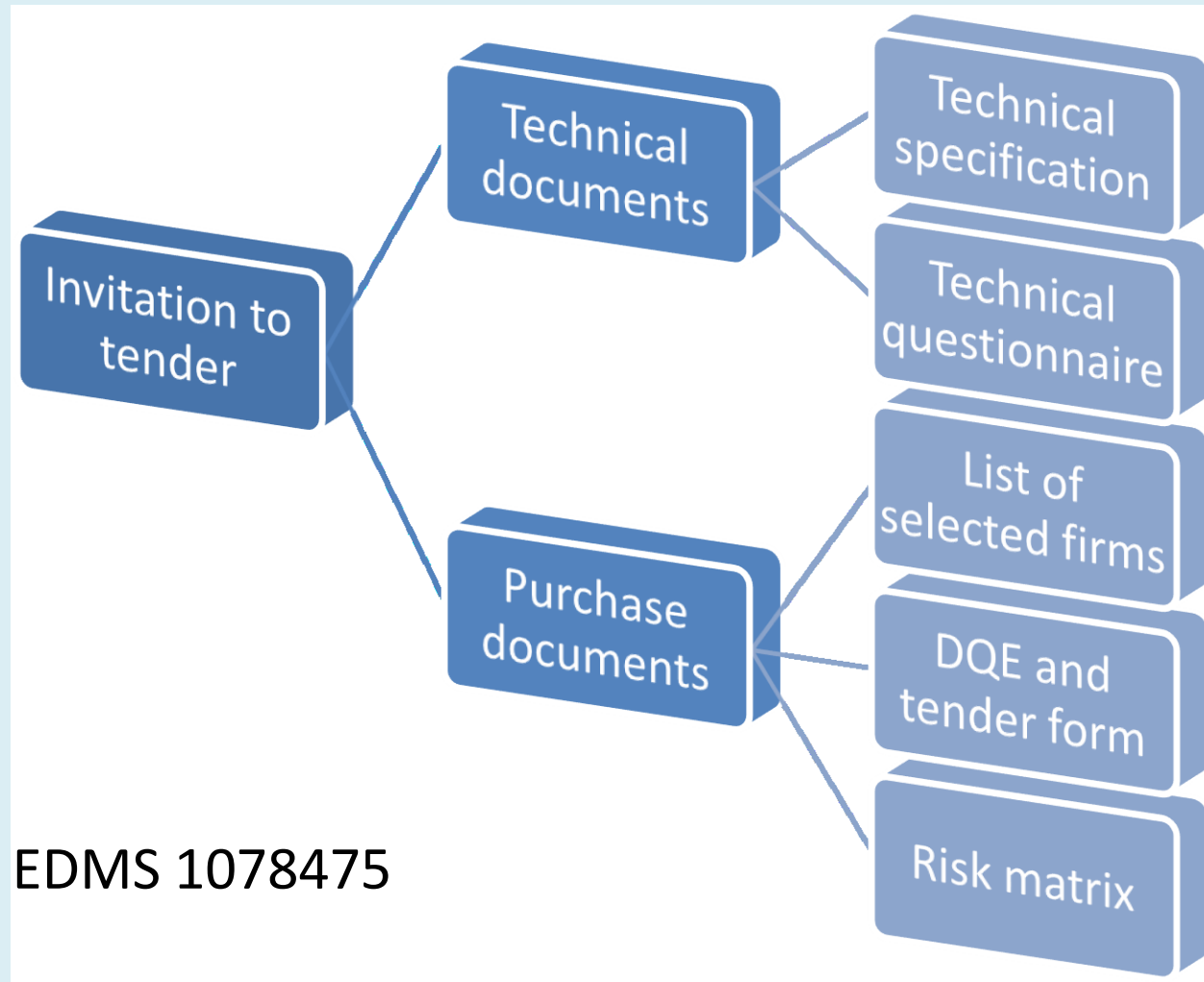
INDUSTRIAL STANDARD SOLUTION

MARKET SURVEY / INVITATION TO TENDER

Purchase procedure Schedule



Purchase procedure Documents



EDMS 1078475

Technical specification

Objective

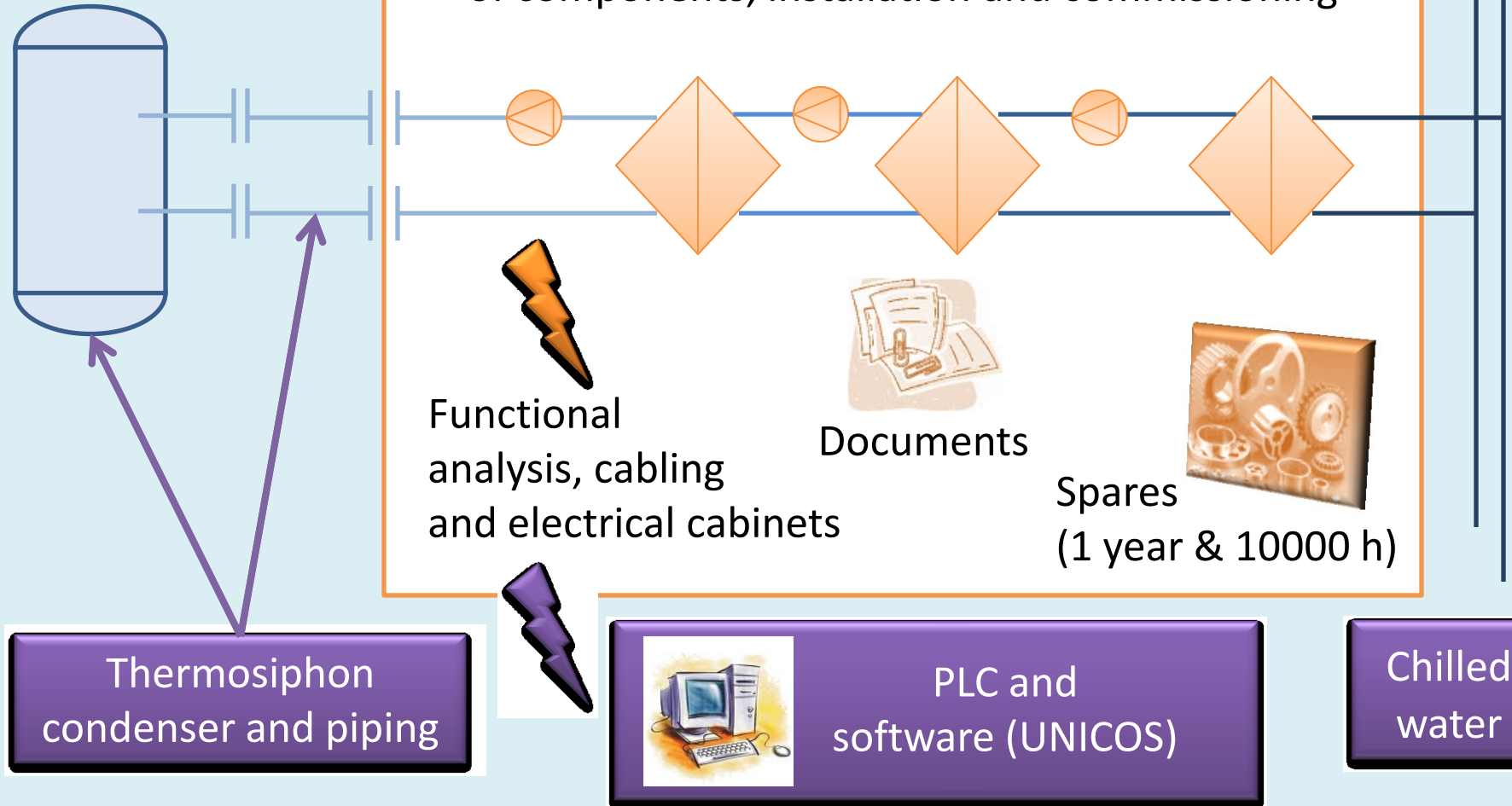
- Define precisely the required equipment technically

Main points

- Scope of the tender
- General conditions for tendering and contracting
- Technical requirements
- Design
- Assembly
- Commissioning
- Delivery and installation
- Maintenance
- Quality assurance
- Safety

Scope of the tender

Chiller and brine : design, construction, purchase of components, installation and commissioning



General conditions for tendering

Pre-tender discussions

- Bidders conference
- Questions and answers sent to all bidders

Alternative proposals

- Sent with the compliant offer

Documents to be sent with the tender

Technical and design

- P&ID, P-h diagram
- Dimensions and weights, general assembly drawings.
- Electrical power, compress air and water supply needed.
- MSDS for refrigerants and TDS for compressors, pumps and heat exchangers.
- Technical questionnaire.
- Reliability and risk analysis.

