APR 2 1999 58
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ENGINEERING DATA TRANSMITTAL

Page 1 of 1
1. EDT 626254

2. To: (Receiving Organization) Distribution		3. From: (Originating Organization)		4. Related EDT No.: N/A				
5. Proj./Prog./Dept./Div.:		6. Design Authority/ Design Agent/Cog. Engr.:		7. Purchase Order No.:				
Spent Nuclear Fuel Project		C. Van Katwijk		N/A				
8. Originator Remarks: N/A				9. Equip./Component No.:				
				N/A				
11. Receiver Remarks: 11A. Design Baseline Document? ☐ Yes ☒ No				10. System/Bldg./Facility: Spent Nuclear Facility				
				12. Major Assm. Dwg. No.:				
				N/A				
				13. Permit/Permit Application No.:				
				N/A				
				14. Required Response Date:				
				N/A				
15. DATA TRANSMITTED								
(A) Item No.	(B) Document/Drawing No.	(C) Sheet No.	(D) Rev. No.	(E) Title or Description of Data Transmitted	(F) Approval Design- ator	(G) Reason for Trans- mittal	(H) Origina- tor Dispo- sition	(I) Receiv- er Dispo- sition
1	SNF-3880		0	Asheroft Temperature Switch and Thermowell - Tempered Water Cask Inlet High Temperature	Q	2	1	N/A

16. KEY											
Approval Designator (F)		Reason for Transmittal (G)				Disposition (H) & (I)					
E, S, Q, D or N/A (see WHC-CM-3-5, Sec. 12.7)		1. Approval		4. Review		1. Approved		4. Reviewed no/comment			
		2. Release		5. Post-Review		2. Approved w/comment		5. Reviewed w/comment			
		3. Information		6. Dist. (Receipt Acknow. Required)		3. Disapproved w/comment		6. Receipt acknowledged			
17. SIGNATURE/DISTRIBUTION (See Approval Designator for required signatures)											
(G) Rea- son	(H) Disp.	(J) Name	(K) Signature	(L) Date	(M) MSIN	(G) Rea- son	(H) Disp.	(J) Name	(K) Signature	(L) Date	(M) MSIN
2	1	Design Authority R. Whitehurst		3/30/99							
2	1	Designated Engineer C. Van Katwijk		3/30/99							
2	1	QA T. D. Hays		3/30/99							

18. C. Van Katwijk Signature of EDT Originator		19. T. Choho Authorized Representative Date for Receiving Organization		20. R. Whitehurst Design Authority/ Cognizant Manager		21. DOE APPROVAL (if required) Ctrl. No. ☐ Approved ☐ Approved w/comments ☐ Disapproved w/comments	
---	--	--	--	---	--	---	--

Ashcroft Temperature Switch and Thermowell – Tempered Water Cask Inlet High Temperature

S

Carl Van Katwijk
Numatec Hanford Co, Richland, WA 99352
U.S. Department of Energy Contract DE-AC06-96RL13200

EDT/ECN: 626254	UC: 620
Org Code: 2G300	Charge Code: 105559/A000
B&R Code: 39EW40400	Total Pages: 14

Key Words: Temperature Switch and Thermowell

Abstract: Ashcroft Temperature Switch and Thermowell – Tempered Water Cask Inlet High Temperature
CGI-SNF-D-47-P4-005

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Manuel 3/31/99
Release Approval

Date

Release Stamp

Approved for Public Release

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Title: **ASHCROFT TEMPERATURE SWITCH AND THERMOWELL**

- TEMPERED WATER CASK INLET HIGH TEMPERATURE

Section 1 Part Information

Item No.: NA	Manufacturer:	Supplier:
Mfg. Part/Model No.:	Supplier's P/N:	
Part Description:		
End Use Description:		

Section 2a Component Information

Equipment No.: TW-TSH 1*28; TSH 1*29;	Specification No.: W-441-P4, Rev. 2	Manufacturer: Ashcroft	Past P.O. No.: NA
Manufacturer's Part/ : Model No.: SWITCH;- LTD-N4-KK-00-060- 20°-95° C. Thermowell; 15-W-0450-HF385C2R150	Equipment Supplier (if different from manufacturer): TBD		Equip. Supplier's Part No.: NA

Component Description: **Tempered water high temperature switch and thermowell. Trip signal to SCIC on tempered water cask inlet high temperature.**

Section 2b Qualified Vendor/Supplier Survey

1. Is the Item available from a catalog from a qualified NQA1 ~~or ISO 9000~~ supplier (coordinate with project CGI interface Engineer or BTR)?

