CALCULATION CHANGE NOTICE

CCN NO. XX-E-013 (Base Calc No.) - 004 (Rev No.) - CN007 (Sequence No.)

CALCULATION TITLE – From *CALCULATION TITLE* field in EIS:
Post-Fire Safe Shutdown (PFSSD) Analysis

COMPUTER CODE: **VERSION:**

Administrative?	☐ **YES** ☑ **NO**	**ASSOCIATED ENGINEERING CHANGE #:**	020021

REGULATORY REVIEWS:
☐ **Attached** **Evaluation #** _____
☑ **Attached to:** CP 020021 R/1
☐ **Not Applicable** N/A Only if Administrative

USAR STATEMENT:
☐ **Requires a change to the USAR:**
☑ **Does NOT require a change to the USAR**

ANY DOCUMENTS IMPACTED?
☐ **YES** If yes, enter: SWO #, or Condition Report #, if applicable.
☑ **NO**

Status: ☑ **COMMITTED** ☐ **FINAL** ☐ **VOID** ☐ **SUPERSEDED**

ORIG	*DigsigOrg 2.8, 0.7* NA-Vendor Calculation *Printed Name*	*Date*	**ORIG**	*Printed Name*	*Date*
	NA *Signature*			*Signature*	
	QUALIFICATION REQUIRED:	**ES9280479**		**QUALIFICATION REQUIRED:**	**ES9280479**
VERF	*DigsigVer 2.8, 0.7* William M. Wilkins *Printed Name*	05/19/2020 *Date*	**VERF**	*Printed Name*	*Date*
	Signature	**ES9280479**		*Signature*	
	QUALIFICATION REQUIRED:			**QUALIFICATION REQUIRED:**	**ES9280479**
APP	*DigsigApp 2.8, 0.7* Jeff Suter *Printed Name*	05/19/2020 *Date*	**APP**	*Printed Name*	*Date*
	Signature			*Signature*	

DigsigCert 3.5 1.75 *DigsigCert 3.5 1.75*

Vendor supplied document – WCNOC PE Stamping is not required per WCNOC-162 Rev. 05, Section 8.1.13.

RPE Certification (For ASME Section III Stress Reports/Design Reports, refer to AP 05D-001 for qualification requirements)

CALCULATION SUBJECT (Statement Of Problem) - Enter this in *SUBJECT* field in EIS:

CP 020021 XNB01 replacement impact to revise relay designations for transformer protection features. Additionally, discussion

CALCULATION CHANGE NOTICE	 CCN NO. XX-E-013 (Base Calc No.) - 004 (Rev No.) - CN007 (Sequence No.)

of load tap changer feature of new transformer included with clarification it is not PFSSD. XX-E-013-004-CN007 supersedes XX-E-013-004-CN005 in its entirety.

CALCULATION DATABASE INPUT	Page 3 CCN NO. XX-E-013 - 004 - CN007 Base Calc No. Rev No. Sequence No.

Link new systems to the calculation/CCN in EIS.	
Systems Affected:	NB, MA
Develop relationships between interdependent calculations in EIS.	
Additional Calculations Providing Input to this calculation:	None
Additional Calculations Impacted by this calculation:	None
Develop relationships between the calculation/CCN and controlled reference documents in EIS.	
Additional Controlled Documents Inputs to this calculation:	None
Additional Controlled Documents Impacted by this calculation:	None
The reference documents listed below are those that cannot be linked to the calculation/CCN and shall be entered in the INDUSTRY REFERENCE field in EIS, e.g., ASME Codes, ANSI Standards, letters, etc.	
Additional Other Reference Documents:	CP 020021, Enercon Calc. WCN-025-CALC-010 R/1
Link new components to the calculation/CCN in EIS.	
Additional Components:	None

REFER TO DESKTOP GUIDE FOR PROCESSING CALCULATIONS IN EIS

ATTACHMENT 1

CCN NO. XX-E-013 - 004 - CN007
(Base Calc No. / Rev No. / Sequence No)

CCN Page No.	Calc. Page Affected DVR/SCRN/ Other	CCN Page No.	Calc. Page Affected /DVR/SCRN /Other	CCN Page No.	Calc. Page Affected /DVR/SCRN /Other	CCN Page No.	Calc. Page Affected /DVR/SCRN /Other
1-4	None						
5(Att. 1)	Appendix 1; p63 Appendix 2; p7 Appendix 4; p4,24						
OAR	None						

ATTACHMENT 1

CCN NO. XX-E-013 - 004 - CN007

Base Calc No. Rev No. Sequence No

Vendor calculation WCN-025-CALC-010, Rev 1

ENERCON Excellence—Every project. Every day.	**CALCULATION COVER SHEET**	**CALC NO.** WCN-025-CALC-010 **REV.** 1 **PAGE NO.** 1 of 8

Title:	UPDATE TO WCNOC CALCULATION XX-E-013, PFSSD ANALYSIS	**Client:**	WCNOC
		Project Identifier:	WCN-025

Item	Cover Sheet Items	Yes	No
1	Does this calculation contain any open assumptions, including preliminary information, that require confirmation? (If **YES**, identify the assumptions.)	☐	☒
2	Does this calculation serve as an "Alternate Calculation"? (If **YES**, identify the design verified calculation.) **Design Verified Calculation No.** _____	☐	☒
3	Does this calculation supersede an existing Calculation? (If **YES**, identify the design verified calculation.) **Superseded Calculation No.** WCN-025-CALC-010 Rev. 0	☒	☐

Scope of Revision:

Revised Section 1.0, 3.0, and 5.0 and Appendix A for DCP 20021 Rev. 1

Revision Impact on Results:

This calculation documents the changes for the replacement of transformer XNB01.