Organization

- Work site organisation, preliminary schedule, project team.
- Working methods, protection means and test methods for commissioning.

Purchase

- Price List
- Tender form.

General conditions for the contract

The contractor has responsibility for

- Design, components and performance.
- No deviations from this technical specification.
- Allow CERN factory access if requested.
- Manpower and tooling, including training for the manpower, management and supervision.
- Contract follow-up (Contract engineer, progress report).
- The design approval and production be done by CERN.

Delivery schedule

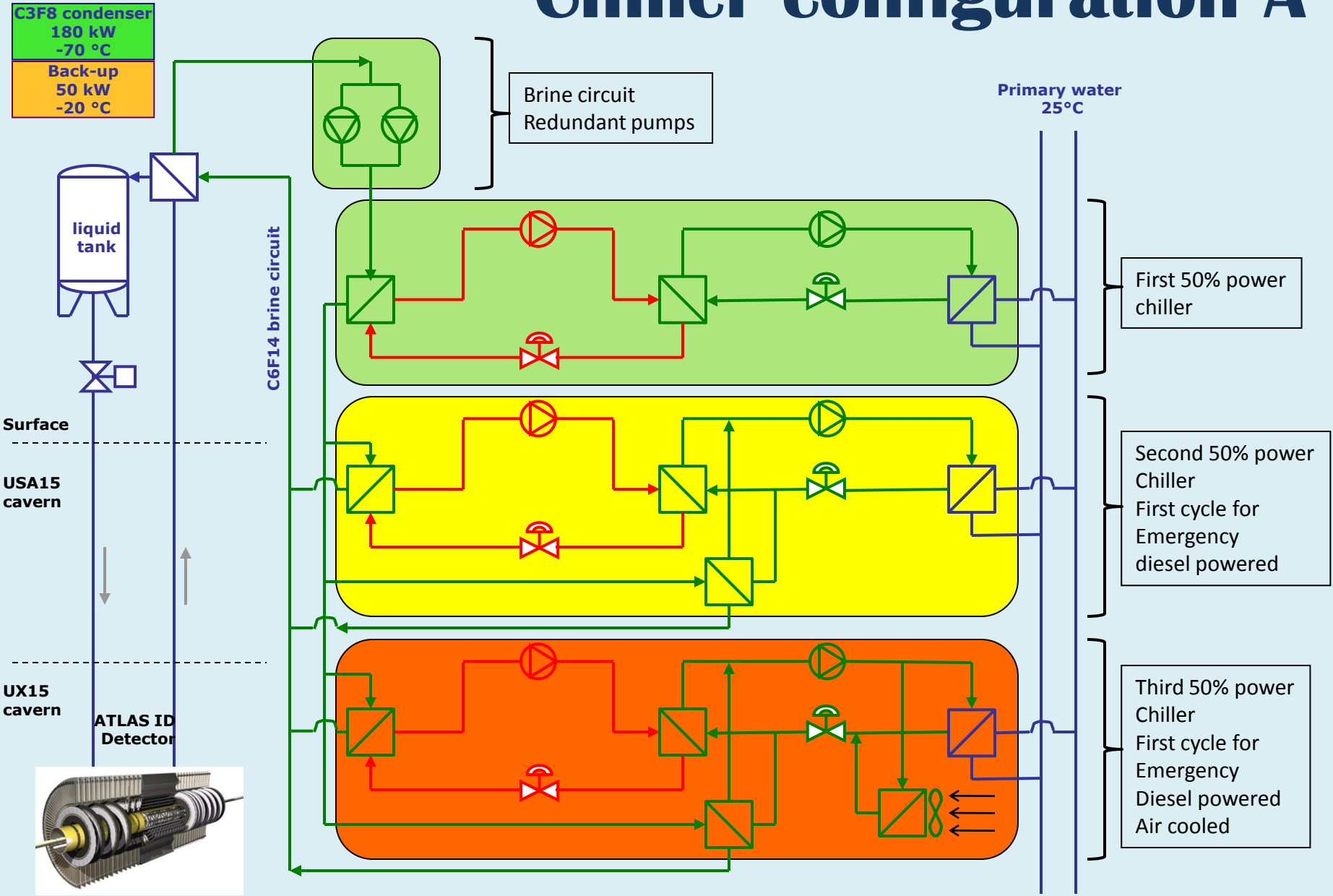
- Functional analysis and detailed design by end of April 2011.
- Delivery of the skids at CERN by end of September 2011.
- Installation finished by end of October 2011.
- Commissioning completed by end of December 2011.