☐ YES (go to #2 below)

☒ NO (go to procedure step 5.3.2, proceed to dedicate item.)

2. List of Candidate qualified suppliers ~~or ISO 9000 suppliers~~ *Rev 12/21/98*

company name and type

contact name

phone

NA

3. Recommended Procurement Strategy (coordinate with project CGI interface Engineer or BTR):

NA

Section 2c CGI Determination

1. Question #1: Is the Item subject to design or specification requirements that are unique to nuclear facilities or activities?

☐ YES (the Item is not commercial grade)

☒ NO (continue)

2. Question #2: Is the Item used in applications other than nuclear facilities or activities?

☐ NO (the item is not commercial grade)

☒ YES (continue)

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- TEMPERED WATER CASK INLET HIGH TEMPERATURE

3. Question #3: Is the Item ordered from manufacturer/supplier on the basis or specifications set forth in the manufacturers catalog?

☐ NO (the Item is not commercial grade)

☒ YES (continue)

☒ All three criteria have been satisfied. The Item meets the definition of commercial grade.

Section 2d Reason for Dedication

The above described Item is being Dedicated for use in the application cited for the following reason(s):

☒ Item is being purchased from a non ESL manufacturer supplier as commercial grade to be used in a Safety Class application.

☐ Item is being purchased from a non ESL manufacturer supplier as commercial grade to be used in a Safety Significant application.

☐ Item was purchased from a non ESL manufacturer supplier as commercial grade to be used in a Safety Class application.

☐ Item was purchased from a non ESL manufacturer supplier as commercial grade to be used in a Safety Significant application.

☐ Other ('like-for-like', similar, substitution, replacement evaluation)

Section 3 Failure Effects Evaluation

A. Part/Component Safety Function:

1. **Provide process trip to SCIC on high tempered water cask inlet temperature.**

2.

3.

B. Part/Component Functional Mode:

Safety Function #1:

☒ Active – Mechanical or Electrical change of state is required to occur for the component to perform its safety function.

☐ Passive – Change of state is not required for the component to perform its safety function

Safety Function #2:

☐ Active – Mechanical or Electrical change of state is required to occur for the component to perform its safety function.

☐ Passive – Change of state is not required for the component to perform its safety function

Safety Function #3:

☐ Active – Mechanical or Electrical change of state is required to occur for the component to perform its safety function.

☐ Passive – Change of state is not required for the component to perform its safety function.

C. Host Component Safety Function (if applicable):

1. **NA**

2.

3.

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Title: **ASHCROFT TEMPERATURE SWITCH AND THERMOWELL**

- TEMPERED WATER CASK INLET HIGH TEMPERATURE

D. Failure Mechanisms(s) and the effects on component or system safety function (see worksheet 1):

1. **Failure in switch mechanism (failure of contacts to open) resulting in loss of tempered water high temperature trip to SCIC.**
2. **Failure to ground resulting in loss of output signal or loss of input power, resulting in loss of signal to the SCIC.**
- 3.
- 4.
- 5.

Section 4 Environmental & Natural Phenomena Hazard Design

Environmental Qualification Required:

Yes []

No [X]

Environmental Condition B

If yes: Environmental Qualification Requirements

Limiting Environmental Conditions

Required Safety Functions: **provide alarm and trip signal to SCIC on high tempered water temperature at cask inlet (temperature switch).**

Qualification Period:

Natural Phenomena Hazard (NPH) Design Required:

Yes []

No [X]

HNF-PRO-97, Rev. 0

W-441-P4, Rev. 2

If yes: NPH Design Requirements

Performance Category: **PC-1**

NPH Design Req'ts.: **NA**

Required Safety Functions:

Section 5 Component Functional Classification

[X] Safety Class (SC)

[] General Service

[] Safety Significant (SS)

If part/component classification is different from host component/system, document basis.