Study Calculation	☐	**Final Calculation**	☒
Safety-Related	☐	**Non-Safety-Related**	☒

(Print Name and Sign)

Originator: Alex Wurtz	Alex Wurtz Digitally signed by Alex Wurtz DN: cn=Alex Wurtz, c=US, email=awurtz@enercon.com Date: 2020.05.06 15:21:20 -05'00'	**Date: See Electronic Signature**
Design Verifier[1] (Reviewer if NSR): Stacey Graybeal	Digitally signed by Stacey Graybeal Date: 2020.05.06 16:09:59 -05'00'	**Date: See Electronic Signature**
Approver: Austin Tran	Digitally signed by Austin Tran DN: cn=Austin Tran, ou=Enercon Services, Inc., email=atran@enercon.com, c=US Date: 2020.05.12 14:21:57 -05'00'	**Date: See Electronic Signature**

Note 1: For non-safety-related calculation, design verification can be sul

AUSTIN TRAN LICENSED 26514 KANSAS PROFESSIONAL ENGINEER

Digitally signed by Austin Tran
DN: cn=Austin Tran, ou=Enercon Services, Inc., email=atran@enercon.com, c=US
Date: 2020.05.12 14:22:48 -05'00'

ENERCON Excellence—Every project. Every day.	CALCULATION REVISION STATUS SHEET	CALC NO. WCN-025-CALC-010
		REV. 1
		PAGE NO. 2 of 8

CALCULATION REVISION STATUS

REVISION	DATE	DESCRIPTION
0	09/20/2018	Initial Issue
1	04/16/2020	Revised section 1.0, 3.0, and 5.0 and Appendix A

PAGE REVISION STATUS

PAGE NO.	REVISION	PAGE NO.	REVISION
3,7,8	0		
1,2,4-5	1		

APPENDIX/ATTACHMENT REVISION STATUS

APPENDIX NO.	NO. OF PAGES	REVISION NO.	ATTACHMENT NO.	NO. OF PAGES	REVISION NO.
A	4	1			

1.0 Purpose and Scope

Wolf Creek is performing a systematic replacement of their large oil-filled transformers to address aging concerns and to implement design improvements in support of long-term station operation. ESF Transformer XNB02 is to be replaced prior to the replacement of ESF transformer XNB01.

DCP 020021 is replacing XNB01 and the new transformer will have a Load Tap Changer (LTC) to control the voltage supplied to 4.16kV bus NB01 even if the 13.8 kV input voltage level changes. The DCP is also replacing/deleting relays in the MA104F panel and the relays are addressed by XX-E-013. The purpose of this calculation is to document the impact on Wolf Creek calculation XX-E-013 due to these changes. This calculation is non-safety related per the ENERCON requirements. The Wolf Creek update will be considered “special scope” per the site requirements.

2.0 Summary of Results and Conclusions

Wolf Creek calculation XX-E-013 does not have any computations. It is a document used to identify the components required to support the Post Fire Safe Shutdown (PFSSD) functions. Based on the results of this calculation the addition of the LTC controls will not impact the PFSSD function of XNB01. Two differential current relays (287/T1 Phase B and Phase C) are removed from the calculation (287/T1 Phase A is replaced with one new relay 287/T1 (A,B,C) to monitor all three phases). Also, components 263-1/T1, 263X-1/T1, 263-2/T1 and 263X-2/T1 are removed from the calculation. New fault pressure trip relays 263FP K4A and 263FP K4B are added because they provide a trip input for breaker NB00112 (XNB01 input breaker to NB01). Cable 15NBK16AA supplies 125VDC to the sudden pressure monitor that contains the two relays at XNB01. Failure of this cable does not cause the relays to change state and cause a loss of power to XNB01. Therefore, cable 15NBK16AA is not a PSFFD related cable. Drawing E-1F9425 impacted by this change and will be revised by DCP 020021 via WIP-E-1F9425-002-A-1. The proposed changes to XX-E-013 as a result of DCP 020021 are acceptable.

3.0 References

3.1 Wolf Creek Calculation XX-E-013, PFSSD Analysis, Rev. 4
3.2 E-074-00007, Outline (Trans-Sealed), Rev. W09
3.3 DCP 020021, XNB01 Replacement, Rev. 0
3.4 E-1F9425, Post Fire Safe Shutdown Logic Diagram Support Function – Electrical, NB001 Off-Site Power Availability, Rev. 2
3.5 E-1F9910, Post Fire Safe Shutdown Fire Area Analysis, Rev. 15
3.6 E-022-00029, Relay Panels and Fabrication Details, (related to MA104F), Rev. W12
3.7 E-022-00043, Transformer Feeder Wiring (related to XNB01), Rev. W09
3.8 E-15000, Electrical Cable and Raceway List, Rev. 67
3.9 E-1R4431, Raceway Plan Turbine Building Area-3 EL. 2033'-0", Rev. 2
3.10 E-1R4331, Raceway Plan Turbine Building Area-3 EL. 2000'-0", Rev. 1
3.11 E-1R4321, Raceway Plan Turbine Building Area-2 EL. 2000'-0", Rev. 2
3.12 E-1R4322, Exposed Conduit Turbine Building Area-2 EL. 2000'-0", Rev. 5
3.13 E-13NB10, Schematic Diagram 13.8kv XNB01 Breaker Rev. 3
3.14 E-13NB16, ESF Transformers Auxiliary Power and Control Schematic Diagram, Rev. 1

4.0 Assumptions

There are no assumptions used in the calculation.

