



# ATLAS Cooling System

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Rev. No.: **01**

**Technical definition - Draft**

*PIXEL & SCT COOLING SYSTEM*

*WU.1*

## **ELECTRICAL CONTROL UNIT & PROCESS EVALUATION**

*Prepared by:*

**P.BONNEAU  
S. BERRY**

*Checked by:*

*Approved by:*

*Distribution List*

**2 General description:**

**2.1 Identification:**

Job n. : WU.1  
 Responsible : P.BONNEAU  
 User : M.OLCESE  
 Localisation : Control: USA15 ; Pump unit: USA15 Distribution: UX15  
 Accessibility : Control: permanent ; Pump unit : permanent Distribution: 1h/day

Grouping possibility: ....No.....

Outside design : Standard rack

Magnetic field : negligible (USA15)  
 Radiation : negligible (USA15)

**2.2 Presentation :**

Schematic drawing n. : 186/15-50

Description :

C3F8 evaporative cooling system, 232 channels at -24 Celsius degrees, 60 kW total.

- 4 global cooling temperature control from evaporative pressure regulation (Distribution rack).
- 4 global cooling power control from inlet pressure regulation (Distribution rack).

Control rack & safety compressor always On (powered from UPS) for thermal screen cooling.

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**2.3 Observation :**

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 .....

**6 Process :**

**6.1 Programmable Logical Controller:**

**6.1.1 Functional analyse:**

Reference : ...to be done...  
 complexity level :  $\forall E / E / C / VC / \dots\dots\dots$

**6.1.2 Processor:**

Maximum cycle time :  $\leq 100ms / \dots\dots\dots$   
 Integrated regulation loops (Qty): ... 7 ... PID (+232 ??)  
 ..... others

Tableau de variables partages  $yes / no$   
 Quantity: ... 1 ...  
 Origin : ... ECR ...

Function : Global temperature setpoint (4 inlet pressure control)  
 Individual control (232 On / Off / stand-by control)  
 Individual loops status (232 x “on / off / stand-by / fault / alarm”)  
 General cooling status (on / off / fault / alarm)  
 .....  
 .....  
 .....

**6.1.3 Observation :**

.....  
 .....  
 .....

**6.2 User interface :**

Localisation:  $local / network / ~~deport~~ \dots\dots\dots$   
 Type:  $BP / ~~graphical~~ XBT / WIZCON / \dots\dots\dots$

Observation :  
 .....  
 .....  
 .....



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*TRT COOLING SYSTEM*

*WU.2-1*

## **ELECTRICAL CONTROL UNIT & PROCESS EVALUATION**

*Prepared by:*

**P.BONNEAU  
S. BERRY**

*Checked by:*

*Approved by:*

*Distribution List*

**2 General description:**

**2.1 Identification:**

Job n. : WU.2-1  
 Responsible : P.BONNEAU  
 User : J.GODLEWSKI & D.FROIDEVAUX  
 Localisation : Control: USA15 ; cooling sys: UX15  
 Accessibility : Control: permanent ; cooling sys: 1h/day

Grouping possibility: ....Yes.....

Outside design : Standard rack

Magnetic field : negligible

Radiation : negligible

**2.2 Presentation :**

Schematic drawing n. : 186/15-40

Description :

C6F14 monophase leakless cooling system, around 100 channel at +14 Celsius degrees, 70 kW total.

Global cooling temperature control from 3-ways valves on chilled water (resolution 0.1 degree).

Dew point measurement for temperature adjustment if necessary.

Control rack & leakless function, always On (powered from diesel).

.....

**2.3 Observation :**

Cooling system similar to WU.2-2

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 .....

**6 Process :**

**6.1 Programmable Logical Controller:**

**6.1.1 Functional analyse:**

Reference : ...to be done...  
 complexity level : VE / ~~E~~ / ~~€~~ / ~~¥€~~ / .....

**6.1.2 Processor:**

Maximum cycle time : <100ms / .....

Integrated regulation loops (Qty): ... 1 ... PID  
 ..... others

Tableau de variables partages yes / no  
 Quantity: ... 1 ...  
 Origin : ... ECR ...

Function :  
 Global temperature setpoint (1 temperatures control)  
 Distribution rack control (4 On/Off control)  
 Distribution rack status (4 x “on / off / fault / alarm”)  
 General cooling status (on / off / fault / alarm)

**6.1.3 Observation :**

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 .....  
 .....

**6.2 User interface :**

Localisation: ~~local~~ / network / ~~deport~~ .....

