CALCULATION
ED-Q2268-87322
480V Reactor MOV Board 2A
w/data sheet attachments 1-6, 11, 13, 14

Form 10697 TV-72164A
TSD-E034

EBASCO SERVICES INC
CALCULATION COVER SHEET Q. A. Record

TITLE: THERMAL OVERLOAD HEATER CALCULATIONS - 480V REACTOR MOV BD 2A	PLANT/UNIT: BFNP/2
PREPARING ORGANIZATION: EBASCO	KEY NOUNS (Consult RIMS DESCRIPTORS LIST): THERMAL OVERLOAD CALCULATION
BRANCH/PROJECT IDENTIFIERS: ED-Q2268-87322	Each time these calculations are issued, preparer must ensure that the original (RO) RIMS accession number is filled in.
APPLICABLE DESIGN DOCUMENT(S): AS REFERENCED	Rev (for RIMS' use) / RIMS accession number
SAR SECTION(S): N/A	UNID SYSTEM(S): 268

RO 8804110010 (203) — B22 '880331 103

R1 880824F0015 (208) — B22 '88 0815 103

R2 —

R3 —

Revision 0	R1	R2	R3
ECN No. (or indicate Not Applicable) E-2-P7010	ECN H1239 RA		
Prepared: (BHATT) 3-13-88	3-21-88 Ramm Kohli		
Checked: 3-15-88	7-29-88		
Reviewed: 3/21/88	8/11/88		
Approved:			
Date: 3/23/88	8/11/88		
List all pages added by this revision.	4A, 5A, 6A, 7A, NONE 8A 10-11		
List all pages deleted by this revision.	NONE 4, 5, 6, 7, 8		
List all pages changed by this revision.	AS NOTED		

Safety-related? Yes ☒ No ☐

Statement of Problem

THERMAL OVERLOAD HEATERS (TOL) AT BFNP WERE NOT PREVIOUSLY DOCUMENTED.

THIS CALCULATION DETERMINES THE DESIGN AND EVALUATES THE INSTALLED TOL HEATERS PER REQUIREMENTS OF OIR EEB 87031.

Abstract

These calculations contain an unverified assumption(s) that must be verified later. Yes ☐ No ☒

CLASSIFICATION: R1

ESSENTIAL
DIRECT DESIGN INPUT

ORIGINAL

Ebasco QR
No. of pages 210
RD
Final 3-11-88

☐ Microfilm and store calculations in RIMS Service Center. Microfilm and destroy. ☐

☐ Microfilm and return calculations to: Calculation File Room Address: E3, BFN

TVA

CALC. TION NO: ED-Q2268-87322
THERMAL OVERLOAD HEATER CALCULATIONS -
480V REACTOR MOV BD 2A

Title:

REVISION LOG

Revision No.	DESCRIPTION OF REVISION	Date Approved
0	THIS CALCULATION VOIDS AND SUPERSEDES CALCULATION NO BFEP-E1-86060, RIMS B22 870403 116 AND ALL REVISIONS THERETO.	
1	REVISED HEATER SIZES BASED ON CLARIFICATION OF G.E. INSTRUCTIONS.	8/11/88

PREPARED RK 7-21-88
CHECKED JPM 7-29-88 | REV. 1

TABLE OF CONTENTS

R1

1.0 GENERAL

1.1 Purpose

The purpose of this calculation is to establish the requirements and guidelines to evaluate, verify, control and retain engineering design calculations for thermal overload relay (TOL) heaters.

1.2 Scope

The scope of this calculation is to determine the design for TOL heater sizes and settings and to evaluate the installed TOL heaters for continuous duty motors and motor operated valve motors powered from the Motor Control Center (MCC) required for Unit 2 restart at Browns Ferry Nuclear Plant utilizing QIR EEB 87031 design criteria. (Ref. #5)

2.0 CRITERIA

The manufacturer's recommendations are used in the selection of overload heaters. The overload heater sizes and settings will be in accordance with the design criteria in QIR EEB 87031. For calculations of continuous duty motors and motor operated valve motors refer to the thermal overload heater calculation sheets performed for the individual motors. The presently installed overload heaters will be considered acceptable if they do not exceed the limits specified in the design criteria or shall be replaced with the properly sized heaters determined in section 2 of continuous duty motor calculation sheet or section 3 of MOV motor calculation sheet.

2.1 Continuous Duty Motors

The following procedures are to be used for continuous duty motors:

2.1.1 The walkdown input data for the motor nameplate and motor control center will be recorded and used to perform the calculations. (Ref. #3)

2.1.2 Temperature Correction Factor

Manufacturer's recommendations shall be followed when non-accident ambient temperatures of the motor and motor control centers are within 10° - 18°C of each other. If the temperature difference is higher, the full load current shall be multiplied by temperature correction factor before selecting the overload heater. (Ref. #5)

The temperature correction factor is the ratio of motor ambient temperature correction factor and overload heater ambient temperature correction factor. (Ref. #5)

SUPERSEDED BY (A PAGE) OF

This Sheet Added by Rev. 1

1.0 GENERAL

1.1 Purpose

The purpose of this calculation is to establish the requirements and guidelines to evaluate, verify, control and retain engineering calculations for thermal overload relay (TOL) selection.

1.2 Scope

The scope of this calculation is to determine the design for TOL heater sizes and settings and to evaluate the installed TOL heaters for continuous duty motors and motor operated valve motors powered from the Motor Control Centers (MCC) required for Unit 2 restart at Browns Ferry Nuclear Plant utilizing QIR-EEB-87031 design criteria. (Ref. #5)

2.0 CRITERIA

The manufacturer's recommendations are used in the selection of overload heaters. The overload heater sizes and settings will be in accordance with the design criteria in QIR-EEB-87031. | R1

2.1 Continuous Duty Motors

Following is the process to be used in the selection of thermal overload heaters for continuous duty motors: | R1

2.1.1 The walkdown input data for the motor nameplate and motor control center will be recorded and used to perform the calculations. (Ref. #3)

2.1.2 Temperature Correction Factor

Manufacturer's recommendations shall be followed when non-accident ambient temperatures of the motor and motor control centers are within 10°C of each other. If the temperature difference is higher, the full load current shall be multiplied by temperature correction factor before selecting the overload heater. (Ref. #5)

The temperature correction factor is the ratio of motor ambient temperature correction factor and overload heater ambient temperature correction factor. (Ref. #5)

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CHECKED glm 7-29-88

2.1.3 Designed thermal overload heaters are sized as follows:

a) The service factor is determined from the walkdown input data. From Ref. #1 sh. 1, the derating factor is selected and the motor nameplate full load current is multiplied by the derating factor to determine the maximum full load current to be used in the heater table. (Ref. #1 sh. 8)

b) The heater catalog number is selected for the starter NEMA size and maximum full load current calculated in Item 2.1.3 a. If the maximum full load current does not match the heater table, use the next larger maximum motor full load current and adjust the percent setting of the overload relay as required.

c) The degree of protection provided by the overload heater is evaluated by multiplying the maximum motor full load current given in the heater table by 125% and dividing by the motor nameplate full load current. (Ref. #9)

d) This value is then compared to the design criteria for acceptance. (Ref. #5)

2.1.4 The installed thermal overload heaters are evaluated as follows:

The maximum motor full load current given in the table is multiplied by 125% and by the percent setting of the overload relay. This value is the trip current of the overload heater. The trip current of the heater is then divided by the nameplate full load current of the motor to determine the percent protection. (Ref. #9) This value is then compared to the design criteria for acceptance. (Ref. #5)

2.1.5 Section 4 of the calculation sheet makes the recommendation to either leave the installed heater and adjust setting as necessary or to replace with the thermal overload heater sized in section 2 of the calculation sheet.

2.2 Motor Operated Valve Motors

The following procedures are to be used for motor operated valve motors.

2.2.1 The walkdown input data for the motor nameplate and motor control center will be recorded and used to perform the calculations. (Ref. #3)

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2.1.3 Thermal overload heaters for continuous-duty motors are sized as follows:

a) The service factor is determined from the walkdown input data. Multiply the motor nameplate full load current by the service factor derating factor to determine the current to be used when selecting a heater from the heater table. (Ref. #1 Sh. 8)

b) The heater is selected from the heater table for the starter size it will be used with. The heater minimum current must be equal to or greater than the motor full load current calculated in Item 2.1.3 a above.

c) Heater minimum current is determined from the heater tables by the method described in G.E. "Application Tips" dated March 11, 1983 No. 001.

d) The degree of protection provided by the overload heater is evaluated by multiplying the heater minimum current by 1.25 and dividing by the motor nameplate full load current. (Ref. #9) R1

e) This value is then compared to the design criteria for acceptance. (Ref. #5)

2.1.4 Acceptability of existing thermal overload heaters will be determined using the method described in 2.1.3 above and based on the following:

a) Heaters will be selected based on an overload relay setting of 100%.

b) Existing heaters will be reset or replaced as required.

2.2 Motor Operated Valve Motors

Following is the process to be used in the selection of thermal overload heaters for motor operated valve motors:

2.2.1 The walkdown input data for the motor nameplate and motor control center will be recorded and used to perform the calculations. (Ref. #3)

2.2.2 Designed thermal overload heaters are sized as follows:

Using the time-current curve for the overload relay (Ref. # 1 Shts 5 through 7) locate the 15 second point and determine the current rating multiple for the particular zone of curve selected. Locked rotor current is divided by the current rating multiple to calculate the trip current. Divide trip current by factor of 1.25 to determine the heater selection current. (Ref. #9)

2.2.3 The heater catalog number is selected for the starter NEMA size and the heater selection current from heater selection table (Ref. #1, Sh. 8). If the heater selection current does not match the heater table, use the next larger maximum heater selection current. This value is the maximum full load current of the heater (Im).

2.2.4 The overload heater trip current (It) is calculated by multiplying maximum motor full load current (Im) by factor of 1.25 and the percent setting of the overload relay. (Ref. #9)

2.2.5 Determine the tripping time of the heater at 100% Full Load Current (FLC), 200% FLC and Locked Rotor Current/Amps (LRA) by dividing these values by the tripping current for each value. The percent values obtained shall be compared to the time vs current curves giving time in seconds. The heater tripping zones are given in Ref. #1 Shts 2, 3, & 4 and time-current curves are given in Ref. # 1 Shts 5, 6, & 7. If the trip time does not fall within the acceptance criteria, then overload relay setting shall be adjusted to bring the trip time with the acceptance criteria outlined in OIR EED 87032 (Ref. #5)

2.2.6 Installed thermal overload heaters are evaluated as follows:

The heater catalog number is located in the heater selection table (Ref. #1 Sht 8) for the proper size NEMA starter. The maximum motor full load current is located opposite the catalog number. After determining the maximum motor full load current follow steps 2.2.4 and 2.2.5 above to determine the tripping time of the overload heater for 100% FLC, 200% FLC and LRA.

2.2.7 Section 5 of the calculation sheet makes the recommendation either to leave the installed heater and adjust the setting as necessary or to replace thermal overload heater with the one sized in section 3 of the calculation sheet.

2.2.8 If the Locked Rotor Current/Amps (LRA) is to be determined from the NEC code letter, select the value from Sec. 3.6 NEC Table 430-7(b) and multiply by the motor rated horsepower. The KVA value obtained is divided by the square root of three and the motor rated voltage to determine the motor Locked Rotor Current/Amps (LRA).

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2.2.2 Thermal overload heaters for motor operated valves are sized as follows:

a) Using the time-current curve for the overload relay (Ref. #1 Shts. 5-7) locate the 15 second point and determine the current rating multiple for the particular zone of curve selected. Locked rotor current is divided by the current rating multiple to calculate the trip current. Divide trip current by factor of 1.25 to determine the heater selection current. (Ref. #9)

b) The heater is selected for the starter size it will be used with. The heater selected should have minimum current rating equal to or less than the current calculated in 2.2.2a above.

c) The overload relay trip current (It) is calculated by multiplying heater minimum current (Im) by factor of 1.25. (Ref. #9)

d) Determine the tripping time of the heater at 100% Full Load Current (FLC), 200% FLC and Locked Rotor Current by dividing these values by the tripping current. The percent values obtained shall be used to determine the maximum and minimum trip times from the heater curve operating band and recorded on the calculation worksheet. The heater tripping zones and time-current curves are given in TVA memorandum dated March 2, 1987 (RIMS B22 870302 013). The values obtained will then be compared to the criteria outlined in OIR-EEB-87031 to verify the acceptability of heater selected. R1

2.2.3 Acceptability of existing thermal overload heaters will be determined using the method described in 2.2.2 above and based on the following:

a) Heaters will be selected based on an overload relay setting of 100%.

b) Existing heaters will be reset or replaced as required.