5.0 Design Inputs

Reviews of existing change notices against XX-E-013 were performed to determine if any of the documents impact the changes being performed by DCP 020021. Results are as follows:

- XX-E-013-004-CN001 – VOID
- XX-E-013-004-CN002 – FINAL – DCP 14209 removes the HMCP breakers from MCC cubicles NG03DBF6 and NG04DBF6, which were

added as PFSSD components in CCN XX-E-013-002-CN014 per DCP 13800. These breaker cubicles provide power and control functions for Train A and B emergency diesel generator room supply fan motors DCGM01A and DCGM01B, respectively. Due to breaker coordination issues, DCP 14209 will modify the power supply to supply 480 VAC power to the diesel generator room supply fan motors DCGM01A and DCGM01B directly from new load center breakers NG0308 and NG0408, respectively. Breakers NG0308 and NG0408 will supply power to the fan control functions within NG03DBF6 and NG04DBF6, respectively. Therefore, MCC cubicles NG03DBF6 and NG04DBF6 will remain as PFSSD components. The changes per this update do not impact the evaluation performed by this calculation.

- XX-E-013-004-CN003 – COMMITTED – Change Package 14658 is replacing cable from EDGs speed signal generators to the EDGs speed switches. Appendices 1, 2 and 3 are updated to reflect these changes. The changes per this update do not impact the evaluation performed by this calculation.
- XX-E-013-004-CN004 – FINAL - CP 15070 is changing the 120VAC source from system NG to NN for the control room a/c unit inlet and exhaust dampers GKHZ0029A/B (Train A) & GKHZ0040A/B (Train B). The changes per this update do not impact the evaluation performed by this calculation.
- XX-E-013-004-CN005 – COMMITTED – CP 20021 is replacing XNB01 and the change impacts the PFSSD components for XNB01. This revision (revision 1) of this calculation will be accepted by Wolf Creek as a new CCN that supersedes XX-E-013-004-CN005
- XX-E-013-004-CN006 – COMMITTED – CP 12513 is replacing XNB02 and the change impacts the PFSSD components for XNB02. The changes per this update do not impact the evaluation performed by this calculation.

6.0 Methodology

This calculation is a tabulation of cables and components that are required to support the PFSSD power sources and functions. XNB01 is a power source that is required to support the PFSSD functions. The impact of the LTC controls on the PFSSD power supply function was reviewed and determined to not impact the PFSSD power supply function of XNB01. PFSSD components associated with XNB01 are listed in calculation XX-E-013. Some of the components are being removed by DCP 020021. The calculation was reviewed and components 287/T1(B) and 287/T1(C) are removed from the plant and will be removed from the calculation. Relay 287/T1(A) is changed to 287/T1(A,B,C) because the new digital relay monitors all three phases. Fault pressure monitors 263-1/T1 and 263-2/T1 are being removed from the plant and will be removed from the calculation. Auxiliary relays 263X-1/T1 and 263X-2/T1 are being disconnected/ “abandoned-in-place” and will be removed from the calculation. A new sudden pressure monitor at XNB01 contains trip relays that are used to trip the NB00112 breaker on a fault pressure signal, 263FP relays K4A and K4B. These relays will be added to the calculation. The changes to the relays also impact drawing E-1F9425. This drawing update will be addressed in DCP 020021 via WIP-E-1F9425-002-A-1. PK4115 via cable 15NBK16AA supplies 125VDC to the sudden pressure monitor. Failure of this power source or cable does not cause the relays to change state and loss of XNB01. Therefore, PK4115 and cable 15NBK16AA are not required for PFSSD.

7.0 Calculations

N/A

8.0 Computer Software

NONE

APPENDIX A – Markups to Calculation XX-E-013 Rev. 4 (4 pages)

APPENDIX 1
PFSSD FUNCTION EVALUATIONS
(PFSSD SUPPORT)

CALCULATION NO. XX-E-013

REVISION NO. 4

PA0210 is included in the PFSSD design because PA0210 control section provides control power for PA02. No PFSSD loads other than PA02 control power are supplied by PA0210.

Off-site power availability requires that off-site power cables and cables associated with XNB01 and XNB02 protective relays remain free of fire damage. The power cables are associated with the circuit breakers in the preceding table. Off-site protective relays and potential transformers required for PFSSD are identified in Appendix 4 and Appendix 3.

XMA02

The above discussion addresses safety-related power required for post fire safe shutdown. A limited number of components derive their power from non-safety related busses (PA01 and PA02). The non-safety related power is normally supplied from the unit auxiliary transformer (~~XMR02~~). On a failure of ~~XMR02~~ or the power to ~~XMR02~~, a fast bus transfer to the start-up transformer (XMR01) occurs. The power path from ~~XMR02~~ is not included in the PFSSD design because the XMR01 power path is in the PFSSD design. Other than 480V MCCs, there are no other non-safety related PFSSD loads powered from PA01 and PA02. Controls required for off-site and on-site power are identified in Appendix 3.

Forced cooling of ESF transformers XNB01 and XNB02 is not required for PFSSD. Each transformer has a self-cooled rating of 12 MVA and a forced air cooled rating of 16 MVA. The maximum design basis accident (DBA) load is approximately 6 MW which equates to 6 MVA assuming a power factor of 1 (actual power factor is between 0.8 and 1.0). Therefore, there is a 100% margin for the DBA loading for the self-cooled rating. PFSSD loading would be equal to or less than the DBA rating since some of the DBA loads are not credited for PFSSD (e.g. containment spray pumps and safety injection pumps). Therefore, there is adequate justification for not including ESF transformer cooling in the PFSSD analysis.

Lower medium voltage – 4.16KV components and relays required for PFSSD are identified in Appendix 4 and Appendix 3.

An evaluation of the potential for a fire-induced loss of off-site power is contained in Appendix 2. This evaluation identified the plant locations where a fire initiated loss of off-site power (loss of non-safety related power) could occur.