Technical requirements

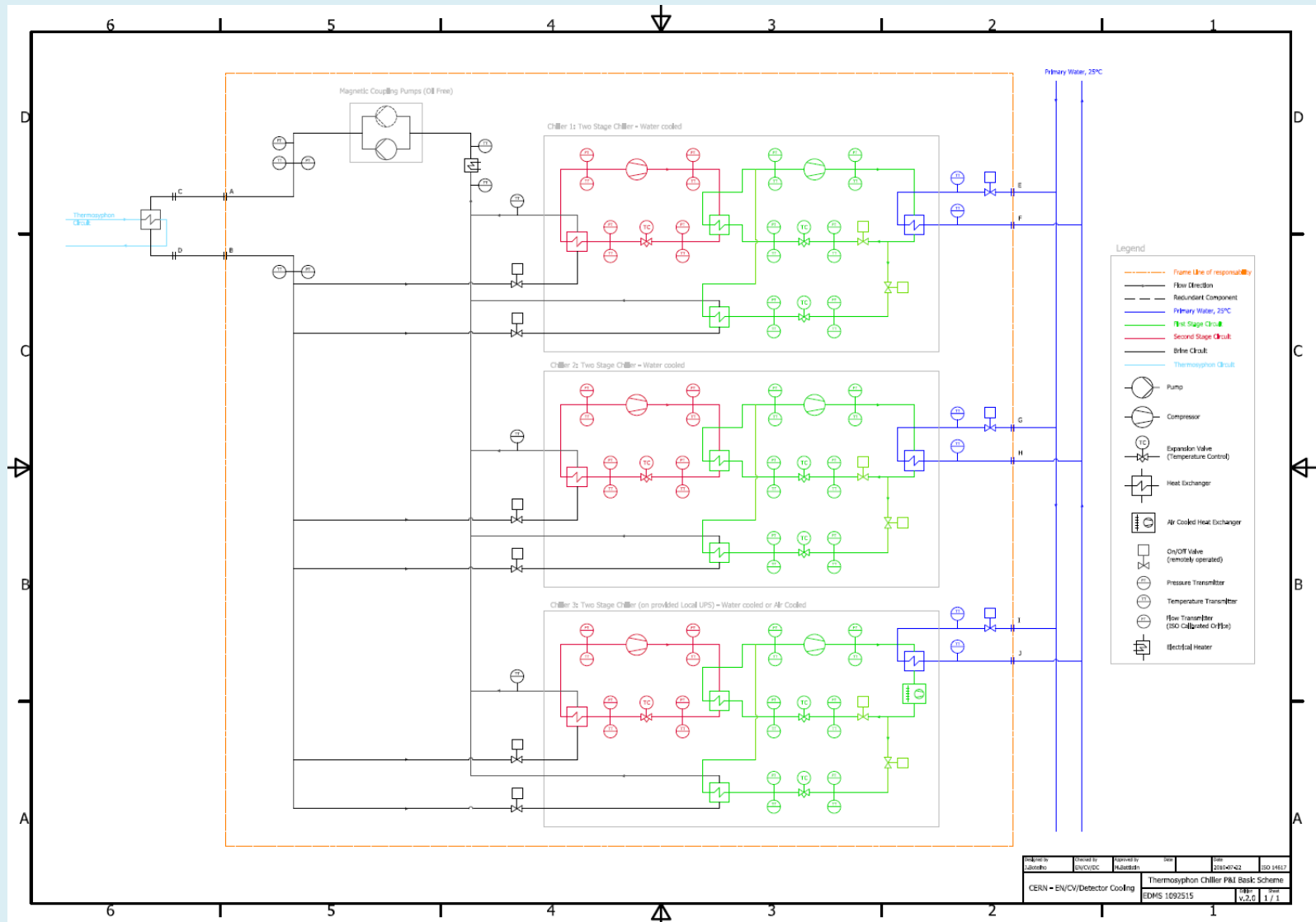
- Chiller units
 - Two circuits in cascade (high and low temperature)
 - Refrigerant to be chosen by contractor
- Brine circuit
 - Mono-phase liquid C_6F_{14}