2.2.4 If the Locked Rotor Current/Amps (LRA) is to be determined from the NEC code letter, select the maximum value from Sec. 3.6 NEC Table 430-7(b) and multiply by the motor rated horsepower. The KVA value obtained is divided by the square root of three and the motor rated voltage to determine the motor Locked Rotor Current.

2.2.5 For cases where the 200% FLC criteria stated in OIR-EEB-87031 is not met, acceptability of the selected heater is proven by demonstrating that full load current can be carried for at least the motor duty cycle which is greater than 2 times the valve stroke time. This meets the alternate criteria stated in the OIR.

3.0 CODES AND STANDARDS

3.1 National Electric Code - NFPA 70-1987, 430-32 & 430-34 for Continuous Duty Motors.

3.2 IEEE Transactions - Vol. PAS-100, No. 1, Jan. 1981, Pg. 43, Motor Overload Protection for Motors on Motor-Operated Valves.

3.3 National Electrical Manufacturers Association (NEMA) - Standards.

3.4 American National Standard for Electrical Power Systems and Equipment - Voltage Rating (60 Hz) ANSI C84.1 1982.

3.5 National Electrical Code - NFPA 70-1987, 430-110 (C3).

3.6 National Electrical Code - NFPA 70-1987, Tab 430-7 (b).

4.0 ASSUMPTIONS

4.1 Assumptions will be made for the required data to perform the calculations where the walkdown input data is not available. Assumptions shall be noted in the calculation sheets based on the following documentation:

a) TVA's design approved drawings and EQP walkdown input data
b) Manufacturer's published data
c) By similarity among motors with same characteristics (e.g. used for alike functions, same size MOV operator, same horsepower, purchased on same contract).
d) Vendor drawings.

4.2 Locked rotor current for small motors below 1/2 HP that are not listed in the reference tables will be six (6) times full load current (NFPA 70-1987, 430-110 (C3)).

4.3 Continuous duty motors will be considered to be a Design B, Class B Insulation, 40°C Rise, NEC Code C, continuous duty and a Service Factor of 1 unless stated otherwise in the walkdown input data (Ref. #3).

4.4 The ambient temperature differential is assumed to be less than 13°C for all continuous duty motors where the average ambient temperature does not exceed 40°C.

5.0 DESIGN INPUT DATA

Ref. #1 Technical Justification - Thermal Overload Heaters (RIMS B22 870302 013).

Att. A: General Electric publications for CR124 overload relays and heaters applications, sheets 1 through 8.

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3.0 CODES AND STANDARDS

3.1 National Electric Code - NFPA 70-1987, 430-32 & 430-34 for Continuous Duty Motors.

3.2 IEEE Transactions - Vol. PAS-100, No. 1, Jan. 1981, Pg. 43, Motor Overload Protection for Motors on Motor-Operated Valves.

3.3 National Electrical Manufacturers Association (NEMA) - Standards.

3.4 American National Standard for Electrical Power Systems and Equipment - Voltage Rating (60 Hz) ANSI C84.1 1982.

3.5 National Electrical Code - NFPA 70-1987, 430-110 (C3).

3.6 National Electrical Code - NFPA 70-1987, Tab 430-7 (b).

4.0 ASSUMPTIONS

4.1 Assumptions will be made for the required data to perform the calculations where the walkdown input data is not available. Assumptions shall be noted in the calculation sheets based on the following documentation:

a) TVA's design approved drawings and EQP walkdown input data
b) Manufacturer's published data
c) By similarity among motors with same characteristics (e.g. used for alike functions, same size MOV operator, same horsepower, purchased on same contract).
d) Vendor drawings.

4.2 Motor data may be obtained from TVA Design Guide DS-E2.4.6 if unavailable from walkdown data or through assumptions described in 4.1 above.

4.3 Continuous duty motors will be considered to be a Design B, Class B Insulation, 40°C Rise, NEC Code C, continuous duty and a Service Factor of 1 unless stated otherwise in the walkdown input data. (Ref. #3)

4.4 The ambient temperature differential is assumed to be less than 18°C for all equipment where the average ambient temperature does not exceed 40°C.

5.0 DESIGN INPUT DATA

Ref. #1 Technical Justification - Thermal Overload Heaters (RIMS B22 870302 013).

Att. A: General Electric publications for CR124 overload relays and heaters applications, sheets 1 through 8.

Sheet 1 - How to use heater tables.

Sheet 2 - Overload relay heater tripping zones for open relay-open starter or enclosed starter-sizes 00, 0, 1, 2, and 3 - Drawing 4231BA165-3.

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Sheet 1 - How to use heater tables.

Sheet 2 - Overload relay heater tripping zones for open relay-open starter or enclosed starters sizes 00, 0, 1, 2, and 5 - Drawing #231HA165 - 3.

Sheet 3 - Overload heaters tripping zones for open and enclosed size 4 starters - Drawing #545A196 - 1.

Sheet 4 - Overload relay heaters tripping zones for size 3 starters - Drawing #K-9770791 - 1.

Sheet 5 - Time-Current characteristics curves for series 00, 0, 1, 2, and 5 starter overload heaters - Drawing 231HA165-2. Read with sheet #2 listed above.

Sheet 6 - Time-Current characteristics curves for size 3 starter overload heaters - Drawing #K-9770790-1. Read with sheet #4 listed above

Sheet 7 - Time-Current characteristics curves for size 4 starter overload heaters - Drawing #55-172381-1. Use with sheet # 3 listed above.

Sheet 8 - Overload heater selection table extracted from instruction manual GEH-2614C.

Att. B: General Electric approximate motor full load current ratings for motors from 1/4 HP to 400 HP. Sheet 1 of 1.

Ref. #2 Rotork Controls Inc. Publication AE2/01 (4/1983) - Rotork # 7874305 480V motor data for Motor Operated Valves (55C 01057 D, K -01-08-01 Sec. 5 D-03.

Ref. #3 Walkdown Input Data - Motor & Motor Control Centers (QIREQP87073, QIREQP87005, QIREQP87085, QIREQP87096, WD-1063 & WD-1066).

Ref. #4 General Electric letter for sizing Thermal Overload Heaters (RIMS B22 870126 702).

Ref. #5 QIT release QIR EEB 87031 (RIMS P43 870203 903).

Ref. #6 Mechanical Valve Motor Operator tabulation drawings (47A368 Series).

Ref. #7 American National Standard for Electrical Power Systems and Equipment - Voltage Ratings (60 Hz) ANSI C84.1 1982, Page 10.

Ref. #8 Environmental drawings (47A225 Series).

Ref. #9 General Electric Publication - Instructions, Installation and Maintenance of 7700 Line Motor Control Center GEH-2614F, Contract 9[illegible]182.

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This Sheet Added by Rev. 1

Sheet 3 - Overload heaters tripping zones for open and enclosed size 4 starters - Drawing #545A296-1.

Sheet 4 - Overload relay heaters tripping zones for size 3 starters - Drawing #K-9770791-1.

Sheet 5 - Time-Current characteristics curves for series 00, 0, 1, 2, and 5 starter overload heaters - Drawing 231HA165-2. Read with sheet #2 listed above.

Sheet 6 - Time-Current characteristics curves for size 3 starter overload heaters - Drawing #K-9770790-1. Read with sheet #4 listed above

Sheet 7 - Time-Current characteristics curves for size 4 starter overload heaters - Drawing #55-172381-1. Use with sheet # 3 listed above.

Sheet 8 - Overload heater selection table extracted from instruction manual GEH-2614C.

Att. B: General Electric approximate motor full load current ratings for motors from 1/4 HP to 400 HP. Sheet 1 of 1.

<u>Ref. #2</u> Rotork Controls Inc. Publication AE2/01 (4/1983) - Rotork # 7874305 480V Motor data for Motor Operated Valves (55C 01057 D, K -01-08-01) Pg. 5 D-03.

<u>Ref. #3</u> Walkdown Input Data - Motor & Motor Control Centers (QIREQP86073, QIREQP87005, QIREQP87085, QIREQP87096 & WD-1134)

<u>Ref. #4</u> General Electric letter for sizing Thermal Overload Heaters (RIMS B22 870126 702).

<u>Ref. #5</u> QIR Release QIR EEB 87031 (RIMS B43 870203 903), Supplemented by Memorandum (Guha to ~~Raleigh~~ Raughley RK 7/21/88) RIMS B22 68012 011. R1

<u>Ref. #6</u> Mechanical Valve Motor Operator tabulation drawings (47A36? Series).

<u>Ref. #7</u> American National Standard for Electrical Power Systems and Equipment - Voltage Ratings (60 Hz) ANSI C84.1 1982, Page 13.

<u>Ref. #8</u> Environmental drawings (47W225 Series).

<u>Ref. #9</u> General Electric Publication - Instructions, Installation and Maintenance of 7700 Line Motor Control Center GEH-2614?, Contract #?24182.

<u>Ref. #10</u> General Electric "Application Tips" dated 3/11/83, no. 001 GE General Purpose Control Department. R1

<u>Ref. #11</u> TVA Electrical Design Guide DG-E2.4.6 Rev 0

RK 7 PB 68 | REV.1
JLM 7 68

6.0 CALCULATIONS

The calculation for TOL Heaters are prepared on individual set of sheets as identified in the calculation index and contain the following:

a. Walkdown Input Data

b. Manufacturers Data

c. Definitions

d. Acceptance Limits

e. Calculations

f. Design of Overload Heaters

g. Evaluation of Installed Overload Heaters

h. Comments

7.0 SUMMARY OF CALCULATION RESULTS

480V Reactor MOV Bd 2A

42 MCC Compartments have been evaluated in this calculation.

4 MCC Compartment have been addressed by prerequisite ECN's.

45 Individual TOL Heater calculations prepared.

~~8~~ 3 Installed TOL Heater sizes and settings have been determined acceptable.

~~16~~ 2 Installed TOL Heater sizes have been determined acceptable but require resetting. R1

~~20~~ 40 Installed TOL Heater sizes have been determined unacceptable and require replacing and setting.

0 TOL Heater calculations have unverified assumptions.

RI 7-1-88
JPM 1-29-88 | REV. 1

8.0 CONCLUSIONS

All thermal overload (TOL) heaters required for Unit 2 restart have been designed and the installed TOL heaters have been evaluated for compliance with the QIR EEB 87031 design criteria. The evaluation of the installed TOL heaters has determined:

8.1 Acceptable - Use as is.

The following Motor Control Center (MCC) compartment heater sizes and settings have been determined acceptable:

Compt. No.	Compt. No.
~~1A (Fast speed)~~	4A
~~1D (2A1)~~	7C
~~6A~~	
~~10A (Main Turbine Turning Gear)~~	
~~11A~~	
16A	
~~18E~~	
~~R9C2~~	
~~R10F~~	

RI

8.2 Acceptable - Reset.

The following Motor Control Center (MCC) compartment heater sizes have been determined acceptable but require resetting:

Compt. No.	Compt. No.
~~1D (2A2)~~	6A
~~1D (2A3)~~	
~~4A~~	
6C	
~~7B~~	
~~7C~~	
~~10A (Piggy Back Motor)~~	
~~11C~~	
~~12B~~	
~~14E~~	
~~17A~~	
~~17E~~	
~~18A~~	
~~R9A~~	
~~R9B~~	
~~R9E~~	

RI

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8.3 Unacceptable - Replace.

The following Motor Control Center (MCC) compartment heater sizes and setting have been determined unacceptable:

Compt. No.	Compt. No.	Compt. No.
1A (slow speed)	1A (FAST SPEED)	R9A
2B	1D (2A1)	R9B
4B	1D (2A2)	R9C2
4C	1D (2A3)	R9E
4E	7B	R10F
5C	10A (MAIN TURBINE TURNING GEAR)	
5E	10A (PIGGY BACK MOTOR)	
6E	11A	
7E	11C	
8C	12E	
9B2	14E	
9D	17A	
9E	17E	
11B	18A	
12B	18E	
14A		
16E		
17C		
18C		
19A		

R1

8.4 Prequisite

The following Motor Control Center (MCC) compartments have not been addressed in this calculation:

Compt. No.	
11 E	(See ECN-P3117)
13 B	(See ECN-P3118)
13 C	(See ECN-P3117)
14 B	(See ECN-P3118)

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9.0 REFERENCES

9.1 Company Procedure

E-30-TVA-BFNP - Preparation, Review and Approval of Calculations for Browns Ferry Nuclear Plant.

E-76-TVA-BFNP - Procedure for Design Verification for Nuclear Power Plants.

E-77-TVA-BFNP - Procedure for Identifying, Selecting and Documenting Design Inputs for Nuclear Power Plants.

E-7-TVA-BFNP - Processing Drawings for Review and Approval.

I-5-TVA-BFNP - Site Document Control.

PJ-1-TVA-BFNP - Project Filing System.