Low Voltage System – 480V

XNB01 has a Load Tap Changer (LTC) that is used to maintain a set voltage level on the NB01 bus even though voltage level changes on the 13.8kV switchyard supply voltage may occur. This function is local to the transformer. The power for the LTC and transformer auxiliary loads is supplied from either the auxiliary winding local to the transformer or an external 480VAC power supply. When operated in a "fixed tap" position (fixed tap setting by Operations) the transformer functions as a standard step down transformer and there are no new failure modes. When placed in the "automatic" mode of operation, the LTC controller monitors the 4.16 kV output and adjusts the tap changer position to maintain the NB bus voltage level at a set level. A failure of the main LTC controller would result in the LTC controls being shifted to the backup LTC controller and the Control Room being informed of the change via an alarm. The backup LTC controller has limited control function and prevents the transformer from being in an undesirable position. A loss of 480VAC power feeding the LTC/auxiliary load for XNB01 will result in loss of power to the main and backup LTC controllers. This would keep the tap setting at a fixed position (the same as the "fixed tap" operation) and the transformer functions as a standard step down transformer. Therefore, a loss of power to the LTC controllers will not impact the PFSSD function of XNB01.

APPENDIX 2
LOSS OF OFF-SITE POWER EVALUATION

CALCULATION NO. XX-E-013

REVISION NO. 4

TABLE A

OFF-SITE POWER AND EMERGENCY DIESEL GENERATOR CABLES

CABLE	ASSOCIATED BUS / DIESEL GENERATOR				DESCRIPTION
	NB01	DG A	NB02	DG B	
14NEB02AH				X	Emergency Diesel Generator B
14NEB02AJ				X	Emergency Diesel Generator B
14NEB02AL				X	Emergency Diesel Generator B
14NEB02AM				X	Emergency Diesel Generator B
14NEB02AN				X	Emergency Diesel Generator B
14NEB02AP				X	Emergency Diesel Generator B
14NEB02AQ				X	Emergency Diesel Generator B
14NEB02AR				X	Emergency Diesel Generator B
14NEB02AS				X	Emergency Diesel Generator B
14NEB02AU				X	Emergency Diesel Generator B
14NEB02AV				X	Emergency Diesel Generator B
14NEB11AA				X	Emergency Diesel Generator B
14NEB11AB				X	Emergency Diesel Generator B
14NEB11AC				X	Emergency Diesel Generator B
14NEB11AD				X	Emergency Diesel Generator B
14NEB11AF				X	Emergency Diesel Generator B
14NEB11AG				X	Emergency Diesel Generator B
14NEB11AJ				X	Emergency Diesel Generator B
14NEK13AA				X	Emergency Diesel Generator B
14NEK13AD				X	Emergency Diesel Generator B
14NEK13AE				X	Emergency Diesel Generator B
14NEK13AH				X	Emergency Diesel Generator B
14NEK13AJ				X	Emergency Diesel Generator B
15MRK10AA			X		XMR01 fault pressure switch 463-1/T2 XMR01 fault pressure switch 463-2/T2 XMR01 fault pressure relay 463X-1/T2 XMR01 fault pressure relay 463X-2/T2
15MRK10AE			X		XMR01 Deluge Relay AR7
15MRK10AF			X		XMR01 Trip On PA0201 Phase Overcurrent
15MRM11AA			X		XMR01 Transformer Cooling
15MRM11AC			X		XMR01 Lockout Relay Cooling and Oil Level Trips
15MRX01AG			X		XMR01 Phase Differential Relay 487/T1
15MRX01AL			X		XMR01 Neutral Ground Relay 251N-1/T1 XMR01 Neutral Ground Relay 251N-2/T1
15MRX01AN			X		XMR01 Feeder to PA0110
15NBA10AA	X				NB0112 Lockout Relay 286-1/T1 NB0212 Lockout Relay 286-2/T1
15NBA10AC	X				XNB01 Fault Pressure Switch 263-1/T1 XNB01 Fault Pressure Relay 263X-1/T1 XNB01 Fault Pressure Switch 263-2/T1 XNB01 Fault Pressure Relay 263X-2/T1

XNB01 Fault Pressure Trip Monitor relays 263FP K4A and K4B

APPENDIX 4
PFSSD RELAY LIST

(Sorted by Relay Location / Relay ID)