Section 6 (reserved)

Section 7 (reserved)

Section 8 References (for Functional Classification)

National Codes/Standards: **IEEE 379, IEEE384, IEEE 603, IEEE 627**

Safety Analysis Report (SAR):
HNF-SD-SNF-SAR-002, Rev. 4A

Drawings: **H-1-82161, Rev. 2**
HNF-SD-SNF-SEL-002, Rev. 4

Vendor Manuals/Manufacturer/Supplier Information: **Ashcroft I series temperature switches, bulletin SW-12.**

Other:

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Title: **ASHCROFT TEMPERATURE SWITCH AND THERMOWELL**

- TEMPERED WATER CASK INLET HIGH TEMPERATURE

Section 9 Critical Characteristics

Critical Characteristics	Acceptance Criteria/Tolerances	Acceptance Method	ID	Function
Verification Document: Vendor Specifications; HNF-SD-SNF-SEL-002, Rev. 4				
1. Item Identification Critical Characteristics (necessary for reasonable assurance that the Item delivered is the Item specified)				
Nameplate Data	Per Vendor Manual	1,IN	X	
Model Number, Switch	LTD-N4-KK-00-060-20°- 95°C	1,IN	X	
Model Number, Thermowell	15-W-0450-HF385C2R150	1,IN	X	
Enclosure	NEMA 4	1,IN	X	
Manufacturer	Ashcroft	1,IN	X	
2. Physical Critical Characteristics (necessary for reasonable assurance that the Item delivered is the Item specified)				
Material, Temperature Switch Probe	Stainless Steel	1,T	X	
Material, Thermowell	Stainless Steel	1,T	X	
Process Connection, Thermowell	Stainless Steel; 1 1/2" 150# Flanged	1,T 1,IN	X	
Thermowell, "U" Dimension	Nominal 4 1/2 Inches	1,IN	X	
Sensing Bulb Length, "S" Dimension	Nominal 6 Inches	1,IN	X	
3. Performance Critical Characteristics (necessary & sufficient for reasonable assurance that the Item will perform its intended safety function(s))				
Set Point Repeatability	+/- 1% of Span over the operating temperature range	1,T		X
Operating Range	20°-95°C.	1,T		X
Environmental	Note 1.			
Seismic Condition	NA			
Switch Contact Rating	Nominal 15 Amps at 120 VAC, Less Than 0.5 Volt Drop Across Contacts	1,T		X
Contact Position	Contact to Open on Temperature Increase	1,T		X
Insulation Resistance	Greater Than 10 Megohm Resistance	1,T		X
4. Notes and Legend:		Acceptance Method:		
1. The temperature switch includes a split rubber grommet which is not subject to degradation at conditions of 40°F and 60% RH or 115°F and 22% RH and is suitable for Environmental Condition B application.		1. Special Test and Inspection 1,IN for Inspection 1,T for Test 2. Commercial Grade Survey 3. Source Verification 4. Vendor/Item History		

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Title: ASHCROFT TEMPERATURE SWITCH AND THERMOWELL
- TEMPERED WATER CASK INLET HIGH TEMPERATURE

Section 10 Initial Reviews and Approvals

Approvals:

Designated Engineer: *Edna Blum* 12/21/98

Design Authority: *James Whitehurst* 12/21/98

QA Engineer: *John Day* 12/21/98

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- TEMPERED WATER CASK INLET HIGH TEMPERATURE

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WORKSHEET 1 DETERMINATION OF FAILURE MECHANISMS/MODES

SECTION 1

Typical Failure Mechanisms	Definition	Applicable to Component under Evaluation
Fracture	Separation of a solid accompanied by little or no macroscopic plastic deformation.	Yes [] No [X]; If Yes, indicate failure Mode _____
Corrosion	The gradual deterioration of a material due to chemical or electrochemical reactions, such as oxidation, between the material and its environment.	Yes [] No [X]; If Yes, indicate failure Mode _____
Erosion	Destruction of materials by the abrasive action of moving fluids, usually accelerated by the presence of solid particles carried with the fluid.	Yes [] No [X]; If Yes, indicate failure Mode _____
Open Circuit	An electrical circuit that is unintentionally broken so that there is no complete path for current flow.	Yes [X] No [] ; If Yes, indicate failure Mode <u>Failure of switch contacts to make or break resulting in loss of signal input to the SCIC.</u>
Short Circuit	An abnormal connection by which an electrical current is connected to ground, or to some conducting body, resulting in excessive current flow.	Yes [X] No [] ; If Yes, indicate failure Mode <u>Failure to ground resulting in loss of output signal or loss of input power, resulting in loss of signal input to the SCIC.</u>
Blockage	Clogging of a filtering medium resulting in the inability to perform its purification function or blockage of flow.	Yes [] No [X]; If Yes, indicate failure Mode _____
Seizure	Binding of a normally moving item through excessive pressure, temperature, friction, jamming.	Yes [] No [X]; If Yes, indicate failure Mode _____
Unacceptable Vibration	Mechanical oscillations produced are beyond the defined permissible limits due to unbalancing, poor support, or rotation at critical speeds.	Yes [] No [X]; If Yes, indicate failure Mode _____
Loss of Properties	A loss of mechanical and physical properties of a material due to exposure to high temperatures, radiation exposure.	Yes [] No [X]; If Yes, indicate failure Mode _____
Excess Strain	Under the action of excessive external forces the material of the part has been deformed or distorted.	Yes [] No [X]; If Yes, indicate failure Mode _____
Mechanical Creep	From prolonged exposure to high temperature and stress, the object will show a slow change in its physical (shape and dimension) and mechanical characteristics.	Yes [] No [X]; If Yes, indicate failure Mode _____
Ductile Fracture	Fracture characterized by tearing of metal accompanied by appreciable gross plastic deformation.	Yes [] No [X]; If Yes, indicate failure Mode _____

Section 2. Additional Failure Modes Applicable To The Component Under Evaluation

1. Switch Mechanism Failure
2. Open/Short in Switch Output

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Title: **ASHCROFT TEMPERATURE SWITCH AND THERMOWELL**

- TEMPERED WATER CASK INLET HIGH TEMPERATURE

CHECKLIST 1

ACCEPTANCE METHOD 1

SPECIAL TEST/INSPECTION VERIFICATION

SECTION 1	
Item Description: Ashcroft Temperature Switch and Thermowell System #: 47	Equip #: TW-TSH 1*28; TSH 1*29 Model #: Switch;-LTD-N4-KK-00-060-20°-95° C. Thermowell; 15-W-0450-HF385C2R150
Manufacturer (Address/Phone): Ashcroft P.O. #	Supplier (Address/Phone):

SECTION 2 CRITICAL CHARACTERISTICS TO BE VERIFIED BY METHOD 1.

Insp	Test	Post-Test	
☒	☐	☐	1. Nameplate Data
☒	☐	☐	2. Model Number, Switch
☒	☐	☐	3. Model Number, Thermowell
☒	☐	☐	4. Enclosure
☒	☐	☐	5. Manufacturer
☐	☒	☐	6. Material, Temperature Switch Probe
☐	☒	☐	7. Material, Thermowell
☒	☒	☐	8. Process Connection, Thermowell
☒	☐	☐	9. Thermowell, "U" Dimension
☒	☐	☐	10. Sensing Bulb Length, "S" Dimension
☐	☒	☐	11. Set Point Repeatability
☐	☒	☐	12. Operating Range
☐	☒	☐	13. Switch Contact Rating
☐	☒	☐	14. Contact Position
☐	☒	☐	15. Insulation Resistance