9.2 TVA Procedure

BFEP-PI-87-29 - Procedure for Assignment of Document Numbers.

NEP 3.1 Calculations

NEP 5.1 Design Output

NEP 5.2 Review

9.3 TVA Calculation

Electrical Equipment Required to Support Unit 2 Restart

RIMS# B43 860206 912.

CALCULATION NO. ED-Q2268-87322		SHEET 1.1 OF 50	
THERMAL OVERLOAD HEATER CALCULATION		REV. 0	DATE 3-12-88
BOARD REF 480V REACTOR MOV BD 2A	COMPUTED BY	THB	DATE 3-12-88
UNIT # 2	CHECKED BY	DJL	DATE 3-15-88

CALCULATION INDEX SHEET #1

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Item No.	Compt. No.	Description	Tag No.	Data Sheet #	Rev. Code	
1	-	Calculation Index Sheets		1.1- 1.2	0	1
2	1A	Sht-dn Bd Rm Exh Fan 2A (Fast Speed)		2.1- 2.3	0	1
3	1A	Sht-dn Bd Rm Exh Fan 2A (Slow Speed)		3.1- 3.3	0	1
4	1D	Turbine Brg Lift Pumps Assy A (2A1)		4.1- 4.3	0	1
5	1D	Turbine Brg Lift Pumps Assy A (2A2)		5.1- 5.3	0	1
6	1D	Turbine Brg Lift Pumps Assy A (2A3)		6.1- 6.3	0	1
7	2B	RHR Outboard Vlv	FCV-74-52	7.1- 7.5	0	1
8	4A	RHR Pmp 2A Cooler Fan		8.1- 8.3	0	1
9	4B	Fuel Pool Make-up from RHR Outbd Vlv	FCV-78-62	9.1- 9.5	0	1
10	4C	RHR Pmp 2A Suction Vlv	FCV-74-01	10.1-10.5	0	1
11	4E	Drywell Equipment Drain Sump Pump 2A		11.1-11.3	0	1
12	5C	RHR Pmp 2C Suction Vlv	FCV-74-12	12.1-12.5	0	1
13	5E	Drywell Floor Drain Pump 2A		13.1-13.3	0	1
14	6A	Core Spray NW Room Cooler Fan		14.1-14.3	0	1
15	6C	RHR Sht-dn Cooling Suction Vlv	FCV-74-02	15.1-15.5	0	1
16	6E	RHR Disch to Main Condenser Vlv	FCV-74-62	16.1-16.5	0	1
17	7B	Drywell Cont Air Compressor 2A		17.1-17.3	0	1
18	7C	RHR Sht-dn Cooling Suction Vlv	FCV-74-13	18.1-18.5	0	1 R1
19	7E	RHR Sys 1 Flush Vlv	FCV-74-104	19.1-19.5	0	1
20	8C	RHR Sht-dn Cooling Suction Isol Vlv	FCV-74-48	20.1-20.5	0	1
21	9B2	Fuel Pool Fltr Dmnrlzr Outbd Isol Vlv	FCV-78-64	21.1-21.5	0	1
22	9D	Fuel Pool Fltr Dmnrlzr Bypass Vlv	FCV-78-65	22.1-22.5	0	1
23	9E	Fuel Pool Isol Vlv	FCV-78-67	23.1-23.5	0	1
24	10A	Main Turbine Turning Gear		24.1-24.3	0	1
25	10A	Main Turbine Turning Gear (Piggy Back Mtr)		25.1-25.3	0	1
26	11A	Reactor Wtr Clean-up Holding Pmp 2A		26.1-26.3	0	1
27	11B	Core Spray Pmp 2A Suction Vlv	FCV-75-02	27.1-27.5	0	1
28	11C	RHR PCS Isol Vlv	FCV-74-57	28.1-28.5	0	1
29	11E	RHR Containment Spray Vlv	FCV-74-61	29.1------	0	1
30	12B	Core Spray Pmp 2C Suction Vlv	FCV-75-11	30.1-30.5	0	1
31	12E	RHR PCS Spray Vlv	FCV-74-58	31.1-31.5	0	1
32	13B	Core Spray Outboard Vlv	FCV-75-23	32.1------	0	1
33	13C	RHR Containment Spray Vlv	FCV-74-60	33.1------	0	1
34	14A	RHR Pump 2C Cooler Fan		34.1-34.3	0	1
35	14B	Core Spray Inboard Vlv	FCV-75-25	35.1------	0	1
36	14E	Core Spray Sys 1 Min Flow Bypass Vlv	FCV-75-09	36.1-36.5	0	1
37	16A	Main Stm Line Drain Vlv	FCV-01-55	37.1-37.5	0	1
38	16E	RWCU Sys Isol Vlv	FCV-69-01	38.1-38.5	0	1
39	17A	Drywell Blower 2A-3		39.1-39.3	0	1
40	17C	RHR Heat Exch A Serv Wtr Disch Vlv	FCV-23-34	40.1-40.5	0	1

EL182

CALCULATION NO. ED-Q2268-87322			SHEET 1.2 OF 50
THERMAL OVERLOAD HEATER CALCULATION		REV. 0	DATE 3-12-88
BOARD REF 480V REACTOR MOV BD 2A	COMPUTED BY	THB	DATE 3-12-88
UNIT # 2	CHECKED BY	DJL	DATE 3-15-88

RK 7-21-88
JPM 7-29-88 REV.1

CALCULATION INDEX SHEET #2

Item No.	Compt. No.	Description	Tag No.	Data Sheet #	Rev. Code	
41	17E	HPCI Stm Supply Line Isol Vlv	FCV-73-2	41.1-41.5	8 1	
42	18A	Drywell Blower 2B-3		42.1-42.3	8 1	
43	18C	RHR Heat Exch C Serv Wtr Disch Vlv	FCV-23-40	43.1-43.5	8 1	
44	18E	Core Spray Test Vlv	FCV-75-22	44.1-44.5	8 1	
45	19A	RCIC Turb Exh Vacuum Relief VLv	FCV-71-59	45.1-45.5	8 1	R1
46	R9A	RHR SW Compt B Sump Pump A		46.1-46.3	8 1	
47	R9B	RHR Sw Compt D Sump Pmp A		47.1-47.3	8 1	
48	R9C2	250V Sht-dn Bd Bat Rm Cxh Fan 2A		48.1-48.3	8 1	
49	R9E	250V Sht-dn Bat Rm Supply Fan 2A		49.1-49.3	8 1	
50	R10F	Cont Atmos Mont Sys Analyzer Return Pmp		50.1-50.3	8 1	

CALCULATION NO. ED-Q2268-87322 SHEET 2.1 OF 50
THERMAL OVERLOAD HEATER CALCULATION REV. 0 DATE 3-12-88
BOARD REF. 480V REACTOR MOV. BD. 2A COMPUTED BY THB DATE 3-12-88
UNIT # 2 DWG. NO. 4582299-2 RQ CHECKED BY — DJA DATE 3-15-88
COMP # 1A EQUIP REF. SHUTDOWN BOARD ROOMS EXHAUST FAN 2A (FAST SPEED)

CONTINUOUS DUTY MOTORS

PREPARED RK 7-21-88 | REV.1
CHECKED JPM 7-29-88 |

WALKDOWN INPUT DATA: (REF # 3)

MOTOR CONTROL CENTER DATA:

STARTER MFGR. GE MODEL CR10950 SIZE 1
O/L RELAY TYPE CR124 HEATER SIZE CR123C7.78A SETTING 115%

MOTOR NAMEPLATE DATA:

H.P. 5 VOLTS 460 FLC 7.1 PHASE 3 INS. CLASS B NEC CODE J
DUTY CONT. S.F. 1.15 TEMP RISE — DEG C. AMBIENT TEMP 40 DEC C

AMBIENT TEMPERATURE: (REF #8)

MOTOR AMBIENT TEMP ≤40 DEG C SHUTDN BD RM NOT PART OF HARSH ENVIRONMENT PER DWG 47W 930-3 REV. C
STARTER AMBIENT TEMP ≤40 DEG C

MANUFACTURER'S DATA:
O/L FACTOR (D.F.) (REF# 1-SH. 1) 1.15 TEMP CORRECTION FACTOR (TCF —)
HEATER TABLE: (REF #1 - SH. 8)

DEFINITIONS

I (t) -- ~~HEATER~~ RELAY TRIP CURRENT MINIMUM
I (m) -- ~~MAXIMUM FULL LOAD~~ CURRENT CORRESPONDING TO THE HEATER CATALOG # RELAY
1.25 -- GENERAL ELECTRIC'S MULTIPLYING FACTOR FOR ESTABLISHING ~~MAXIMUM~~ TRIP CURRENT R1
D.F. -- MOTOR DERATING FACTOR BASED ON MOTOR SERVICE FACTOR. (REF #1 SH 1)
I(n) -- MOTOR NAMEPLATE FULL LOAD CURRENT OR ADJUSTED MOTOR FULL LOAD CURRENT
~~%* -- PERCENT SETTING OF THE OVERLOAD HEATER, EXPRESSED IN PER UNIT (P.U.)~~

ACCEPTANCE LIMITS:

%PROTECTION FROM 125% TO 140% (REF #5)
OVERLOAD HEATERS RANGE FROM 85% to 115%

CALCULATIONS:

1. MOTOR FULL LOAD CURRENT ADJUSTMENT REQUIRED ____ YES ✓ NO
IF YES;

$$I\,(\text{adjusted}) = \frac{V\,(\text{nameplate})}{V\,(\text{operating})} \times I\,(\text{nameplate})$$

I (adjusted) =

FOR THIS CALCULATION I (n) = I ADJUSTED = _____ AMPS

CALCULATION NO. ED-Q2268-87322 | SHEET 2.2 OF 50
THERMAL OVERLOAD HEATER CALCULATION | REV. 0 | DATE 3-12-88
BOARD REF. 480V REACTOR MOV. BD. 2A | COMPUTED BY [illegible] | DATE 3-12-88
UNIT # 2 | DWG. NO. 45B2299-2 RO | CHECKED BY [illegible] | DATE 3-15-88
COMP # 1A | EQUIP REF. SHUTDOWN BOARD ROOMS EXHAUST FAN 2A (FAST SPEED)

2. MOTOR OVERLOAD HEATER SELECTION

PREPARED RK 7-21-88 | REV.1
CHECKED JPM 7-29-88 |

(A) CALCULATION OF HEATER SIZE (REF #5)
I(n)xD.F. = (USE D.F. PER REF #1 SH 1)

7.1 I(n)x 1.0 D.F. = 7.1 AMPS

CATALOG HEATER SIZE ~~CR123B8-67A~~ C9.55A
I(m)= ~~7.64~~ 7.65

(B) CALCULATION FOR OVERLOAD HEATER SETTING:
CALCULATE % PROTECTION USING HEATER SETTING OF 100%
~~7.64~~ / 7.65 I(m) x 1.25 X 100 %* / 7.1 I (n) = 135 % R1

DOES THE % PROTECTION FALL WITHIN THE ACCEPTANCE LIMITS?

✓ YES - THE OVERLOAD HEATER SIZE AND SETTING HAVE BEEN PROPERLY SELECTED.

_____ NO - DETERMINE HEATER SETTING TO MEET THE % PROTECTION ACCEPTANCE CRITERIA BY USING THE CLOSEST ACCEPTANCE LIMIT VALUE.
% * = [% PROTECTION x I(n)] / [I(m) x 1.25]
% * =
% * =

IS % SETTING WITHIN THE OVERLOAD HEATER RANGE?
_____ YES - THE OVERLOAD HEATER SIZE AND SETTING HAVE BEEN PROPERLY SELECTED.
_____ NO - THE OVERLOAD HEATER HAS BEEN IMPROPERLY SIZED.

3. EVALUATION OF INSTALLED MOTOR OVERLOAD HEATER
IS THE HEATER SIZE THE SAME AS CALCULATED IN SECTION 2B?

_____ YES - IS THE HEATER SETTING THE SAME AS CALCULATED IN SECTION 2B?
_____ YES - THE INSTALLED OVERLOAD HEATER SIZE AND SETTING ARE ACCEPTABLE. PROCEED TO SECTION 4.