Relay ID	S/G	Relay Name	Room	Fire Area	Relay Location	SSD Fun	Sprtd Fun	Hot Stdby	Cold Shdwn	Normal Shdwn	Alt Shdwn	Schematic / One Line	Other Drawing	Power Feeder Breaker	Notes	Logic Diagram (E-1F)	REV
TSR	4	Test Start Relay	5201	D-2	KJ122	S	R, M, H	X	X	X	X	E-13KJ03A	M-018-00105 M-018-00106	NK5414	---	9411B 9412B	0
286/T1	6	Lockout Relay	4					X	X	X	---				---	9426	0
486/T1	5	Lockout Relay	4401W	TURB	MA104E	S	R, M, H	X	X	X	---	E-11MR01 E-13MR10 E-13NB11	---	PK6204 PK6106	---	9426	0
151N/T1	5	Ground Over Current Relay	4401W	TURB	MA104F	S	R, M, H	X	X	X	---	E-13NB10	---	PK6108	---	9425	0
263X-1/T1	5	Fault Pressure Switch Relay	4401W	TURB	MA104F	S	R, M, H	X	X	X	---	E-13NB10	---	PK6108	---	9425	0
263X-2/T1	5	Fault Pressure Switch Relay	4401W	TURB	MA104F	S	R, M, H	X	X	X	---	E-13NB10	---	PK6108	---	9425	0
287/T1(A)	6	Phase A Differential Current Relay	4401W	TURB	MA104F	S	R, M, H	X	X	X	---	E-13NB10	---	PK6108	---	9425	0
287/T1(B)	6	Phase B Differential Current Relay	4401W	TURB	MA104F	S	R, M, H	X	X	X	---	E-13NB10	---	PK6108	---	9425	0
287/T1(C)	6	Phase C Differential Current Relay	4401W	TURB	MA104F	S	R, M, H	X	X	X	---	E-13NB10	---	PK6108	---	9425	0
94-1/T	6	Switchyard Trip Relay	4401W	TURB	MA104F	S	R, M, H	X	X	X	---	E-13NB10	---	PK6108	---	9425	0
127-1/DG	1	NB01 Undervoltage Relay	3301	C-9	NB0101	S	R, M, H	X	X	X	---	E-12NF01 E-13NB01 E-13NF01	---	NB0101	---	9411A 9412A	0
152 STA	1	AC Circuit Breaker Stationary Contact	3301	C-9	NB0104	S	R, M, H	X	X	X	---	E-13EG01A	---	NK4101	---	9401A 9401B	0
152 STA	1	AC Circuit Breaker Stationary Contact	3301	C-9	NB0107	S	R, M, H	X	X	X	---	E-13EG01A E-13EG01B	---	NK4101	---	9401A 9401B	0
186/M	1	Lockout Relay	3301	C-9	NB0107	S	R, M, H	X	X	X	---	E-13EG01A	---	NK4101	---	9401A	0
152 STA	1	AC Circuit Breaker Stationary Contact	3301	C-9	NB0108	S	R, M, H	X	X	X	---	E-13EG01A E-13EG01B	---	NK4101	---	9401A 9401B	0
186/M	1	Lockout Relay	3301	C-9	NB0108	S	R, M, H	X	X	X	---	E-13EG01B	---	NK4101	---	9401A	0
125/F	1	Synchronizing Check Relay	3301	C-9	NB0109	S	R, M, H	X	X	X	---	E-13NB02 E-13NB13	---	NK4101	---	9425	0
152 STA	1	AC Circuit Breaker Stationary Contact	3301	C-9	NB0109	S	R, M, H	X	X	X	---	E-13NE10	---	NK4101	---	9423	0
186/F	1	Lockout Relay	3301	C-9	NB0109	S	R, M, H	X	X	X	---	E-13NB13 E-13NE10	---	NK4101	---	9423 9425	0
286-2/T2	1	Lockout Relay	3301	C-9	NB0109	S	R, M, H	X	X	X	---	E-13NB13	---	NK4101	---	9425	0

These two relays are no longer inservice and can be removed.

These two relays are removed from the plant.

287/T1 (A,B,C)

Phase A,B,C Differential Current Relay

APPENDIX 4
PFSSD RELAY LIST

(Sorted by Relay Location / Relay ID)

Relay ID	S/G	Relay Name	Room	Fire Area	Relay Location	SSD Fun	Sprtd Fun	Hot Stdby	Cold Shdwn	Normal Shdwn	Alt Shdwn	Schematic / One Line	Other Drawing	Power Feeder Breaker	Notes	Logic Diagram (E-1F)	REV
K526	4	Safety Injection Master Relay	3605	C-27	SB032D	S	R, M, H	X	X	X	---	---	M-767-00374 M-767-00350	NK4416 NN0412	---	9432	0
K713	4	Pressurizer High Pressure Relay	3601	C-27	SB032D	M	---	X	X	X	---	E-13BB40 E-13SB05	M-767-00186 M-767-00189	NK4421 NN0412 NK4416	BBPCV0456A opens if K713 is energized. XX-E-013-002-CN002	9301	3
K726	4	Low-Low T_{AVG} or ABHS0064 in 'OFF/RESET' Relay	3605	C-27	SB032D	R, H	---	X	---	X	---	E-13AB08	M-767-00188	NK4416 NN0412	---	9103	0
K727	4	Low-Low T_{AVG} or ABHS0064 in 'OFF/RESET' Relay	3605	C-27	SB032D	R, H	---	X	---	X	---	E-13AB11A E-13AB11B E-13AB11C	M-767-00188	NK4416 NN0412	---	9103	0
K728	4	Low-Low T_{AVG} or ABHS0064 in 'OFF/RESET' Relay	3605	C-27	SB032D	R, H	---	X	---	X	---	E-13AB11C	M-767-00188	NK4416 NN0412	---	9103	0
K734	4	High-1 RCS Pressure Relay	3605	C-27	SB032D	H	---	---	X	---	---	E-13BB12A E-13BB12B	M-767-00186 M-767-00189	NG02BCF2 NG02BBF3 NN0412 NK4416	---	9205	0
K740	4	Safety Injection Signal Relay	3605	C-27	SB032D	H	---	---	X	---	---	E-13EJ06B E-13SB05	M-767-00189	NG02BEF2 NN0412 NK4416	---	9205	0
K741	4	RWST Low-Low 1 Level Relay	3605	C-27	SB032D	H	---	---	X	---	---	E-13EJ06B E-13SB05	M-767-00189	NG02BEF2 NN0412 NK4416	---	9205	0
K811	4	Block Test Relay	3605	C-27	SB033A	M	---	X	X	X	---	E-13BB40	---	NK4421	---	9301	0
263-1/T1	5	Fault Pressure Switch Relay	Yard	---	XNB01	S	R, M, H	X	X	X	---	E-13NB10	---	PK6108	---	9425	0
263-2/T1	5	Fault Pressure Switch Relay	Yard	---	XNB01	S	R, M, H	X	X	X	---	E-13NB10	---	PK6108	---	9425	0
263-1/T2	6	Fault Pressure Switch Relay	Yard	---	XNB02	S	R, M, H	X	X	X	---	E-13NB11 E-13PA14	---	PK6204	---	9426	0
263-2/T2	6	Fault Pressure Switch Relay	Yard	---	XNB02	S	R, M, H	X	X	X	---	E-13NB11 E-13PA14	---	PK6204	---	9426	0

263FP (K4A)

263FP (K4B)

PK4115

PK4115

E-13NB16

PK4115 is connected to cable 15NBK16AA. This supplies power to the monitor that houses relays at XNB01. PK4115 and associated cable 15NBK16AA are not required for PFSSD. Loss of power or cable failure will not cause a loss of XNB01.