Type: ~~BP~~ / ~~graphical~~ ~~XBT~~ / WIZCON / .....

Observation :

.....  
 .....  
 .....



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***CABLES COOLING SYSTEM***

***WU.2-2***

## **ELECTRICAL CONTROL UNIT & PROCESS EVALUATION**

*Prepared by:*

**P.BONNEAU  
S. BERRY**

*Checked by:*

*Approved by:*

*Distribution List*

**2 General description:**

**2.1 Identification:**

Job n. : WU.2-2  
 Responsible : P.BONNEAU  
 User : J.GODLEWSKI  
 Localisation : Control: USA15 ; cooling sys: UX15  
 Accessibility : Control: permanent ; cooling sys: 1h/day

Grouping possibility: ....Yes.....

Outside design : Standard rack

Magnetic field : negligible

Radiation : negligible

**2.2 Presentation :**

Schematic drawing n. : 186/15-10

Description :

C6F14 monophase leakless cooling system, around 100 channel at +14 Celsius degrees, 70 kW total.

Global cooling temperature control from 3-ways valves on chilled water (resolution 0.1 degree).

Dew point measurement for temperature adjustment if necessary.

Control rack & leakless function, always On (powered from diesel).

.....

**2.3 Observation :**

Cooling system similar to WU.2-1

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 .....  
 .....



**6 Process :**

**6.1 Programmable Logical Controller:**

**6.1.1 Functional analyse:**

Reference : ...to be done...  
 complexity level : VE / ~~E~~ / ~~€~~ / ~~¥€~~ / .....

**6.1.2 Processor:**

Maximum cycle time : <100ms / .....

Integrated regulation loops (Qty): ... 1 ... PID  
 ..... others

Tableau de variables partages yes / no  
 Quantity: ... 1 ...  
 Origin : ... ECR ...

Function : Global temperature setpoint (1 temperatures control)  
 Distribution rack control (4 On/Off control)  
 Distribution rack status (4 x “on / off / fault / alarm”)  
 General cooling status (on / off / fault / alarm)

**6.1.3 Observation :**

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 .....  
 .....

**6.2 User interface :**

Localisation: ~~local~~ / network / ~~deport~~ .....

Type: ~~BP~~ / ~~graphical~~ ~~XBT~~ / WIZCON / .....

Observation :

.....  
 .....  
 .....



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*LIQUID ARGON CALORIMETER*

*WU.3-1*

## **ELECTRICAL CONTROL UNIT & PROCESS EVALUATION**

*Prepared by:*

**P.BONNEAU  
S. BERRY**

*Checked by:*

*Approved by:*

*Distribution List*

**2 General description:**

**2.1 Identification:**

Job n. : WU.3-1  
 Responsible : P.BONNEAU  
 User : H. TAKAI  
 Localisation : Control: USA15 ; cooling sys: UX15  
 Accessibility : Control: permanent ; cooling sys: 1h/day

Grouping possibility: ....Yes.....

Outside design : Standard rack

Magnetic field : negligible

Radiation : negligible

**2.2 Presentation :**

Schematic drawing n. : 186/15-28 & -29

Description :

Demineralized water leakless cooling system, 24 channel at +18 Celsius degrees, 255 kW total.

Global cooling temperature control from 3-ways valves on mixed water (resolution 0.1 degree).

Integrated on-line analyse & purification system

Control rack & leakless function, always On (powered from diesel).

.....

**2.3 Observation :**

Cooling system similar to WU.3-2 (except temperature setpoint & total power)

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.....

.....

**6 Process :**

**6.1 Programmable Logical Controller:**

**6.1.1 Functional analyse:**

Reference : ...to be done...  
 complexity level : ~~VE~~ / ~~E~~ / C / ~~VC~~ / .....

**6.1.2 Processor:**

Maximum cycle time : <100ms / .....  
 Integrated regulation loops (Qty): ... 24 + 1 ... PID  
 ..... others

Tableau de variables partages yes / no  
 Quantity: ... 1 ...  
 Origin : ... ECR ...

Function :  
 Global temperature setpoint (1 temperatures control)  
 Individual control (24 On/Off control)  
 Individual loops status (24 x “on / off / fault / alarm”)  
 General cooling status (on / off / fault / alarm)

**6.1.3 Observation :**

.....  
 .....  
 .....

**6.2 User interface :**

Localisation: ~~local~~ / network / ~~deport~~ .....  
 Type: ~~BP~~ / ~~graphical~~ ~~XBT~~ / WIZCON / .....

Observation :

.....  
 .....  
 .....