_____ NO - THE INSTALLED OVERLOAD HEATER SIZE IS ACCEPTABLE, FIELD TO RESET SETTING. PROCEED TO SECTION 4.

✓ NO - ~~PROCEED WITH FOLLOWING~~ ~~CR123C8-78A, I(m) 6.92~~
REPLACE HEATER; (PROCEED TO SECTION 4)

~~EVALUATION OF INSTALLED OVERLOAD HEATER TRIP CURRENT~~
~~I(t) = I(m) x 1.25 x %* = TRIP AMPS~~
~~I(t) = 6.92 I(m) x 1.25 x 95 %* = 8.95 AMPS~~ R1

CALCULATION NO. ED-Q226B-87322 SHEET 2.3 OF 50

THERMAL OVERLOAD HEATER CALCULATION REV. 0 DATE 3-12-88

BOARD REF. 480V REACTOR MOV. BD. 2A COMPUTED BY THS DATE 3-12-88

UNIT # 2 DWG. NO. 45B2299-2 RO CHECKED BY DLQ DATE 3-15-88

COMP # 1A EQUIP REF. SHUTDOWN BOARD ROOMS EXHAUST FAN 2A (FAST SPEED)

PREPARED RK 7-21-88

CHECKED jlm 7-29-88 REV. 1

~~EVALUATION OF INSTALLED OVERLOAD HEATER PROTECTION.~~

~~% PROTECTION = I(t) / I(n) x 100~~

~~9.95 I(t) / 7.1 I(n) x 100 = 140 %~~

~~DOES THE % PROTECTION FALL WITHIN THE ACCEPTANCE LIMITS?~~

~~✓ YES - THE INSTALLED OVERLOAD HEATER SIZE AND SETTING ARE ACCEPTABLE.~~

~~NO - DETERMINE HEATER SETTING TO MEET THE % PROTECTION ACCEPTANCE CRITERIA BY USING THE CLOSEST ACCEPTANCE LIMIT VALUE.~~

~~%* = [% PROTECTION x I (n)] / [I(m) x 1.25]~~

~~%* =~~

~~%* =~~

R1

~~IS % SETTING WITHIN THE OVERLOAD HEATER RANGE?~~

~~YES - THE INSTALLED OVERLOAD HEATER SHALL BE RESET TO THIS VALUE.~~

~~NO - THE INSTALLED OVERLOAD HEATER WAS INCORRECTLY SIZED AND SHALL BE REPLACED WITH THE ONE SELECTED IN SECTION 2B.~~

4. THIS CALCULATION HAS VERIFIED THAT THE SIZE AND SETTING OF THE OVERLOAD HEATER HAVE BEEN CORRECTLY DETERMINED TO BE:

OVERLOAD HEATER SIZE ~~CR123C9.73A~~ C9.55A

OVERLOAD HEATER SETTING ~~115 %~~ 100%

5. COMMENTS: ~~THE INSTALLED TOL HEATERS AND SETTINGS ARE ACCEPTABLE~~ REPLACE THE INSTALLED TOL HEATERS WITH THOSE SHOWN ABOVE.

R1

CALCULATION NO. EQ-Q2268-87322 | SHEET 3.1 OF 50
THERMAL OVERLOAD HEATER CALCULATION | REV. 0 | DATE 5-12-88
BOARD REF. 480V REACTOR MOV. BD. 2A | COMPUTED BY [illegible] THC | DATE 5-12-88
UNIT # 2 | DWG. NO. 458299-2RQ | CHECKED BY DLC | DATE 5-15-88
COMP # 1A | EQUIP REF. SHUT DOWN BOARD ROOMS EXHAUST FAN 2A (SLOW SPEED)

CONTINUOUS DUTY MOTORS

PREPARED RK 7-21-88 | REV. 1
CHECKED JPM 7-29-88

WALKDOWN INPUT DATA: (REF # 3)

MOTOR CONTROL CENTER DATA:

STARTER MFGR. GE MODEL CR109 50 SIZE 1
O/L RELAY TYPE CR124 HEATER SIZE CR123C 2.20A SETTING 115%

MOTOR NAMEPLATE DATA: — (1)

H.P. 1.2 VOLTS 460 FLC 2.6 PHASE 3 INS. CLASS B NEC CODE J
DUTY CONT S.F. 1.15 TEMP RISE — DEG C. AMBIENT TEMP 40 DEC C

(1) - SEE SH. 3-3

AMBIENT TEMPERATURE: (REF #8)

MOTOR AMBIENT TEMP ≤ 40 DEG C SHUT DOWN BOARD ROOM NOT PART OF
STARTER AMBIENT TEMP ≤ 40 DEG C HARSH ENVIRONMENT PER DWG 47W930-3, REV. C

MANUFACTURER'S DATA:
O/L FACTOR (D.F.) (REF# 1-SH. 1) 1.0 TEMP CORRECTION FACTOR (TCF —)
HEATER TABLE: (REF #1 - SH. 8)

DEFINITIONS

I (t) -- ~~HEATER~~ RELAY TRIP CURRENT ~~MAXIMUM~~ MINIMUM
I (m) -- ~~MAXIMUM FULL LOAD~~ CURRENT CORRESPONDING TO THE HEATER CATALOG # ~~RELAY~~
1.25 -- GENERAL ELECTRIC'S MULTIPLYING FACTOR FOR ESTABLISHING ~~MAXIMUM~~ TRIP CURRENT
D.F. -- MOTOR DERATING FACTOR BASED ON MOTOR SERVICE FACTOR. (REF #1 SH 1)
I(n) -- MOTOR NAMEPLATE FULL LOAD CURRENT OR ADJUSTED MOTOR FULL LOAD CURRENT
~~X** -- PERCENT SETTING OF THE OVERLOAD HEATER, EXPRESSED IN PER UNIT (P.U.)~~

R1

ACCEPTANCE LIMITS:

%PROTECTION FROM 125% TO 140% (REF #5)
OVERLOAD HEATERS RANGE FROM 85% to 115%

CALCULATIONS:

1. MOTOR FULL LOAD CURRENT ADJUSTMENT REQUIRED ____ YES ✓ NO
IF YES;

$$I\ (adjusted) = \frac{V\ (nameplate)}{V\ (operating)} \times I\ (nameplate)$$

I (adjusted) =

FOR THIS CALCULATION I (n) = I ADJUSTED = _____ AMPS

CALCULATION NO. ED-Q2268-87322 SHEET 3.2 OF 50
THERMAL OVERLOAD HEATER CALCULATION REV. 0 DATE 3-12-88
BOARD REF. 480V REACTOR MOV. BD. 2A COMPUTED BY THS DATE 3-12-88
UNIT # 2 DWG. NO. 45B2299-2 RO CHECKED BY DJA DATE 3-15-88
COMP # 1A EQUIP REF. SHUT DOWN BOARD ROOMS EXHAUST FAN 2A (SLOW SPEED)

PREPARED RK 7-21-88
CHECKED JDA 7-29-88 REV.1

2. MOTOR OVERLOAD HEATER SELECTION

(A) CALCULATION OF HEATER SIZE (REF #5)
I(n)xD.F. = (USE D.F. PER REF #1 SH 1)

2.6 I(n)x 1.0 D.F. = 2.6 AMPS

CATALOG HEATER SIZE ~~CR123C3.01A~~ C3.26A
I(m)= ~~3.60~~ 2.61

(B) CALCULATION FOR OVERLOAD HEATER SETTING: R1
CALCULATE % PROTECTION USING HEATER SETTING OF 100%

$$\frac{\text{~~3.6~~ } 2.61}{} \text{ I(m) x 1.25 x 100 \%* / 2.6 I (n) = 125 \%}$$

DOES THE % PROTECTION FALL WITHIN THE ACCEPTANCE LIMITS?

✓ YES - THE OVERLOAD HEATER SIZE AND SETTING HAVE BEEN PROPERLY SELECTED.

_____ NO - DETERMINE HEATER SETTING TO MEET THE % PROTECTION ACCEPTANCE CRITERIA BY USING THE CLOSEST ACCEPTANCE LIMIT VALUE.
% * = [% PROTECTION x I(n)] / [I(m) x 1.25]
% * =
% * =

IS % SETTING WITHIN THE OVERLOAD HEATER RANGE?
_____ YES - THE OVERLOAD HEATER SIZE AND SETTING HAVE BEEN PROPERLY SELECTED.
_____ NO - THE OVERLOAD HEATER HAS BEEN IMPROPERLY SIZED.

3. EVALUATION OF INSTALLED MOTOR OVERLOAD HEATER
IS THE HEATER SIZE THE SAME AS CALCULATED IN SECTION 2B?

_____ YES - IS THE HEATER SETTING THE SAME AS CALCULATED IN SECTION 2B?
_____ YES - THE INSTALLED OVERLOAD HEATER SIZE AND SETTING ARE ACCEPTABLE. PROCEED TO SECTION 4.

_____ NO - THE INSTALLED OVERLOAD HEATER SIZE IS ACCEPTABLE, FIELD TO RESET SETTING. PROCEED TO SECTION 4.

✓ NO - ~~PROCEED WITH FOLLOWING~~ REPLACE HEATERS (PROCEED TO SECTION 4) R1

~~EVALUATION OF INSTALLED OVERLOAD HEATER TRIP CURRENT~~
~~I(t) = I(m) x 1.25 x % * = TRIP AMPS~~
~~I(t) = 1.90 I(m) x 1.25 x 116 % * = 3.72 AMPS~~

CALCULATION NO. ED-Q2268-87322 SHEET 3.3 OF 50

THERMAL OVERLOAD HEATER CALCULATION REV. 0 DATE 2-12-88

BOARD REF. 48 / REACTOR MOV. BD. 2A COMPUTED BY THG DATE 3-12-88

UNIT # 2 DWG. NO. 4582299-2 R0 CHECKED BY DJC DATE 3-15-88

COMP # 1A EQUIP REF. SHUT DOWN BOARD ROOMS EXHAUST FAN 2A (SLOW SPEED)

~~EVALUATION OF INSTALLED OVERLOAD HEATER PROTECTION.~~

~~% PROTECTION = I(t) / I(n) x 100~~

PREPARED RK 7-21-88

CHECKED JPM 7-29-88 | REV. 1

~~3.73 I(t) / 3.60 I(n) x 100 = 104 %~~

~~DOES THE % PROTECTION FALL WITHIN THE ACCEPTANCE LIMITS?~~

~~___ YES - THE INSTALLED OVERLOAD HEATER SIZE AND SETTING ARE ACCEPTABLE.~~

~~/ NO - DETERMINE HEATER SETTING TO MEET THE % PROTECTION ACCEPTANCE CRITERIA BY USING THE CLOSEST ACCEPTANCE LIMIT VALUE.~~

~~%* = [% PROTECTION x I (n)] / [I(n) x 1.25]~~

~~%* = TOL HEATER IS UNDER SIZED.~~

~~%* = PROCEED TO SECTION 4.~~

R1

~~IS % SETTING WITHIN THE OVERLOAD HEATER RANGE?~~

~~___ YES - THE INSTALLED OVERLOAD HEATER SHALL BE RESET TO THIS VALUE.~~

~~___ NO - THE INSTALLED OVERLOAD HEATER WAS INCORRECTLY SIZED AND SHALL BE REPLACED WITH THE ONE SELECTED IN SECTION 2B.~~

4. THIS CALCULATION HAS VERIFIED THAT THE SIZE AND SETTING OF THE OVERLOAD HEATER HAVE BEEN CORRECTLY DETERMINED TO BE:

OVERLOAD HEATER SIZE ~~CR123 3.91~~ C3.26A | R1

OVERLOAD HEATER SETTING 100 %

5. COMMENTS: REPLACE THE INSTALLED TOL HEATERS WITH THOSE SHOWN ABOVE

① MOTOR NAMEPLATE DATA FOR SLOW SPEED NOT AVAILABLE. ASSUMPTION FOR MOTOR NAMEPLATE DATA PROVIDED FROM MOTOR WALKDOWN DATA OF SHUTDOWN BD RM EXH. FAN 3A CONNECTED TO 480V REACTOR MOV BD 3A COMP. 1A. BY SIMILARITY OF EQUIPMENT.