ENERCON Excellence—Every project. Every day.	CALCULATION PREPARATION CHECKLIST	CALC NO.	WCN-025-CALC-010
		REV.	1

	CHECKLIST ITEMS[1]	YES	NO	N/A
GENERAL REQUIREMENTS				
1.	If the calculation is being performed to a client procedure, is the procedure being used the latest revision? This calculation is not being performed per a client procedure.	☐	☒	☐
2.	Are the proper forms being used and are they the latest revision?	☒	☐	☐
3.	Have the appropriate client review forms/checklists been completed? This calculation is not being performed per a client procedure.	☐	☐	☒
4.	Are all pages properly identified with a calculation number, calculation revision and page number consistent with the requirements of the client's procedure?	☒	☐	☐
5.	Is all information legible and reproducible?	☒	☐	☐
6.	Is the calculation presented in a logical and orderly manner?	☒	☐	☐
7.	Is there an existing calculation that should be revised or voided? This is a revision	☒	☐	☐
8.	Is it possible to alter an existing calculation instead of preparing a new calculation for this situation?	☐	☐	☒
9.	If an existing calculation is being used for design inputs, are the key design inputs, assumptions and engineering judgments used in that calculation valid and do they apply to the calculation revision being performed.	☒	☐	☐
10.	Is the format of the calculation consistent with applicable procedures and expectations?	☒	☐	☐
11.	Were design input/output documents properly updated to reference this calculation? This calculation will be made into a calculation change notice by Wolf Creek. DCP 020021 will update any required documents associated with this calculation.	☐	☐	☒
12.	Can the calculation logic, methodology and presentation be properly understood without referring back to the originator for clarification?	☒	☐	☐
OBJECTIVE AND SCOPE				
13.	Does the calculation provide a clear concise statement of the problem and objective of the calculation? This revision does not impact these items	☐	☐	☒

CHECKLIST ITEMS[1]	YES	NO	N/A
14. Does the calculation provide a clear statement of quality classification? This revision does not impact this item	☐	☐	☒
15. Is the reason for performing and the end use of the calculation understood? This revision does not impact this item	☐	☐	☒
16. Does the calculation provide the basis for information found in the plant's license basis? This revision does not impact this item	☐	☐	☒
17. If so, is this documented in the calculation? This revision does not impact this item	☐	☐	☒
18. Does the calculation provide the basis for information found in the plant's design basis documentation? This revision does not impact this item	☐	☐	☒
19. If so, is this documented in the calculation? 20. This revision does not impact this item	☐	☐	☒
21. Does the calculation otherwise support information found in the plant's design basis documentation? This revision does not impact this item	☐	☐	☒
22. If so, is this documented in the calculation? This revision does not impact this item	☐	☐	☒
23. Has the appropriate design or license basis documentation been revised, or has the change notice or change request documents being prepared for submittal? This revision does not impact this item	☐	☐	☒
DESIGN INPUTS			

CHECKLIST ITEMS[1]	YES	NO	N/A
24. Are design inputs clearly identified? This revision does not impact this item	☐	☐	☒
25. Are design inputs retrievable or have they been added as attachments?	☒	☐	☐
26. If Attachments are used as design inputs or assumptions are the Attachments traceable and verifiable? This revision does not impact this item	☐	☐	☒
27. Are design inputs clearly distinguished from assumptions? This revision does not impact this item	☐	☐	☒
28. Does the calculation rely on Attachments for design inputs or assumptions? If yes, are the attachments properly referenced in the calculation? This revision does not impact this item	☐	☐	☒
29. Are input sources (including industry codes and standards) appropriately selected and are they consistent with the quality classification and objective of the calculation? This revision does not impact this item	☐	☐	☒
30. Are input sources (including industry codes and standards) consistent with the plant's design and license basis? This revision does not impact this item	☐	☐	☒
31. If applicable, do design inputs adequately address actual plant conditions? This revision does not impact this item	☐	☐	☒
32. Are input values reasonable and correctly applied? This revision does not impact this item	☐	☐	☒
33. Are design input sources approved? This revision does not impact this item	☐	☐	☒

CHECKLIST ITEMS[1]	YES	NO	N/A
34. Does the calculation reference the latest revision of the design input source? This revision does not impact this item	☐	☐	☒
35. Were all applicable plant operating modes considered? This revision does not impact this item	☐	☐	☒
ASSUMPTIONS			
36. Are assumptions reasonable/appropriate to the objective? This revision does not impact this item.	☐	☐	☒
37. Is adequate justification/basis for all assumptions provided? This revision does not impact this item	☐	☐	☒
38. Are any engineering judgments used?	☐	☒	☐
39. Are engineering judgments clearly identified as such? This revision does not impact this item	☐	☐	☒
40. If engineering judgments are utilized as design inputs, are they reasonable and can they be quantified or substantiated by reference to site or industry standards, engineering principles, physical laws or other appropriate criteria? This revision does not impact this item	☐	☐	☒
METHODOLOGY			
41. Is the methodology used in the calculation described or implied in the plant's licensing basis? This revision does not impact this item	☐	☐	☒
42. If the methodology used differs from that described in the plant's licensing basis, has the appropriate license document change notice been initiated? This revision does not impact this item	☐	☐	☒