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*TILE CALORIMETER COOLING*

*WU.3-2*

## **ELECTRICAL CONTROL UNIT & PROCESS EVALUATION**

*Prepared by:*

**P.BONNEAU  
S. BERRY**

*Checked by:*

*Approved by:*

*Distribution List*

**2 General description:**

**2.1 Identification:**

Job n. : WU.3-2  
 Responsible : P.BONNEAU  
 User : A-M. HENRIQUES CORREIA  
 Localisation : Control: USA15 ; cooling sys: UX15  
 Accessibility : Control: permanent ; cooling sys: 1h/day

Grouping possibility: ....Yes.....

Outside design : Standard rack

Magnetic field : negligible

Radiation : negligible

**2.2 Presentation :**

Schematic drawing n. : 186/15-17 & -18

Description :

Demineralized water leakless cooling system, 24 channel at +16 Celsius degrees, 77 kW total.

Global cooling temperature control from 3-ways valves on mixed water (resolution 0.1 degree).

Integrated on-line analyse & purification system

Control rack & leakless function, always On (powered from diesel).

.....

**2.3 Observation :**

Cooling system similar to WU.3-1 (except temperature setpoint, & total power)

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.....

**6 Process :**

**6.1 Programmable Logical Controller:**

**6.1.1 Functional analyse:**

Reference : ...to be done...  
 complexity level : ~~VE~~ / ~~E~~ / C / ~~VC~~ / .....

**6.1.2 Processor:**

Maximum cycle time : <100ms / .....  
 Integrated regulation loops (Qty): ... 24 + 1 ... PID  
 ..... others

Tableau de variables partages yes / no  
 Quantity: ... 1 ...  
 Origin : ... ECR ...

Function :  
 Global temperature setpoint (1 temperatures control)  
 Individual control (24 On/Off control)  
 Individual loops status (24 x “on / off / fault / alarm”)  
 General cooling status (on / off / fault / alarm)

**6.1.3 Observation :**

.....  
 .....  
 .....

**6.2 User interface :**

Localisation: ~~local~~ / network / ~~deport~~ .....  
 Type: ~~BP~~ / ~~graphical~~ ~~XBT~~ / WIZCON / .....

Observation :

.....  
 .....  
 .....



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## Technical definition - Draft

*MUONS & TRIGGER COOLING*

*WU.3-3 (a)*

## ELECTRICAL CONTROL UNIT & PROCESS EVALUATION

*Prepared by:*

**P.BONNEAU  
S. BERRY**

*Checked by:*

*Approved by:*

*Distribution List*



**2 General description:**

**2.1 Identification:**

Job n. : WU.3-3 (a)  
 Responsible : P.BONNEAU  
 User : R.RICHTER  
 Localisation : Control: USA15 ; cooling sys: UX15  
 Accessibility : Control: permanent ; cooling sys: 1h/day

Grouping possibility: ....Yes.....

Outside design : Standard rack

Magnetic field : negligible

Radiation : negligible

**2.2 Presentation :**

Schematic drawing n. :186/15-60 (to be done)

Description :

Demineralized water leakless cooling system, 18 channel at +17 Celsius degrees, 45 kW total.

Global cooling temperature control from 3-ways valves on mixed water (resolution 0.1 degree).

Individual pressure control (18 loops).

Integrated on-line analyse & purification system

Control rack & leakless function, always On (powered from diesel).

.....

**2.3 Observation :**

Cooling system similar to WU.3-4 (b) (and WU.3-2 & WU.3-1 except setpoint and total power)

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.....

.....

**6 Process :**

**6.1 Programmable Logical Controller:**

**6.1.1 Functional analyse:**

Reference : ...to be done...  
 complexity level : ~~VE~~ / ~~E~~ / C / ~~VC~~ / .....

**6.1.2 Processor:**

Maximum cycle time : <100ms / .....  
 Integrated regulation loops (Qty): ... 18 + 1 ... PID  
 ..... others

Tableau de variables partages yes / no  
 Quantity: ... 1 ...  
 Origin : ... ECR ...

Function :  
 Global temperature setpoint (1 temperatures control)  
 Individual loops control (18 On/Off control)  
 Individual loops status (18 x "on / off / fault / alarm")  
 General cooling status (on / off / fault / alarm)

**6.1.3 Observation :**

.....  
 .....  
 .....

**6.2 User interface :**

Localisation: ~~local~~ / network / ~~deport~~ .....  
 Type: ~~BP~~ / ~~graphical~~ ~~XBT~~ / WIZCON / .....

Observation :

.....  
 .....  
 .....