SECTION 3 BY INSPECTION

* See Attachment G of Desk Instruction for Sampling Size

Characteristic: **Nameplate Data**

Sample Size*: **All Items**

Acceptance Criteria: **Per Vendor Manual**

Receipt Inspection Plan / Report #: _____

References (see Section 7): **Ashcroft L Series Temperature Switches Bulletin SW-12**

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Title: **ASHCROFT TEMPERATURE SWITCH AND THERMOWELL**
- TEMPERED WATER CASK INLET HIGH TEMPERATURE

Characteristic: Model Number, Switch**Sample Size*: All Items****Acceptance Criteria: LTD-N4-KK-00-060-20°- 95°C****Receipt Inspection Plan / Report #:** _____**References (see Section 7):** _____**Characteristic: Model Number, Thermowell****Sample Size*: All Items****Acceptance Criteria: 15-W-0450-HF385C2R150****Receipt Inspection Plan / Report #:** _____**References (see Section 7):** _____**Characteristic: Enclosure****Sample Size*: All Items****Acceptance Criteria: NEMA 4****Receipt Inspection Plan / Report #:** _____**References (see Section 7):** _____**Characteristic: Manufacturer****Sample Size*: All Items****Acceptance Criteria: Ashcroft****Receipt Inspection Plan / Report #:** _____**References (see Section 7):** _____**Characteristic: Process Connection, Thermowell****Sample Size*: All Items****Acceptance Criteria: 1 1/2" 150# Flange****Receipt Inspection Plan / Report #:** _____**References (see Section 7):** _____**Characteristic: Thermowell, "U" Dimension****Sample Size*: All Items****Acceptance Criteria: Nominal 4 1/2 Inches****Receipt Inspection Plan / Report #:** _____**References (see Section 7):** _____**Characteristic: Sensing Bulb Length, "S" Dimension****Sample Size*: All Items****Acceptance Criteria: Nominal 6 Inches****Receipt Inspection Plan / Report #:** _____**References (see Section 7):** _____

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SECTION 4 BY SPECIAL TEST

* See Attachment G of Desk Instruction for Sampling Size

Test To Be Performed by:

☐ Purchaser

☐ Supplier/Manufacturer**

☐ Other

Number of Items to be Tested:

Test/Inspection Location:

Characteristic for Test: **Material, Temperature Switch Probe**

Acceptance Criteria: **Stainless Steel**

Sample Size*: **Normal Sampling Size**

Actual Test Value:

Test Plan and Report #: _____ References (see Section 7): _____

Characteristic for Test: **Material, Thermowell**

Acceptance Criteria: **Stainless Steel**

Sample Size*: **Normal Sampling Size**

Actual Test Value:

Test Plan and Report #: _____ References (see Section 7): _____

Characteristic for Test: **Process Connection, Thermowell**

Acceptance Criteria: **Stainless Steel**

Sample Size*: **Normal Sampling Size**

Actual Test Value:

Test Plan and Report #: _____ References (see Section 7): _____

Characteristic for Test: **Set Point Repeatability**

Acceptance Criteria: **+/- 1% of Span over the operating temperature range.**

Sample Size*: **Normal Sampling Size**

Actual Test Value:

Test Plan and Report #: _____ References (see Section 7): _____

Characteristic for Test: **Operating Range**

Acceptance Criteria: **20°-95°C.**

Sample Size*: **Normal Sampling Size**

Actual Test Value:

Test Plan and Report #: _____ References (see Section 7): _____

Characteristic for Test: **Switch Contact Rating**

Acceptance Criteria: **Nominal 15 Amps at 120 VAC, Less Than 0.5 Volt Drop Across Contacts**

Sample Size*: **Normal Sampling Size**

Actual Test Value:

Test Plan and Report #: _____ References (see Section 7): _____

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Title: **ASHCROFT TEMPERATURE SWITCH AND THERMOWELL**