CHECKLIST ITEMS[1]	YES	NO	N/A
43. Is the methodology used consistent with the stated objective? This revision does not impact this item	☐	☐	☒
44. Is the methodology used appropriate when considering the quality classification of the calculation and intended use of the results? This revision does not impact this item	☐	☐	☒
BODY OF CALCULATION			
45. Are equations used in the calculation consistent with recognized engineering practice and the plant's design and license basis? This calculation does not use any equations.	☐	☐	☒
46. Is there reasonable justification provided for the use of equations not in common use?	☐	☐	☒
47. Are the mathematical operations performed properly and documented in a logical fashion?.	☐	☐	☒
48. Is the math performed correctly?	☐	☐	☒
49. Have adjustment factors, uncertainties and empirical correlations used in the analysis been correctly applied?.	☐	☐	☒
50. Has proper consideration been given to results that may be overly sensitive to very small changes in input? This revision does not impact this item	☐	☐	☒
SOFTWARE/COMPUTER CODES			
51. Are computer codes or software languages used in the preparation of the calculation? No computer codes are used in this calculation update.	☐	☐	☒
52. Have the requirements of CSP 3.09 for use of computer codes or software languages, including verification of accuracy and applicability been met?	☐	☐	☒
53. Are the codes properly identified along with source vendor, organization, and revision level?	☐	☐	☒
54. Is the computer code applicable for the analysis being performed?	☐	☐	☒

	CHECKLIST ITEMS[1]	YES	NO	N/A
55.	If applicable, does the computer model adequately consider actual plant conditions?	☐	☐	☒
56.	Are the inputs to the computer code clearly identified and consistent with the inputs and assumptions documented in the calculation?	☐	☐	☒
57.	Is the computer output clearly identified?	☐	☐	☒
58.	Does the computer output clearly identify the appropriate units?	☐	☐	☒
59.	Are the computer outputs reasonable when compared to the inputs and what was expected?	☐	☐	☒
60.	Was the computer output reviewed for ERROR or WARNING messages that could invalidate the results?	☐	☐	☒
RESULTS AND CONCLUSIONS				
61.	Is adequate acceptance criteria specified? This revision does not impact this item	☐	☐	☒
62.	Are the stated acceptance criteria consistent with the purpose of the calculation, and intended use? This document does not use acceptance criteria.	☐	☐	☒
63.	Are the stated acceptance criteria consistent with the plant's design basis, applicable licensing commitments and industry codes, and standards? This document does not use acceptance criteria.	☐	☐	☒
64.	Do the calculation results and conclusions meet the stated acceptance criteria? This document does not use acceptance criteria.	☐	☐	☒
65.	Are the results represented in the proper units with an appropriate tolerance, if applicable? This document does not use any units.	☐	☐	☒
66.	Are the calculation results and conclusions reasonable when considered against the stated inputs and objectives?	☒	☐	☐
67.	Is sufficient conservatism applied to the outputs and conclusions? Conservatism is not required for this document.	☐	☐	☒

ENERCON Excellence—Every project. Every day.	CALCULATION PREPARATION CHECKLIST	CALC NO.	WCN-025-CALC-010
		REV.	1

CHECKLIST ITEMS[1]	YES	NO	N/A
68. Do the calculation results and conclusions affect any other calculations? This output of this calculation does not impact any other calculations.	☐	☒	☐
69. If so, have the affected calculations been revised? This output of this calculation does not impact any other calculations.	☐	☐	☒
70. Does the calculation contain any conceptual, unconfirmed or open assumptions requiring later confirmation? No assumptions are used in the calculation update.	☐	☒	☐
71. If so, are they properly identified? No assumptions are used in the calculation update.	☐	☐	☒
DESIGN REVIEW			
72. Have alternate calculation methods been used to verify calculation results? No alternate calculations are used to support this document update.	☐	☒	☐

Note:

1. Where required, provide clarification/justification for answers to the questions in the space provided below each question. An explanation is required for any questions answered as “No’ or “N/A”.

Originator: Alex Wurtz Alex Wurtz Digitally signed by Alex Wurtz DN: cn=Alex Wurtz, c=US, email=awurtz@enercon.com Date: 2020.05.06 15:22:28 -05'00' SEE ELECTRONIC SIGNATURE

Print Name and Sign Date

WCNOC	OWNER'S ACCEPTANCE REVIEW CHECKLIST FOR EXTERNAL CALCULATIONS AND SPECIFICATIONS		PAGE 1 OF 5
	Title: Post Fire Safe Shutdown (PFSSD) Analysis		
	Wolf Creek document #: XX-E-013-004-CN007	Revision #: N/A	
ECDE: Enercon			

INITIATING DOCUMENT and revision: **(e.g., PO, CR, SWO)**	CP 020021 R/1

CHANGE TYPE: [X] **Calculation** [ ] **Specification**

SAFETY CLASS: [ ] **SR** [X] **SS** [ ] **NSR**

WCNOC Reviewer signature:	*DigsigVer 5, 0.45* William M. Wilkins	Date:	05/19/2020
WCNOC Approver:	*DigsigVer 5, 0.45* Eric Sattelmeier	Date:	5/20/2020

Prepared By:	Init / Date
William M. Wilkins	WMW 05/19/2020

WCNOC	OWNER'S ACCEPTANCE REVIEW CHECKLIST FOR EXTERNAL CALCULATIONS AND SPECIFICATIONS		PAGE 2 OF 5
	Title: Post Fire Safe Shutdown (PFSSD) Analysis		
	Wolf Creek document #: XX-E-013-004-CN007	Revision #: N/A	
ECDE: Enercon			