CALCULATION NO. ED-Q2268-87322 | SHEET 4.1 OF 50
THERMAL OVERLOAD HEATER CALCULATION | REV. 0 | DATE 3-12-88
BOARD REF. 480V REACTOR MOV. BD. 2A | COMPUTED BY THS | DATE 3-12-88
UNIT # 2 | DWG. NO. 4582299-2RQ | CHECKED BY DHC | DATE 3-15-88
COMP # 10 | EQUIP REF. TURBINE ERG LIFT PUMP: ASSEMBLY A (2A1)

CONTINUOUS DUTY MOTORS

PREPARED RK 7-21-88
CHECKED JPM 7-29-88 | REV. 1

WALKDOWN INPUT DATA: (REF # 3)

MOTOR CONTROL CENTER DATA:

STARTER MFGR. GE MODEL CR2109C0 SIZE 1 (1)
O/L RELAY TYPE CR124 HEATER SIZE CR123C15.13 SETTING 115

MOTOR NAMEPLATE DATA:

H.P. 10 VOLTS 440 FLC 15.5 PHASE 3 INS. CLASS B NEC CODE H
DUTY CONT S.F. 1.0 TEMP RISE - DEG C. AMBIENT TEMP 40 DEC C

(1) SEE SH. 4.3

AMBIENT TEMPERATURE: (REF #8)

MOTOR AMBIENT TEMP ≤40 DEG C TURBINE BUILDING NOT PART OF HARSH
STARTER AMBIENT TEMP ≤40 DEG C ENVIRONMENT PER DWG 47W 200-3 REV. E

MANUFACTURER'S DATA:
O/L FACTOR (D.F.) (REF# 1-SH. 1) 0.9 TEMP CORRECTION FACTOR (TCF -)
HEATER TABLE: (REF #1 - SH. 8)

DEFINITIONS

I (t) -- ~~HEATER~~ RELAY TRIP CURRENT MINIMUM
I (m) -- ~~MAXIMUM FULL LOAD~~ CURRENT CORRESPONDING TO THE HEATER CATALOG # RELAY
1.25 -- GENERAL ELECTRIC'S MULTIPLYING FACTOR FOR ESTABLISHING ~~MAXIMUM~~ TRIP CURRENT
D.F. -- MOTOR DERATING FACTOR BASED ON MOTOR SERVICE FACTOR. (REF #1 SH 1)
I(n) -- MOTOR NAMEPLATE FULL LOAD CURRENT OR ADJUSTED MOTOR FULL LOAD CURRENT
~~T** -- PERCENT SETTING OF THE OVERLOAD HEATER, EXPRESSED IN PER UNIT (P.U.)~~

R1

ACCEPTANCE LIMITS:

%PROTECTION FROM 115% TO 130% (REF #5)
OVERLOAD HEATERS RANGE FROM 85% to 115%

CALCULATIONS:

1. MOTOR FULL LOAD CURRENT ADJUSTMENT REQUIRED ✓ YES ____ NO
IF YES;

$$I\,(\text{adjusted}) = \frac{V\,(\text{nameplate})}{V\,(\text{operating})} \times I\,(\text{nameplate})$$

$$I\,(\text{adjusted}) = \frac{440}{460} \times 15.5 = 14.83$$

FOR THIS CALCULATION I (n) = I ADJUSTED = 14.83 AMPS

CALCULATION NO. ED-Q2268-87322 SHEET 4.2 OF 50
THERMAL OVERLOAD HEATER CALCULATION REV. 0 DATE 3-12-88
BOARD REF. 480V REACTOR MOV. BD. 2A COMPUTED BY THP DATE 3-12-88
UNIT # 2 DWG. NO. 4582299-2 R0 CHECKED BY DJA DATE 3.15-88
COMP # 1D EQUIP REF. TURBINE BRG LIFT PUMP ASSEMBLY A (2A1)

PREPARED RK 7-21-88
CHECKED JPM 7-29-88 REV. 1

2. MOTOR OVERLOAD HEATER SELECTION

(A) CALCULATION OF HEATER SIZE (REF #5)
I(n)xD.F. = (USE D.F. PER REF #1 SH 1)

14.83 I(n)x 0.9 D.F. = 13.35 AMPS

CATALOG HEATER SIZE ~~CR123C16-38~~ C18.0B
I(m)= ~~14.3~~ 14.4

(B) CALCULATION FOR OVERLOAD HEATER SETTING:
CALCULATE % PROTECTION USING HEATER SETTING OF 100%

~~14.3~~ / 14.4 I(m) x 1.25 x 100 %* / 14.83 I (n) = 121 %

DOES THE % PROTECTION FALL WITHIN THE ACCEPTANCE LIMITS?

✓ YES - THE OVERLOAD HEATER SIZE AND SETTING HAVE BEEN PROPERLY SELECTED.

_____ NO - DETERMINE HEATER SETTING TO MEET THE % PROTECTION ACCEPTANCE CRITERIA BY USING THE CLOSEST ACCEPTANCE LIMIT VALUE.
% * = [% PROTECTION x I(n)] / [I(m) x 1.25]
% * =
% * =

IS % SETTING WITHIN THE OVERLOAD HEATER RANGE?
_____ YES - THE OVERLOAD HEATER SIZE AND SETTING HAVE BEEN PROPERLY SELECTED.
_____ NO - THE OVERLOAD HEATER HAS BEEN IMPROPERLY SIZED.

3. EVALUATION OF INSTALLED MOTOR OVERLOAD HEATER
IS THE HEATER SIZE THE SAME AS CALCULATED IN SECTION 2B?

_____ YES - IS THE HEATER SETTING THE SAME AS CALCULATED IN SECTION 2B?
_____ YES - THE INSTALLED OVERLOAD HEATER SIZE AND SETTING ARE ACCEPTABLE. PROCEED TO SECTION 4.

_____ NO - THE INSTALLED OVERLOAD HEATER SIZE IS ACCEPTABLE, FIELD TO RESET SETTING. PROCEED TO SECTION 4.

✓ NO - ~~PROCEED WITH FOLLOWING CR123C16-38, I(m) 13~~ REPLACE HEATERS (PROCEED TO SECTION 4)

~~EVALUATION OF INSTALLED OVERLOAD HEATER TRIP CURRENT~~
~~I(e) = I(m) x 1.25 x %* = TRIP AMPS~~
~~I(e) = 13 I(m) x 1.25 x 115 %* = 120.93 AMPS~~

R1

R1

CALCULATION NO. ED-Q2268-87322 SHEET 4 .3 OF 50

THERMAL OVERLOAD HEATER CALCULATION REV. 0 DATE 3-12-88

BOARD REF. 480V REACTOR MOV. BD. 2A COMPUTED BY THA DATE 3-12-88

UNIT # 2 DWG. NO. 45B2299-2 RO CHECKED BY DLA DATE 3-15-88

COMP # 1D EQUIP REF. TURBINE BRG LFT PUMP ASSEMBLY A (2A1)

~~EVALUATION OF INSTALLED OVERLOAD HEATER PROTECTION.~~

~~% PROTECTION = I(c) / I(n) x 100~~

PREPARED RK 7-21-88

CHECKED JPM 7-29-88 REV.1

~~18.69 I(c) / 14.83 I(n) x 100 = 126 %~~

~~DOES THE % PROTECTION FALL WITHIN THE ACCEPTANCE LIMITS?~~

~~✓ YES - THE INSTALLED OVERLOAD HEATER SIZE AND SETTING ARE ACCEPTABLE.~~

~~NO - DETERMINE HEATER SETTING TO MEET THE % PROTECTION ACCEPTANCE CRITERIA BY USING THE CLOSEST ACCEPTANCE LIMIT VALUE.~~

~~%* = [% PROTECTION x I (n)] / [I(m) x 1.25]~~

~~%* =~~

~~%* =~~

R1

~~IS % SETTING WITHIN THE OVERLOAD HEATER RANGE?~~

~~YES = THE INSTALLED OVERLOAD HEATER SHALL BE RESET TO THIS VALUE.~~

~~NO - THE INSTALLED OVERLOAD HEATER WAS INCORRECTLY SIZED AND SHALL BE REPLACED WITH THE ONE SELECTED IN SECTION 2B.~~

4. THIS CALCULATION HAS VERIFIED THAT THE SIZE AND SETTING OF THE OVERLOAD HEATER HAVE BEEN CORRECTLY DETERMINED TO BE:

OVERLOAD HEATER SIZE ~~CR123[illegible]~~ C18.0B

OVERLOAD HEATER SETTING ~~46 %~~ 100%

R1

5. COMMENTS: ~~INSTALLED TOL HEATERS & SETTINGS ARE ACCEPTABLE~~

REPLACE INSTALLED TOL HEATERS WITH THOSE SHOWN ABOVE.

① ASSUMPTION: LEF #1, SH. 5

CALCULATION NO. ED-Q2268-87322 SHEET 5.1 OF 50
THERMAL OVERLOAD HEATER CALCULATION REV. 0 DATE 3-12-88
BOARD REF. 480V REACTOR MCN. BD. 2A COMPUTED BY THE DATE 3-12-88
UNIT # 2 DWG. NO. 4582299-2 R0 CHECKED BY — DJL DATE 3-15-88
COMP # 10 EQUIP REF. TURBINE BRG LIFT PUMP ASSEMBLY A (2A2)

CONTINUOUS DUTY MOTORS

PREPARED RK 7-21-88
CHECKED JPM 7-29-88 REV. 1

WALKDOWN INPUT DATA: (REF # 3)

MOTOR CONTROL CENTER DATA:

STARTER MFGR. GE MODEL CR106C0 SIZE 1①
O/L RELAY TYPE CR124 HEATER SIZE CR123C15.18 SETTING 100%

MOTOR NAMEPLATE DATA:

H.P. 10 VOLTS 440 FLC 15.5 PHASE 3 INS. CLASS B NEC CODE H
DUTY CONT S.F. 1.0 TEMP RISE — DEG C. AMBIENT TEMP 40 DEC C
① SEE SH. 5.3

AMBIENT TEMPERATURE: (REF #8)

MOTOR AMBIENT TEMP ≤40 DEG C TURBINE BUILDING NOT PART OF HARSH
STARTER AMBIENT TEMP ≤40 DEG C ENVIRONMENT PER DWG A/W 200-3 REV. E.

MANUFACTURER'S DATA:
O/L FACTOR (D.F.) (REF# 1-SH.1) 0.9 TEMP CORRECTION FACTOR (TCF —)
HEATER TABLE: (REF #1 - SH. 8)

DEFINITIONS

I (t) -- ~~HEATER~~ RELAY TRIP CURRENT MINIMUM
I (m) -- ~~MAXIMUM FULL LOAD~~ CURRENT CORRESPONDING TO THE HEATER CATALOG # RELAY
1.25 -- GENERAL ELECTRIC'S MULTIPLYING FACTOR FOR ESTABLISHING ~~MAXIMUM~~ TRIP CURRENT
D.F. -- MOTOR DERATING FACTOR BASED ON MOTOR SERVICE FACTOR. (REF #1 SH 1)
I(n) — MOTOR NAMEPLATE FULL LOAD CURRENT OR ADJUSTED MOTOR FULL LOAD CURRENT
~~* — PERCENT SETTING OF THE OVERLOAD HEATER, EXPRESSED IN PER UNIT (P.U.)~~

R1

ACCEPTANCE LIMITS:

%PROTECTION FROM 115% TO 130% (REF #5)
OVERLOAD HEATERS RANGE FROM 85% to 115%

CALCULATIONS:

1. MOTOR FULL LOAD CURRENT ADJUSTMENT REQUIRED ✓ YES ____ NO
IF YES;

$$I\,(adjusted) = \frac{V\,(nameplate)}{V\,(operating)} \times I\,(nameplate)$$

$$I\,(adjusted) = \frac{440}{460} \times 15.5 = 14.83$$

FOR THIS CALCULATION I (n) = I ADJUSTED = 14.83 AMPS

CALCULATION NO. ED-Q2268-87322 SHEET 5.2 OF 50
THERMAL OVERLOAD HEATER CALCULATION REV. 0 DATE 5-12-88
BOARD REF. 480V REACTOR MOV. BD. 2A COMPUTED BY THS DATE 5-12-88
UNIT # 2 DWG. NO. 4582299-2RO CHECKED BY DJC DATE 5-15-88
COMP # 1D EQUIP REF. TURBINE BRG LIFT PUMP ASSEMBLY A (2A2)

PREPARED RK 7-21-88
CHECKED JPM 7-29-88 REV.1

2. MOTOR OVERLOAD HEATER SELECTION

(A) CALCULATION OF HEATER SIZE (REF #5)
I(n)xD.F. = (USE D.F. PER REF #1 SH 1)

14.83 I(n)x 0.9 D.F. = 13.35 AMPS

CATALOG HEATER SIZE ~~CR123S16.38~~ - C18.03
I(m)= ~~14.3~~ 14.4

(B) CALCULATION FOR OVERLOAD HEATER SETTING:
CALCULATE % PROTECTION USING HEATER SETTING OF 100%

~~14.3~~ / 14.4 I(m) x 1.25 X 100 %* / 14.83 I (n) = 121 %

DOES THE % PROTECTION FALL WITHIN THE ACCEPTANCE LIMITS?

✓ YES - THE OVERLOAD HEATER SIZE AND SETTING HAVE BEEN PROPERLY SELECTED.

_____ NO - DETERMINE HEATER SETTING TO MEET THE % PROTECTION ACCEPTANCE CRITERIA BY USING THE CLOSEST ACCEPTANCE LIMIT VALUE.
% * = [% PROTECTION x I(n)] / [I(m) x 1.25]
% * =
% * =

IS % SETTING WITHIN THE OVERLOAD HEATER RANGE?
_____ YES - THE OVERLOAD HEATER SIZE AND SETTING HAVE BEEN PROPERLY SELECTED.
_____ NO - THE OVERLOAD HEATER HAS BEEN IMPROPERLY SIZED.