<i>Operation regimes</i>	<i>Nominal operation</i>	<i>Emergency situation</i>
<i>Cooling power in the Thermosiphon condenser</i>	180 kW	50 kW
<i>Temperature at the inlet of the Thermosiphon condenser</i>	-70°C	-20°C
<i>Temperature at the outlet of the Thermosiphon condenser</i>	-65°C	-15°C
<i>Maximum pressure drop</i>	4 bar	4 bar

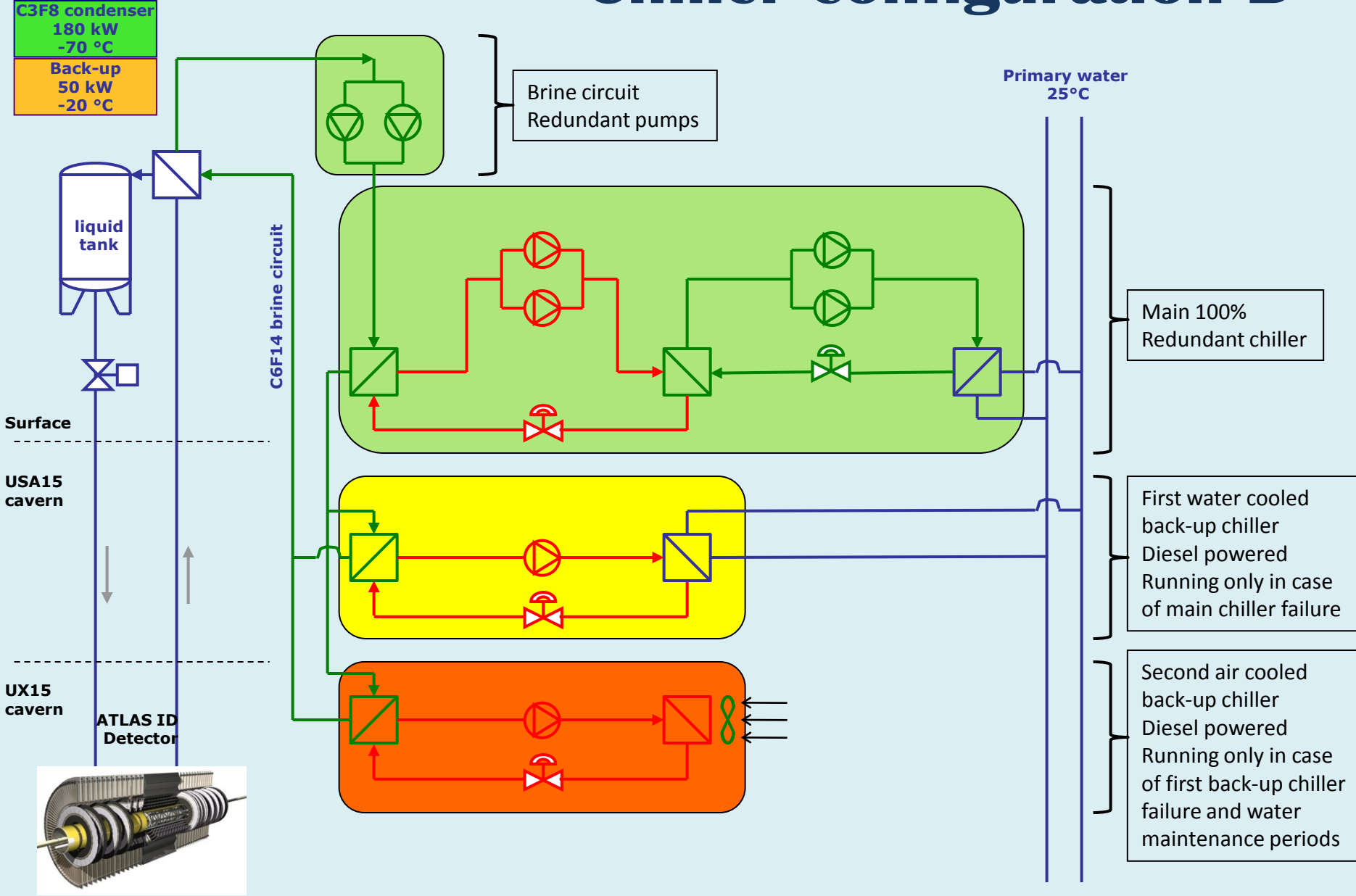
Chiller configuration A



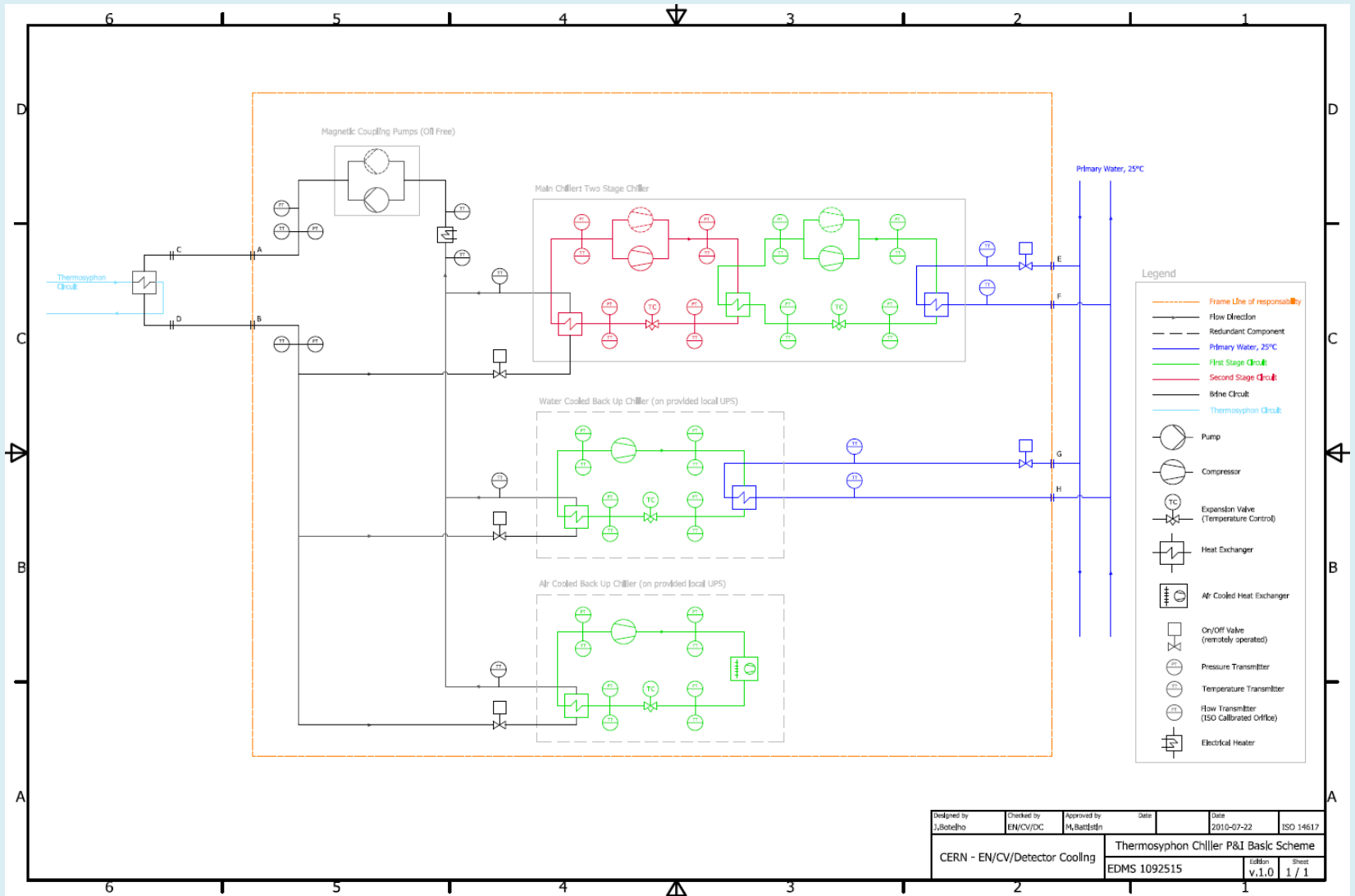
P&I for the configuration A



Chiller configuration B



P&I for the configuration B



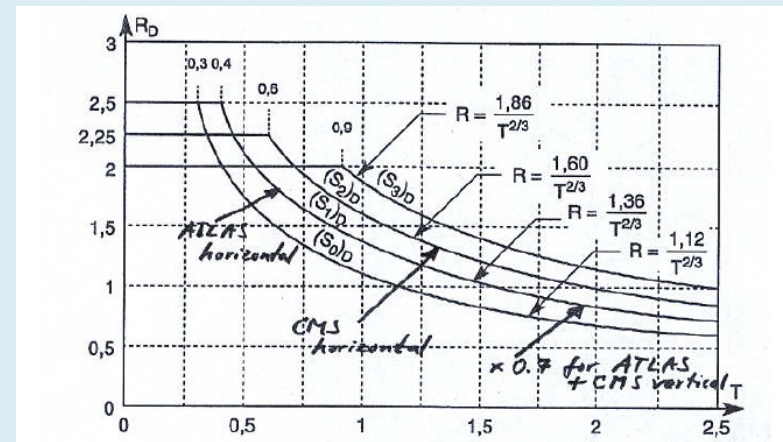
Design

Operation and reliability

- Power regulation
 - 20 ÷ 100%
- Temperature regulation
 - 20°C ÷ -70°C
 - Precision ± 1 K
- Compressor
 - MTBF > 40,000 h
 - MTTR < 10 h
- Chiller system
 - MTBF > 20,000 h

Other

- Seismic requirements



- Sound level
- Integration

Assembly and commissioning

Assembly

Skids and electrical/control cabinets will be pre-assembled

Commissioning

In the contractor premises

At CERN

Welding
inspection
X-rays (10%)

Pressure and
leak tests

Electrical
mapping

Performance
tests

MS results

Company				Qualification criterias									Qualification
Name	Country of origin	Well balanced	Visit	Criteria § 3 Administrative situation	Criteria § 4.1 2 references	Criteria § 4.2 Industrial PLC use	Criteria § 4.3 In-house design office	Criteria § 4.4 Workshop	Criteria § 5.1 Turnover	Criteria § 5.2 Employees	Criteria § 6 Quality	Criteria § 7 Language	