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## Technical definition - Draft

*MUONS & TRIGGER COOLING*

*WU.3-3 (b)*

## ELECTRICAL CONTROL UNIT & PROCESS EVALUATION

*Prepared by:*

**P.BONNEAU  
S. BERRY**

*Checked by:*

*Approved by:*

*Distribution List*

**2 General description:**

**2.1 Identification:**

Job n. : WU.3-3 (b)  
 Responsible : P.BONNEAU  
 User : R.RICHTER  
 Localisation : Control: USA15 ; cooling sys: UX15  
 Accessibility : Control: permanent ; cooling sys: 1h/day

Grouping possibility: ....Yes.....

Outside design : Standard rack

Magnetic field : negligible

Radiation : negligible

**2.2 Presentation :**

Schematic drawing n. :186/15-60 (to be done)

Description :

Demineralized water leakless cooling system, 18 channel at +17 Celsius degrees, 45 kW total.

Global cooling temperature control from 3-ways valves on mixed water (resolution 0.1 degree).

Individual pressure control (18 loops).

Integrated on-line analyse & purification system

Control rack & leakless function, always On (powered from diesel).

.....

**2.3 Observation :**

Cooling system similar to WU.3-4 (a) (and WU.3-2 & WU.3-1 except setpoint and total power)

.....

.....

.....

**6 Process :**

**6.1 Programmable Logical Controller:**

**6.1.1 Functional analyse:**

Reference : ...to be done...  
 complexity level : ~~VE~~ / ~~E~~ / C / ~~VC~~ / .....

**6.1.2 Processor:**

Maximum cycle time : <100ms / .....  
 Integrated regulation loops (Qty): ... 18 + 1 ... PID  
 ..... others

Tableau de variables partages yes / no  
 Quantity: ... 1 ...  
 Origin : ... ECR ...

Function :  
 Global temperature setpoint (1 temperatures control)  
 Individual loops control (18 On/Off control)  
 Individual loops status (18 x "on / off / fault / alarm")  
 General cooling status (on / off / fault / alarm)

**6.1.3 Observation :**

.....  
 .....  
 .....

**6.2 User interface :**

Localisation: ~~local~~ / network / ~~deport~~ .....  
 Type: ~~BP~~ / ~~graphical~~ ~~XBT~~ / WIZCON / .....

Observation :

.....  
 .....  
 .....



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***DIFFUSION PUMP COOLING***

***WU.3-4***

## **ELECTRICAL CONTROL UNIT & PROCESS EVALUATION**

*Prepared by:*

**P.BONNEAU  
S. BERRY**

*Checked by:*

*Approved by:*

*Distribution List*

**2 General description:**

**2.1 Identification:**

Job n. : WU.3-4  
 Responsible : P.BONNEAU  
 User : J.GODLEWSKI  
 Localisation : Control: USA15 ; cooling sys: UX15  
 Accessibility : Control: permanent ; cooling sys: 1h/day

Grouping possibility: ....Yes.....

Outside design : Standard rack

Magnetic field : negligible

Radiation : negligible

**2.2 Presentation :**

Schematic drawing n. : 186/15-82

Description :

Treated water leakless cooling system, 11 channels at +15 Celsius degrees, 60 kW total.

(26 diffusion pumps)

Global cooling temperature controled from 3-ways valves on chilled water (resolution 0.5 degree).

Individual flow control (26 x on/off)

Individual pressure regulation (11 loops)

Control rack & leakless function, always On (powered from UPS).

.....

**2.3 Observation :**

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 .....  
 .....  
 .....

**6 Process :**

**6.1 Programmable Logical Controller:**

**6.1.1 Functional analyse:**

Reference : ...to be done...  
 complexity level : ~~VE~~ / ~~E~~ / C / ~~VC~~ / .....

**6.1.2 Processor:**

Maximum cycle time : <100ms / .....  
 Integrated regulation loops (Qty): ... 11 + 1 ... PID  
 ..... others

Tableau de variables partages yes / no  
 Quantity: ... 1 ...  
 Origin : ... ECR ...

Function :  
 Global temperature setpoint (1 temperatures control)  
 Individual control (26 On/Off control)  
 Individual loops status (26 x “on / off / fault / alarm”)  
 General cooling status (on / off / fault / alarm)

**6.1.3 Observation :**

.....  
 .....  
 .....

**6.2 User interface :**

Localisation: ~~local~~ / network / ~~deport~~ .....  
 Type: ~~BP~~ / ~~graphical~~ ~~XBT~~ / WIZCON / .....

Observation :

.....  
 .....  
 .....