3. EVALUATION OF INSTALLED MOTOR OVERLOAD HEATER
IS THE HEATER SIZE THE SAME AS CALCULATED IN SECTION 2B?

_____ YES - IS THE HEATER SETTING THE SAME AS CALCULATED IN SECTION 2B?
_____ YES - THE INSTALLED OVERLOAD HEATER SIZE AND SETTING ARE ACCEPTABLE. PROCEED TO SECTION 4.

_____ NO - THE INSTALLED OVERLOAD HEATER SIZE IS ACCEPTABLE, FIELD TO RESET SETTING. PROCEED TO SECTION 4.

✓ NO - ~~PROCEED WITH FOLLOWING CR123S15.18, I(m) = 13~~ REPLACE HEATERS (PROCEED TO SECTION 4)

~~EVALUATION OF INSTALLED OVERLOAD HEATER TRIP CURRENT~~
~~I(t) = I(m) x 1.25 x % = TRIP AMPS~~
~~I(t) = 13 I(m) x 1.25 x 100 % = 16.25 AMPS~~

R1

R1

CALCULATION NO. ED-Q2268-87322 | SHEET 5.3 OF 50
THERMAL OVERLOAD HEATER CALCULATION | REV. 0 | DATE 3-12-88
BOARD REF. 480V REACTOR MOV. BD. 2A | COMPUTED BY THR | DATE 3-12-88
UNIT # 2 | DWG. NO. 45B2299-2 RO | CHECKED BY DJA | DATE 5-15-88
COMP # 1D | EQUIP REF. TURBINE BRG LIFT PUMP ASSEMBLY A (2A2)

~~EVALUATION OF INSTALLED OVERLOAD HEATER PROTECTION.~~
~~% PROTECTION = I(c) / I(n) x 100~~

PREPARED RK 7-21-88
CHECKED JPM 7-29-88
REV. 1

~~16.25 I(c) / 14.83 I(n) x 100 = 110 %~~

~~DOES THE % PROTECTION FALL WITHIN THE ACCEPTANCE LIMITS?~~

~~___ YES - THE INSTALLED OVERLOAD HEATER SIZE AND SETTING ARE ACCEPTABLE.~~

~~✓ NO - DETERMINE HEATER SETTING TO MEET THE % PROTECTION ACCEPTANCE CRITERIA BY USING THE CLOSEST ACCEPTANCE LIMIT VALUE.~~
~~%* = [% PROTECTION x I (n)] / [I(n) x 1.25]~~
~~110 %* = 110% x 14.83 / 13 x 1.25; 110% = 131%~~
~~%* =~~

R1

~~IS % SETTING WITHIN THE OVERLOAD HEATER RANGE?~~

~~✓ YES - THE INSTALLED OVERLOAD HEATER SHALL BE RESET TO THIS VALUE.~~

~~___ NO - THE INSTALLED OVERLOAD HEATER WAS INCORRECTLY SIZED AND SHALL BE REPLACED WITH THE ONE SELECTED IN SECTION 2B.~~

4. THIS CALCULATION HAS VERIFIED THAT THE SIZE AND SETTING OF THE OVERLOAD HEATER HAVE BEEN CORRECTLY DETERMINED TO BE:

OVERLOAD HEATER SIZE ~~CR123B15-18~~ C.18.0B

OVERLOAD HEATER SETTING ~~110%~~ 100%

R1

5. COMMENTS: ~~RESET~~ REPLACE THE INSTALLED TOL HEATERS ~~TO 110%~~ WITH THOSE SHOWN ABOVE.

① ASSUMPTION: REF #1, SH. 5

CALCULATION NO. ED-Q2268-87322 | SHEET 6.1 OF 50
THERMAL OVERLOAD HEATER CALCULATION | REV. 0 | DATE 8-12-88
BOARD REF. 480V REACTOR MOV. BD. 2A | COMPUTED BY THE | DATE 8-12-88
UNIT # 2 | DWG. NO. 4582299-2RQ | CHECKED BY DLA | DATE 8-15-88
COMP # 1D | EQUIP REF. TURBINE BRG LIFT PUMP ASSEMBLY A (2A3)

CONTINUOUS DUTY MOTORS

PREPARED RK 7-21-88
CHECKED JPM 7-29-88
REV. 1

WALKDOWN INPUT DATA: (REF # 3)

MOTOR CONTROL CENTER DATA:

STARTER MFGR. GE MODEL CR106C0 SIZE 1 0
O/L RELAY TYPE CR124 HEATER SIZE CR123C15.1B SETTING 100%

MOTOR NAMEPLATE DATA:

H.P. 10 VOLTS 440 FLC 15.5 PHASE 3 INS. CLASS B NEC CODE H
DUTY CONT S.F. 1.0 TEMP RISE — DEG C. AMBIENT TEMP 40 DEC C
(1) SEE SH. 6.3

AMBIENT TEMPERATURE: (REF #8)

MOTOR AMBIENT TEMP ≤40 DEG C TURBINE BUILDING NOT PART OF HARSH
STARTER AMBIENT TEMP ≤40 DEG C ENVIRONMENT PER DWG. 47W200-3 REV. E.

MANUFACTURER'S DATA:
O/L FACTOR (D.F.) (REF# 1-SH.1) 0.9 TEMP CORRECTION FACTOR (TCF —)
HEATER TABLE: (REF #1 - SH. 8)

DEFINITIONS

I (t) -- ~~HEATER~~ RELAY TRIP CURRENT MINIMUM
I (m) -- ~~MAXIMUM FULL LOAD~~ CURRENT CORRESPONDING TO THE HEATER CATALOG # RELAY
1.25 -- GENERAL ELECTRIC'S MULTIPLYING FACTOR FOR ESTABLISHING ~~MAXIMUM~~ TRIP CURRENT R1
D.F. -- MOTOR DERATING FACTOR BASED ON MOTOR SERVICE FACTOR. (REF #1 SH 1)
I(n) — MOTOR NAMEPLATE FULL LOAD CURRENT OR ADJUSTED MOTOR FULL LOAD CURRENT
~~I* — PERCENT SETTING OF THE OVERLOAD HEATER, EXPRESSED IN PER UNIT (P.U.)~~

ACCEPTANCE LIMITS:

%PROTECTION FROM 115% TO 130% (REF #5)
OVERLOAD HEATERS RANGE FROM 85% to 115%

CALCULATIONS:

1. MOTOR FULL LOAD CURRENT ADJUSTMENT REQUIRED ✓ YES ____ NO
IF YES;

$$I\,(\text{adjusted}) = \frac{V\,(\text{nameplate})}{V\,(\text{operating})} \times I\,(\text{nameplate})$$

$$I\,(\text{adjusted}) = \frac{440}{460} \times 15.5 = 14.83$$

FOR THIS CALCULATION I (n) = I ADJUSTED = 14.83 AMPS

CALCULATION NO. ED-Q2268-87322 | SHEET 6.2 OF 57
THERMAL OVERLOAD HEATER CALCULATION | REV. 0 | DATE 3-12-88
BOARD REF. 480V REACTOR MOV. BD. 2A | COMPUTED BY THR | DATE 3-12-88
UNIT # 2 | DWG. NO. 4582299-2 RO | CHECKED BY DLA | DATE 3-15-88
COMP # 1D | EQUIP REF. TURBINE BRG LIFT PUMP ASSEMBLY A (2A3)

PREPARED RK 7-21-88 | REV.1
CHECKED JPN. 7-29-88

2. MOTOR OVERLOAD HEATER SELECTION

(A) CALCULATION OF HEATER SIZE (REF #5)
I(n)xD.F. = (USE D.F. PER REF #1 SH 1)

14.83 I(n)x 0.9 D.F = 13.35 AMPS

CATALOG HEATER SIZE ~~CR123C16.38~~ C18.0B
I(m)= ~~14.3~~ 14.4

(B) CALCULATE FOR OVERLOAD HEATER SETTING: RI
CALCULATE % PROTECTION USING HEATER SETTING OF 100%
~~14.3~~ / 14.4 I(m) x 1.25 X 100 %* / 14.83 I (n) = 121 %

DOES THE % PROTECTION FALL WITHIN THE ACCEPTANCE LIMITS?

✓ YES - THE OVERLOAD HEATER SIZE AND SETTING HAVE BEEN PROPERLY SELECTED.

_____ NO - DETERMINE HEATER SETTING TO MEET THE % PROTECTION ACCEPTANCE CRITERIA BY USING THE CLOSEST ACCEPTANCE LIMIT VALUE.
% * = [% PROTECTION x I(n)] / [I(m) x 1.25]
% * =
% * =

IS % SETTING WITHIN THE OVERLOAD HEATER RANGE?
_____ YES - THE OVERLOAD HEATER SIZE AND SETTING HAVE BEEN PROPERLY SELECTED.
_____ NO - THE OVERLOAD HEATER HAS BEEN IMPROPERLY SIZED.

3. EVALUATION OF INSTALLED MOTOR OVERLOAD HEATER
IS THE HEATER SIZE THE SAME AS CALCULATED IN SECTION 2B?

_____ YES - IS THE HEATER SETTING THE SAME AS CALCULATED IN SECTION 2B?
_____ YES - THE INSTALLED OVERLOAD HEATER SIZE AND SETTING ARE ACCEPTABLE. PROCEED TO SECTION 4.

_____ NO - THE INSTALLED OVERLOAD HEATER SIZE IS ACCEPTABLE, FIELD TO RESET SETTING. PROCEED TO SECTION 4.

✓ NO - ~~PROCEED WITH FOLLOWING CR123C16.38, I(m) = 13~~
REPLACE HEATERS (PROCEED TO SECTION 4)

~~EVALUATION OF INSTALLED OVERLOAD HEATER TRIP CURRENT~~ RI
~~I(t) = I(m) x 1.25 x % * = TRIP AMPS~~
~~I(t) = 13 I(m) x 1.25 x 100 % * = 16.25 AMPS~~

CALCULATION NO. ED-Q2268-87322 SHEET 6.3 OF 50
THERMAL OVERLOAD HEATER CALCULATION REV. 0 DATE 3-12-88
BOARD REF. 480V REACTOR MOV. BD. 2A COMPUTED BY THF DATE 3-12-88
UNIT # 2 DWG. NO. 4582299-2 R0 CHECKED BY DJA DATE 3-15-88
COMP # 1D EQUIP REF. TURBINE SRG LIFT PUMP ASSEMBLY A (2A3)

~~EVALUATION OF INSTALLED OVERLOAD HEATER PROTECTION.~~ PREPARED RK 7-21-88
CHECKED JPM 7-29-88 REV. 1

~~% PROTECTION = I(t) / I(n) x 100~~

~~16.25 I(t) / 14.83 I(n) x 100 = 110 %~~

~~DOES THE % PROTECTION FALL WITHIN THE ACCEPTANCE LIMITS?~~

~~___ YES - THE INSTALLED OVERLOAD HEATER SIZE AND SETTING ARE ACCEPTABLE.~~

~~✓ NO - DETERMINE HEATER SETTING TO MEET THE % PROTECTION ACCEPTANCE CRITERIA BY USING THE CLOSEST ACCEPTANCE LIMIT VALUE.~~

~~% = [% PROTECTION x I (n)] / [I(n) x 1.25]~~

~~110 % = 110 % PROT. 14.83 / 14.83 x 1.25; % PROT. = 121 %~~

~~%~~

~~IS % SETTING WITHIN THE OVERLOAD HEATER RANGE?~~

~~✓ YES - THE INSTALLED OVERLOAD HEATER SHALL BE RESET TO THIS VALUE.~~

~~___ NO - THE INSTALLED OVERLOAD HEATER WAS INCORRECTLY SIZED AND SHALL BE REPLACED WITH THE ONE SELECTED IN SECTION 2B.~~

R1

4. THIS CALCULATION HAS VERIFIED THAT THE SIZE AND SETTING OF THE OVERLOAD HEATER HAVE BEEN CORRECTLY DETERMINED TO BE:

OVERLOAD HEATER SIZE C18.0B ~~C12.5-15-18~~

OVERLOAD HEATER SETTING ~~110 %~~ 100%

5. COMMENTS: REPLACE ~~REPLACE~~ THE INSTALLED TOL HEATERS ~~TO 110 %~~ WITH THOSE AS SHOWN ABOVE. 7/21/88 RK

① ASSUMPTION: REF #1 - SH. 5

CALCULATION NO. EQ-Q2268-87322 SHEET 11.1 OF 60

THERMAL OVERLOAD HEATER CALCULATION REV. 0 DATE 2-12-88

BOARD REF. 480V REACTOR MOV. BD. 2A COMPUTED BY [illegible] DATE 2-12-88

UNIT # 2 DWG. NO. 4582299-2RO CHECKED BY [illegible] DATE 3-15-88

COMP # — EQUIP REF. DRYWELL EQUIPMENT DRAIN SUMP PUMP 2A

CONTINUOUS DUTY MOTORS

PREPARED RK 7-21-88

CHECKED JPM 7-29-88 REV. 1

WALKDOWN INPUT DATA: (REF # 3)