Angelantoni	Italy	yes	Known	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
Idom	Spain	no	Known	YES	NO	YES	YES	YES	YES	YES	YES	YES	NO
Cofely Refrigeration	Germany	yes	30/Sept (Lindau)	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
GEA Matal / Technofrigo	France	yes	17/Sept (Berlin)	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
Herco	Germany	yes	7/Oct (Düsseldorf)	YES	NO	YES	YES	YES	YES	NO	YES	YES	NO
Johnson controls (York)	Switzerland	yes	8/Sept (Visp)	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
J&E Hall	England	no	14/June (London)	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
Telstar	Spain	no	3/Sept (Barcelona)	YES	1 reference	YES	YES	YES	YES	YES	YES	YES	?

Adjudication



- The adjudication formula must be defined BEFORE the invitation to tender is sent.
- It shall be an OBJECTIVE way of comparing the bidders and judging the offers. Even if there are different options in the tender.
- A penalization can be applied **only for adjudication** to some of the options.
- Purchase proposed different ways of doing the adjudication (next slide)

Adjudication



Adjudication on one option

- The adjudication is done comparing the price of one of the options.
- Risk: the company has no incentive whatsoever to put a low price in the other options.

Adjudication on the cheapest option for each supplier

- The adjudication is done comparing the cheapest option for each supplier.
- Risk: the technical option that will be purchased is not decided by us but by the cheapest of all the offers.

Adjudication on the global price

- The adjudication is done on the global price for all the options
- Risk: the chosen company could not be the cheapest for the technical option required.

Adjudication

Practical example



Company	Configuration A	Configuration B (penalization 10%)	Price for Adjudication
I (price)	100	100	
I (adjudication)	<u> </u>		<u> </u>
II (price) ←	110	80 ←	
II (adjudication)	<u> </u>	<u> </u>	<u> </u>
III (price) ←	90	100	
III (adjudication)	<u> </u>		<u> </u>

$$\text{Adjudication price} = \frac{\text{Configuration A} + 1.1 * \text{Configuration B} + \text{Spare comps}}{2}$$

Conclusions

- The chiller is the CRITICAL component of the installation.
- The purchase process is taking place.
 - A detailed analysis of the firms has been done
 - The documents can be consulted in EDMS 1078475
 - Contact persons:
Elena Perez Rodriguez and Bjorn Jenssen



*Any
questions ?*

**Thank you
for your
attention**