- TEMPERED WATER CASK INLET HIGH TEMPERATURE

Characteristic for Test: **Contact Position**

Acceptance Criteria: **Contact to Open on Temperature Increase**

Sample Size*: **Normal Sampling Size**

Actual Test Value:

Test Plan and Report #: _____ References (see Section 7): _____

Characteristic for Test: **Insulation Resistance**

Acceptance Criteria: **Greater Than 10 Megohm Resistance**

Sample Size*: **Normal Sampling Size**

Actual Test Value:

Test Plan and Report #: _____ References (see Section 7): _____

****If Supplier/Manufacturer or Other, Refer to CGI Checklist-2 for Support Information**

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Section 5 Test/Inspection Summary (Acceptance Method 3)

1. SUMMARY OF VERIFIED CRITICAL CHARACTERISTICS, THEIR VERIFICATION METHODS, AND RESULTS

ITEM DESCRIPTION:

Critical Characteristics				Verification Results							
Critical Characteristics	Acceptance Criteria/Tolerances	ID	Function	Method T/N	Procedure or R#	Check- list ID	Number Tested	Number Failed	Verifying Organization	Printed Name Signature	Date
Nameplate Data	Per Vendor Manual	X									
Model Number, Switch	LTD-N4-KK-00-060-20°-95°C	X									
Model Number, Thermowell	15-W-0450-HF385C2R150	X									
Enclosure	NEMA 4	X									
Manufacturer	Ashcroft	X									
Material, Temperature Switch Probe	Stainless Steel	X									
Material, Thermowell	Stainless Steel	X									
Process Connection, Thermowell	Stainless Steel; 1 1/2" 150# Flanged	X									
Thermowell, "U" Dimension	Nominal 4 1/2 Inches	X									
Sensing Bulb Length, "S" Dimension	Nominal 6 Inches	X									
Set Point Repeatability	+/- 1% of Span over the operating temperature range.		X								
Operating Range	20°-95°C.		X								
Environmental	NA										
Seismic Condition	NA										
Switch Contact Rating	Nominal 15 Amps at 120 VAC, Less Than 0.5 Volt Drop Across Contacts		X								
											SNF-3880

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- TEMPERED WATER CASK INLET HIGH TEMPERATURE

Contact Position	Contact to Open on Temperature Increase	X							
Insulation Resistance	Greater Than 10 Megohm Resistance	X							

2. DISPOSITION OF UNVERIFIED OR FAILED CRITICAL CHARACTERISTICS									
Critical Characteristic	Disposition								

3. SIGNATURE INDICATES ALL CRITICAL CHARACTERISTICS VERIFIED SATISFACTORY OR ACCEPTABLY DISPOSITIONED AND COMMERCIAL GRADE DEDICATION IS SATISFACTORY AND COMPLETE.									
Testing Agency Approval: _____					BUYER VERIFICATION				
Testing Agency QA Engineer: _____					Design Authority: _____				
					Date: _____				
					QA Engineer: _____				
					Date: _____				

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Title: ASHCROFT TEMPERATURE SWITCH AND THERMOWELL

- TEMPERED WATER CASK INLET HIGH TEMPERATURE

Section 6: Contacts/Phone Numbers

Name	Phone
Design Authority	()
QA	()
QC	()
Cog - Engineer	()
CGI Engineer	()
Procurement Engineer	()
Other	()

Section 7: Supporting Documentation for this Checklist

Initial Procurement Documents	For Critical Characteristics
☐ Drawings:	
☐ Manuals (specify type & number):	
☐ Design Calculations	
☐ Installation Instructions	
☐ Operation Instructions	
☐ Calibration Instructions	
☐ Manufacturer's Recommended Spare Parts List	
☐ Other:	
Procurement Documents	
☐ Certificate of Conformance/Compliance	
☐ Seismic Qualification Certificate	
☐ Environmental Qualification Certificate	
☐ Test Report (s):	
☐ Inspection Report (s):	
☐ CMTRs for ASME Pressure Retaining Materials	
☐ Valve Seat Leakage Report	
☐ Weld Records	
☐ Material Traceability Record	
☐ Other:	