MOTOR CONTROL CENTER DATA:

STARTER MFGR. GE MODEL CR106C0 SIZE 1

O/L RELAY TYPE CR124 HEATER SIZE CR123C7.78A SETTING 95%

MOTOR NAMEPLATE DATA:

H.P. — VOLTS 460 FLC 4.8 PHASE 3 INS. CLASS B NEC CODE K

DUTY CONT S.F. 1.0 TEMP RISE — DEG C. AMBIENT TEMP 40 DEC C

AMBIENT TEMPERATURE: (REF #8)

DRYWELL AREA IS PART OF HARSH ENVIRONMENT PER DWG. Nos. 47N225-2 REV. 1 AND 47N200-7 REV. A

MOTOR AMBIENT TEMP 42 DEG C

STARTER AMBIENT TEMP 27 DEG C

ELEC. SWRM IS NOT PART OF HARSH ENVIRONMENT PER DWG. No. 47N225-2 RO

MANUFACTURER'S DATA:

O/L FACTOR (D.F.) (REF# 1-SH. 1) 0.9 TEMP CORRECTION FACTOR (TCF —)

HEATER TABLE: (REF #1 - SH. 8)

DEFINITIONS

I (t) -- ~~HEATER~~ RELAY TRIP CURRENT MINIMUM

I (m) -- ~~MAXIMUM FULL LOAD~~ CURRENT CORRESPONDING TO THE HEATER CATALOG # RELAY

1.25 -- GENERAL ELECTRIC'S MULTIPLYING FACTOR FOR ESTABLISHING ~~MAXIMUM~~ TRIP CURRENT

D.F. -- MOTOR DERATING FACTOR BASED ON MOTOR SERVICE FACTOR. (REF #1 SH 1)

I(n) — MOTOR NAMEPLATE FULL LOAD CURRENT OR ADJUSTED MOTOR FULL LOAD CURRENT

~~%* PERCENT SETTING OF THE OVERLOAD HEATER, EXPRESSED IN PER-UNIT (P.U.)~~

R1

ACCEPTANCE LIMITS:

%PROTECTION FROM 115% TO 130% (REF #5)

OVERLOAD HEATERS RANGE FROM 85% to 115%

CALCULATIONS:

1. MOTOR FULL LOAD CURRENT ADJUSTMENT REQUIRED ____ YES ✓ NO

IF YES;

$$I\ (adjusted) = \frac{V\ (nameplate)}{V\ (operating)} \times I\ (nameplate)$$

I (adjusted) =

FOR THIS CALCULATION I (n) = I ADJUSTED = _____ AMPS

0051T

CALCULATION NO. ED-Q2268-87322 SHEET 11.2 OF 60
THERMAL OVERLOAD HEATER CALCULATION REV. 0 DATE 3-12-88
BOARD REF. 480V REACTOR MOV. BD. 2A COMPUTED BY THG DATE 3-12-88
UNIT # 2 DWG. NO. 45B2299-2 R0 CHECKED BY D.A.G. DATE 3-15-88
COMP # 4E EQUIP REF. DRYWELL EQUIPMENT DRAIN SUMP PUMP 2A

PREPARED RK 7-21-88
CHECKED JPM 7-29-88 REV.1

2. MOTOR OVERLOAD HEATER SELECTION

(A) CALCULATION OF HEATER SIZE (REF #5)
I(n)xD.F. = (USE D.F. PER REF #1 SH 1)

4.8 I(n)x 0.9 D.F. = 4.32 AMPS

CATALOG HEATER SIZE ~~CR123E5.26A~~ C5.92A
I(m)= ~~4.73~~ 4.74

(B) CALCULATION FOR OVERLOAD HEATER SETTING:
CALCULATE % PROTECTION USING HEATER SETTING OF 100%
~~4.73~~ 4.74 I(m) x 1.25 X 100 %* / 4.8 I (n) = 123 %

DOES THE % PROTECTION FALL WITHIN THE ACCEPTANCE LIMITS?

✓ YES - THE OVERLOAD HEATER SIZE AND SETTING HAVE BEEN PROPERLY SELECTED.

_____ NO - DETERMINE HEATER SETTING TO MEET THE % PROTECTION ACCEPTANCE CRITERIA BY USING THE CLOSEST ACCEPTANCE LIMIT VALUE.
% * = [% PROTECTION x I(n)] / [I(m) x 1.25]
% * =
% * =

IS % SETTING WITHIN THE OVERLOAD HEATER RANGE?
_____ YES - THE OVERLOAD HEATER SIZE AND SETTING HAVE BEEN PROPERLY SELECTED.
_____ NO - THE OVERLOAD HEATER HAS BEEN IMPROPERLY SIZED.

3. EVALUATION OF INSTALLED MOTOR OVERLOAD HEATER
IS THE HEATER SIZE THE SAME AS CALCULATED IN SECTION 2B?

_____ YES - IS THE HEATER SETTING THE [illegible] CALCULATED IN SECTION 2B?
_____ YES - THE INSTALLED OVER[illegible] & SIZE AND SETTING ARE ACCEPTABLE. PROCEED TO SECTION 4.

_____ NO - THE INSTALLED OVERLOAD HEATER SIZE IS ACCEPTABLE, FIELD TO RESET SETTING. PROCEED TO SECTION 4.

✓ NO - ~~PROCEED WITH FOLLOWING CR123E7.78A, $I_{(m)}$ 6.92~~
REPLACE HEATERS (PROCEED TO SECTION 4)

~~EVALUATION OF INSTALLED OVERLOAD HEATER TRIP CURRENT~~
~~I(t) = I(m) x 1.25 x %* = TRIP AMPS~~
~~I(t) = 5.92 I(m) x 1.25 x 95 %* = 6.92 AMPS~~

R1

00511

CALCULATION NO. ED-Q226B-87322 SHEET 11.3 OF 50
THERMAL OVERLOAD HEATER CALCULATION REV. 0 DATE 2-12-88
BOARD REF. 480V REACTOR MOV. BD. 2A COMPUTED BY TJH DATE 2-12-88
UNIT # 2 DWG. NO. 4582292-2 R0 CHECKED BY DJL DATE 3.15-88
COMP # 4E EQUIP REF. DRYWELL EQUIPMENT DRAIN SUMP PUMP 2A

~~EVALUATION OF INSTALLED OVERLOAD HEATER PROTECTION.~~

~~% PROTECTION = I(c) / I(a) x 100~~

~~822 I(c) / 4.8 I(a) x 100 = 171 %~~

PREPARED RK 7-21-88
CHECKED JPM 1-29-88 REV.1

~~DOES THE % PROTECTION FALL WITHIN THE ACCEPTANCE LIMITS?~~

~~YES - THE INSTALLED OVERLOAD HEATER SIZE AND SETTING ARE ACCEPTABLE.~~

~~NO - DETERMINE HEATER SETTING TO MEET THE % PROTECTION ACCEPTANCE CRITERIA BY USING THE CLOSEST ACCEPTANCE LIMIT VALUE.~~

~~% = [% PROTECTION x I (a)] / [I(a) x 1.25]~~

~~85 % = 85% PROT. x 4.8 / 6.92 x 1.25, % PROT. = 102%~~

~~% =~~ R1.

~~IS % SETTING WITHIN THE OVERLOAD HEATER RANGE?~~

~~YES - THE INSTALLED OVERLOAD HEATER SHALL BE RESET TO THIS VALUE.~~

~~NO - THE INSTALLED OVERLOAD HEATER WAS INCORRECTLY SIZED AND SHALL BE REPLACED WITH THE ONE SELECTED IN SECTION 2B.~~

4. THIS CALCULATION HAS VERIFIED THAT THE SIZE AND SETTING OF THE OVERLOAD HEATER HAVE BEEN CORRECTLY DETERMINED TO BE:

OVERLOAD HEATER SIZE ~~ERIZBE~~ C5.92A R1

OVERLOAD HEATER SETTING 100%.

5. COMMENTS: REPLACE THE INSTALLED TOL HEATERS WITH THOSE SHOWN ABOVE.

0051T

CALCULATION NO. ED-Q2268-87322 SHEET 13.1 OF 60
THERMAL OVERLOAD HEATER CALCULATION REV. 0 DATE 3-12-88
BOARD REF. 480V REACTOR MOV. BD. 2A COMPUTED BY THG DATE 3-12-88
UNIT # 2 DWG. NO. 4582299-2R0 CHECKED BY DJH DATE 3-15-88
COMP # 6E EQUIP REF. DRYWELL FLOOR DRAIN SUMP PUMP 2A

CONTINUOUS DUTY MOTORS

PREPARED RK 7-21-88
CHECKED JPM 7-29-88 REV. 1

WALKDOWN INPUT DATA: (REF # 3)

MOTOR CONTROL CENTER DATA:

STARTER MFGR. GE MODEL CR2106C0 SIZE 1
O/L RELAY TYPE CR124 HEATER SIZE CR123C77BA SETTING 115 %

MOTOR NAMEPLATE DATA:

H.P. 3 VOLTS 460 FLC 4.8 PHASE 3 INS. CLASS B NEC CODE K
DUTY CONT S.F. 1.0 TEMP RISE — DEG C. AMBIENT TEMP 40 DEC C

AMBIENT TEMPERATURE: (REF #8)

MOTOR AMBIENT TEMP 42 DEG C DRYWELL AREA IS PART OF HARSH ENVIR. PER DWG 47W225-1DLR1; 47W200-7RA
STARTER AMBIENT TEMP 27 DEG C ELEC. SWITCH ROOM IS NOT PART OF HARSH ENVIRONMENT PER DWG 47W225-113 R1

MANUFACTURER'S DATA:
O/L FACTOR (D.F.) (REF# 1-SH. 1) 0.9 TEMP CORRECTION FACTOR (TCF —)
HEATER TABLE: (REF #1 - SH. 8)

DEFINITIONS

I (t) -- ~~HEATER~~ RELAY TRIP CURRENT ~~MINIMUM~~
I (m) -- ~~MAXIMUM FULL LOAD~~ CURRENT CORRESPONDING TO THE HEATER CATALOG # RELAY
1.25 -- GENERAL ELECTRIC'S MULTIPLYING FACTOR FOR ESTABLISHING ~~MAXIMUM~~ TRIP CURRENT
D.F. -- MOTOR DERATING FACTOR BASED ON MOTOR SERVICE FACTOR. (REF #1 SH 1)
I(L) — MOTOR NAMEPLATE FULL LOAD CURRENT OR ADJUSTED MOTOR FULL LOAD CURRENT
~~%* PERCENT SETTING OF THE OVERLOAD HEATER, EXPRESSED IN PER UNIT (P.U.)~~ R1

ACCEPTANCE LIMITS:

%PROTECTION FROM 115 % TO 130 % (REF #5)
OVERLOAD HEATERS RANGE FROM 85% to 115%

CALCULATIONS:

1. MOTOR FULL LOAD CURRENT ADJUSTMENT REQUIRED ____ YES ✓ NO
IF YES;

$$I\,(\text{adjusted}) = \frac{V\,(\text{nameplate})}{V\,(\text{operating})} \times I\,(\text{nameplate})$$

I (adjusted) =

FOR THIS CALCULATION I (n) = I ADJUSTED = _____ AMPS

0051T

CALCULATION NO. ED-Q2268-87322 | SHEET 13.2 OF 50
THERMAL OVERLOAD HEATER CALCULATION | REV. 0 | DATE 3-12-88
BOARD REF. 480V REACTOR MOV. BD. 2A | COMPUTED BY THG | DATE 3-12-88
UNIT # 2 | DWG. NO. 45B2299-2 RO | CHECKED BY DJA | DATE 3-15-88
COMP # 5E | EQUIP REF. DRYWELL FLOOR DRAIN SUMP PUMP 2A

PREPARED RK 7-21-88
CHECKED JPM 7-29-88 | REV. 1

2. MOTOR OVERLOAD HEATER SELECTION

(A) CALCULATION OF HEATER SIZE (REF #5)
I(n)xD.F. = (USE D.F. PER REF #1 SH 1)

4.8 I(n)x 0.9 D.F. = 4.32 AMPS

CATALOG HEATER SIZE ~~CR123C5.92A~~ C5.92A
I(m)= ~~4.73~~ 4.74

(B) CALCULATION FOR OVERLOAD HEATER SETTING: R1
CALCULATE % PROTECTION USING HEATER SETTING OF 100%

~~4.73~~ / 4.74 I(m) x 1.25 X 100 %* / 4.8 I (n) = 123 %

DOES THE % PROTECTION FALL WITHIN THE ACCEPTANCE LIMITS?