No.	Question	Instructions and Guidance	YES	NO	N/A
1	Do assumptions have sufficient documented rationale?	All Assumptions should be stated in clear terms with enough justification to confirm that the assumption is conservative: For example, 1) the exact value of a particular parameter may not be known or that parameter may be known to vary over the range of conditions covered by the Calculation. It is appropriate to represent or bound the parameter with an assumed value. 2) The predicted performance of a specific piece of equipment in lieu of actual test data. It is appropriate to use the documented opinion/position of a recognized expert on that equipment to represent predicted equipment performance. Consideration should also be given as to any qualification testing that may be needed to validate the Assumptions. Ask yourself, would you provide more justification if you were performing this analysis? If yes, the rationale is likely incomplete.			X
2	Are assumptions compatible with the way the plant is operated and with the licensing basis?	Ensure the documentation for source and rationale for the assumption supports the way the plant is currently or will be operated post change and they are not in conflict with any design parameters. If the Analysis purpose is to establish a new licensing basis, this question can be answered yes, if the assumption supports that new basis.			X

WCNOC	OWNER'S ACCEPTANCE REVIEW CHECKLIST FOR EXTERNAL CALCULATIONS AND SPECIFICATIONS		PAGE 3 OF 5
	Title: Post Fire Safe Shutdown (PFSSD) Analysis		
	Wolf Creek document #: XX-E-013-004-CN007	Revision #: N/A	
ECDE: Enercon			

No.	Question	Instructions and Guidance	YES	NO	N/A
3	Do all unverified assumptions have a tracking and closure mechanism in place?	If there are unverified assumptions without a tracking mechanism indicated, then create the tracking item either through an ATI or a work order attached to the implementing WO. Due dates for these actions need to support verification prior to the analysis becoming operational or the resultant plant change being op authorized.			X
4	Do the design inputs have sufficient rationale?	The origin of the input, or the source should be identified and be readily retrievable within WCNOC's documentation system. If not, then the source should be attached to the analysis. Ask yourself, would you provide more justification if you were performing this analysis? If yes, the rationale is likely incomplete.	X		
5	Are design inputs correct and reasonable with critical parameters identified, if appropriate?	The expectation is that an WCNOC Engineer should be able to clearly understand which input parameters are critical to the outcome of the analysis. That is, what is the impact of a change in the parameter to the results of the analysis? If the impact is large, then that parameter is critical.	X		
6	Are design inputs compatible with the way the plant is operated and with the licensing basis?	Ensure the documentation for source and rationale for the inputs supports the way the plant is currently or will be operated post change and they are not in conflict with any design parameters.	X		
7	Are Engineering Judgments clearly documented and justified?	Ask yourself, would you provide more justification if you were performing this analysis? If yes, the rationale is likely incomplete.			X

WCNOC	OWNER'S ACCEPTANCE REVIEW CHECKLIST FOR EXTERNAL CALCULATIONS AND SPECIFICATIONS		PAGE 4 OF 5
	Title: Post Fire Safe Shutdown (PFSSD) Analysis		
	Wolf Creek document #: XX-E-013-004-CN007	Revision #: N/A	
ECDE: Enercon			

No.	Question	Instructions and Guidance	YES	NO	N/A
8	Are Engineering Judgments compatible with the way the plant is operated and with the licensing basis?	Ensure the justification for the engineering judgment supports the way the plant is currently or will be operated post change and is not in conflict with any design parameters. If the Analysis purpose is to establish a new licensing basis, then this question can be answered yes, if the judgment supports that new basis.			X
9	Do the results and conclusions satisfy the purpose and objective of the Design Analysis?	Why was the analysis being performed? Does the stated purpose match the expectation from WCNOC on the proposed application of the results? If yes, then the analysis meets the needs of the contract.	X		
10	Are the results and conclusions compatible with the way the plant is operated and with the licensing basis?	Make sure that the results support the USAR defined system design and operating conditions, or they support a proposed change to those conditions. If the analysis supports a change, are all of the other changing documents included on the cover sheet as impacted documents?	X		
11	Have any limitations on the use of the results been identified and transmitted to the appropriate organizations?	Does the analysis support a temporary condition or procedure change? Make sure that any other documents needing to be updated are included and clearly delineated in the design analysis. Make sure that the cover sheet includes the other documents where the results of this analysis provide the input.			X
12	Have margin impacts been identified and documented appropriately for any negative impacts.	Make sure that the impacts to margin are clearly shown within the body of the analysis. If the analysis results in reduced margins ensure that this has been appropriately dispositioned in the EC being used to issue the analysis.			X

WCNOC	OWNER'S ACCEPTANCE REVIEW CHECKLIST FOR EXTERNAL CALCULATIONS AND SPECIFICATIONS		PAGE 5 OF 5
	Title: Post Fire Safe Shutdown (PFSSD) Analysis		
	Wolf Creek document #: XX-E-013-004-CN007	Revision #: N/A	
ECDE: Enercon			

No.	Question	Instructions and Guidance	YES	NO	N/A
13	Does the Design Analysis include the applicable design basis documentation?	Are there sufficient documents included to support the sources of input, and other reference material that is not readily retrievable in WCNOC controlled Documents?			X
14	Have all affected design analyses been documented on the Affected Documents List (ADL) for the associated Configuration Change?	Determine if sufficient searches have been performed to identify any related analyses that need to be revised along with the base analysis. It may be necessary to perform some basic searches to validate this.			X
15	Do the sources of inputs and analysis methodology used meet committed technical and regulatory requirements?	Compare any referenced codes and standards to the current design basis and ensure that any differences are reconciled. If the input sources or analysis methodology are based on an out-of-date methodology or code, additional reconciliation may be required if the site has since committed to a more recent code			X
16	Have vendor supporting technical documents and references (including GE DRFs) been reviewed when necessary?	Based on the risk assessment performed during the pre-job brief for the analysis, ensure that sufficient reviews of any supporting documents not provided with the final analysis are performed.			X
17	If the design includes digital assets, does it adequately address digital and cyber security requirements?	Ensure the design addresses and meets digital and cyber security requirements. Refer to AP 15D-008 and contact the Cyber Security Group to perform additional reviews prior to approval. The CSAT is required to review modifications impacting Cyber Security.	X		

- END -