✓ YES - THE OVERLOAD HEATER SIZE AND SETTING HAVE BEEN PROPERLY SELECTED.

_____ NO - DETERMINE HEATER SETTING TO MEET THE % PROTECTION ACCEPTANCE CRITERIA BY USING THE CLOSEST ACCEPTANCE LIMIT VALUE.
% * = [% PROTECTION x I(n)] / [I(m) x 1.25]
% * =
% * =

IS % SETTING WITHIN THE OVERLOAD HEATER RANGE?
_____ YES - THE OVERLOAD HEATER SIZE AND SETTING HAVE BEEN PROPERLY SELECTED.
_____ NO - THE OVERLOAD HEATER HAS BEEN IMPROPERLY SIZED.

3. EVALUATION OF INSTALLED MOTOR OVERLOAD HEATER
IS THE HEATER SIZE THE SAME AS CALCULATED IN SECTION 2B?

_____ YES - IS THE HEATER SETTING THE SAME AS CALCULATED IN SECTION 2B?
_____ YES - THE INSTALLED OVERLOAD HEATER SIZE AND SETTING ARE ACCEPTABLE. PROCEED TO SECTION 4.
_____ NO - THE INSTALLED OVERLOAD HEATER SIZE IS ACCEPTABLE, FIELD TO RESET SETTING. PROCEED TO SECTION 4.

✓ NO - ~~PROCEED WITH FOLLOWING CR123C7.78A, I(m) 6.92~~ REPLACE HEATERS (PROCEED TO SECT. 4)

~~EVALUATION OF INSTALLED OVERLOAD HEATER TRIP CURRENT~~ R1
~~I(t) = I(m) x 1.25 x %* = TRIP AMPS~~
~~I(t) = 6.92 I(m) x 1.25 x 115 %* = 9.95 AMPS~~

CALCULATION NO. ED-Q2268-87322 SHEET 13.3 OF 50
THERMAL OVERLOAD HEATER CALCULATION REV. 0 DATE 3-12-88
BOARD REF. 480V REACTOR MOV. BD. 2A COMPUTED BY THE DATE 3-12-88
UNIT # 2 DWG. NO. 4582299-2 R0 CHECKED BY DLQ DATE 3-15-88
COMP # 5E EQUIP REF. DRYWELL FLOOR DRAIN SUMP PUMP 2A

~~EVALUATION OF INSTALLED OVERLOAD HEATER PROTECTION.~~

~~% PROTECTION = I(t) / I(u) x 100~~

PREPARED RK 7-21-88
CHECKED JPM 7-29-88 REV.1

~~9.95 I(t) / 4.8 I(u) x 100 = 207 %~~

~~DOES THE % PROTECTION FALL WITHIN THE ACCEPTANCE LIMITS?~~

~~___ YES - THE INSTALLED OVERLOAD HEATER SIZE AND SETTING ARE ACCEPTABLE.~~

~~✓ NO - DETERMINE HEATER SETTING TO MEET THE % PROTECTION ACCEPTANCE CRITERIA BY USING THE CLOSEST ACCEPTANCE LIMIT VALUE.~~

~~% = [% PROTECTION x I (u)] / [I(m) x 1.25]~~

~~85%* = 85% PROT x 4.8 / 6.92 X 1.25 % PROT. = 133%~~

~~%* =~~

~~IS % SETTING WITHIN THE OVERLOAD HEATER RANGE?~~

~~___ YES - THE INSTALLED OVERLOAD HEATER SHALL BE RESET TO THIS VALUE.~~

~~✓ NO - THE INSTALLED OVERLOAD HEATER WAS INCORRECTLY SIZED AND SHALL BE REPLACED WITH THE ONE SELECTED IN SECTION 2B.~~

R1

4. THIS CALCULATION HAS VERIFIED THAT THE SIZE AND SETTING OF THE OVERLOAD HEATER HAVE BEEN CORRECTLY DETERMINED TO BE:

   OVERLOAD HEATER SIZE ~~CR123E5-264~~ C5.92A

   OVERLOAD HEATER SETTING 100 %

5. COMMENTS: REPLACE THE INSTALLED TOL HEATERS WITH THOSE SHOWN ABOVE.

CALCULATION NO. EQ-Q226B-87322 SHEET 14.1 OF 50
THERMAL OVERLOAD HEATER CALCULATION REV. 0 DATE 3-12-88
BOARD REF. 480V REACTOR MOV. BD. 2A COMPUTED BY TMB DATE 3-12-88
UNIT #-2 DWG. NO. 45B2299-2RQ CHECKED BY DJL DATE 3-15-88
COMP #-6A EQUIP. REF. CORE SPRAY NW ROOM COOLER FAN

CONTINUOUS DUTY MOTORS PREPARED RK 7-21-88 CHECKED gpm 7-29-88 REV. 1

WALKDOWN INPUT DATA: (REF # 3)

MOTOR CONTROL CENTER DATA:

STARTER MFGR. GE MODEL CR106C0 SIZE 1
O/L RELAY TYPE CR124 HEATER SIZE CR123C8.67A SETTING 90%

MOTOR NAMEPLATE DATA:

H.P. 5 VOLTS 460 FLC 6.8 PHASE 3 INS. CLASS — NEC CODE —
DUTY CONT S.F. 1.15 TEMP RISE — DEG C. AMBIENT TEMP 40 DEC C

AMBIENT TEMPERATURE: (REF #8)

MOTOR AMBIENT TEMP ≤ 40 DEG C EQUIP. LOCATED IN PORTION OF R. BLDG
STARTER AMBIENT TEMP ≤ 40 DEG C WHICH IS NOT PART OF HARSH ENVIRONMENT PER DWGS 47N923-4 RA & 47W229-103 R1

MANUFACTURER'S DATA:
O/L FACTOR (D.F.) (REF# 1-SH. 1) 1.0 TEMP CORRECTION FACTOR (TCF —)
HEATER TABLE: (REF #1 - SH. 8)

DEFINITIONS

I (t) -- ~~HEATER~~ RELAY TRIP CURRENT / MINIMUM
I (m) -- ~~MAXIMUM FULL LOAD~~ CURRENT CORRESPONDING TO THE HEATER CATALOG # / RELAY
1.25 -- GENERAL ELECTRIC'S MULTIPLYING FACTOR FOR ESTABLISHING ~~MAXIMUM~~ TRIP CURRENT
D.F. -- MOTOR DERATING FACTOR BASED ON MOTOR SERVICE FACTOR. (REF #1 SH 1)
I(n) — MOTOR NAMEPLATE FULL LOAD CURRENT OR ADJUSTED MOTOR FULL LOAD CURRENT
~~T* PERCENT SETTING OF THE OVERLOAD HEATER, EXPRESSED IN PER UNIT (P.U.)~~

R1

ACCEPTANCE LIMITS:

%PROTECTION FROM 125% TO 140% (REF #5)
OVERLOAD HEATERS RANGE FROM 85% to 115%

CALCULATIONS:

1. MOTOR FULL LOAD CURRENT ADJUSTMENT REQUIRED ____ YES ✓ NO
IF YES;

$$I\,(adjusted) = \frac{V\,(nameplate)}{V\,(operating)} \times I\,(nameplate)$$

I (adjusted) =

FOR THIS CALCULATION I (n) = I ADJUSTED = _____ AMPS

00.1T

CALCULATION NO. EO-Q2268-87322 SHEET 14.2 OF 50

THERMAL OVERLOAD HEATER CALCULATION REV. 0

BOARD REF. 480V REACTOR MOV. BD. 2A COMPUTED BY TJH DATE 3-12-88

UNIT # 2 DWG. NO. 45B2299-2 RO CHECKED BY DJH DATE 3-15-88

COMP # 6A EQUIP REF. CORE SPRAY NW ROOM COOLER FAN

PREPARED RK 7-21-88

CHECKED JPM 7-29-88 REV. 1

2. MOTOR OVERLOAD HEATER SELECTION

(A) CALCULATION OF HEATER SIZE (REF #5)
I(n)xD.F. = (USE D.F. PER REF #1 SH 1)

6.8 I(n)x 1.0 D.F. = 6.8 AMPS

CATALOG HEATER SIZE ~~CR123C7.78A~~ CR123C8.67A

I(m)= ~~6.92~~ 6.93

(B) CALCULATE PROTECTION FOR OVERLOAD HEATER SETTING:
CALCULATE % PROTECTION USING HEATER SETTING OF 100%

~~6.92~~ 6.93 I(m) x 1.25 X 100 %* / 6.8 I (n) = 127 % RI

DOES THE % PROTECTION FALL WITHIN THE ACCEPTANCE LIMITS?

✓ YES - THE OVERLOAD HEATER SIZE AND SETTING HAVE BEEN PROPERLY SELECTED.

_____ NO - DETERMINE HEATER SETTING TO MEET THE % PROTECTION ACCEPTANCE CRITERIA BY USING THE CLOSEST ACCEPTANCE LIMIT VALUE.

% * = [% PROTECTION x I(n)] / [I(m) x 1.25]

% * =

% * =

IS % SETTING WITHIN THE OVERLOAD HEATER RANGE?

_____ YES - THE OVERLOAD HEATER SIZE AND SETTING HAVE BEEN PROPERLY SELECTED.

_____ NO - THE OVERLOAD HEATER HAS BEEN IMPROPERLY SIZED.

3. EVALUATION OF INSTALLED MOTOR OVERLOAD HEATER

IS THE HEATER SIZE THE SAME AS CALCULATED IN SECTION 2B?

_____ YES - IS THE HEATER SETTING THE SAME AS CALCULATED IN SECTION 2B?

_____ YES - THE INSTALLED OVERLOAD HEATER SIZE AND SETTING ARE ACCEPTABLE. PROCEED TO SECTION 4.

✓ NO - THE INSTALLED OVERLOAD HEATER SIZE IS ACCEPTABLE, FIELD TO RESET SETTING. PROCEED TO SECTION 4.

~~✓ NO - PROCEED WITH FOLLOWING CR123C8.67A, I(m) 7.64~~

~~EVALUATION OF INSTALLED OVERLOAD HEATER TRIP CURRENT~~

~~I(e) = I(n) x 1.25 x %* = TRIP AMPS~~

~~I(e) = 7.64 I(n) x 1.25 x 90 %* = 8.60 AMPS~~ RI

0511

CALCULATION NO. ED-Q2268-87322 SHEET 14.3 OF 60
THERMAL OVERLOAD HEATER CALCULATION REV. 0
BOARD REF. 480V REACTOR MOV. BD. 2A COMPUTED BY TMB DATE 8-12-88
UNIT # 2 DWG. NO. 4582299-2 R0 CHECKED BY DLU DATE 9-15-88
COMP # 2A EQUIP REF. CORE SPRAY NW ROOM COOLER FAN

~~EVALUATION OF INSTALLED OVERLOAD HEATER PROTECTION.~~ PREPARED RK 7-21-88
~~% PROTECTION = I(t) / I(n) x 100~~ CHECKED JRM 7-29-88 REV.1

~~0.60 I(t) / 6.8 I(n) x 100 = 186 %~~

~~DOES THE % PROTECTION FALL WITHIN THE ACCEPTANCE LIMITS?~~

~~✓ YES - THE INSTALLED OVERLOAD HEATER SIZE AND SETTING ARE ACCEPTABLE.~~

~~NO - DETERMINE HEATER SETTING TO MEET THE % PROTECTION ACCEPTANCE CRITERIA BY USING THE CLOSEST ACCEPTANCE LIMIT VALUE.~~
~~%* = {% PROTECTION x I (n)} / {I(m) x 1.25}~~
~~%* =~~
~~%* =~~

~~IS % SETTING WITHIN THE OVERLOAD HEATER RANGE?~~

~~YES - THE INSTALLED OVERLOAD HEATER SHALL BE RESET TO THIS VALUE.~~

~~NO - THE INSTALLED OVERLOAD HEATER WAS INCORRECTLY SIZED AND SHALL BE REPLACED WITH THE ONE SELECTED IN SECTION 2B.~~ R1

4. THIS CALCULATION HAS VERIFIED THAT THE SIZE AND SETTING OF THE OVERLOAD HEATER HAVE BEEN CORRECTLY DETERMINED TO BE:

   OVERLOAD HEATER SIZE CR123C B.67A

   OVERLOAD HEATER SETTING ~~90%~~ 100%

5. COMMENTS: ~~INSTALLED TOL HEATERS SETTING NOT ACCEPTABLE~~ R1
   RESET THE INSTALLED TOL HEATERS TO 100%.

0051T