





Risk Assessment & Method Statement – Internal Blade Access and Rescue - Siemens 3.6 mw turbine

Document Number: AT RAM - 012
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Revision: 1
Complied by: Alex Mountain
Reviewed/Authorised by: Peter King

Purpose:	This document details the method by which Siemens 3.6mw wind turbine blades are internally accessed and how a rescue will be carried out if required. A risk assessment of the task is found in Appendix A.		
Summary of Changes	Rev 0	26/11/2020	First Issue
	Rev 1	04/02/2022	Scheduled Review

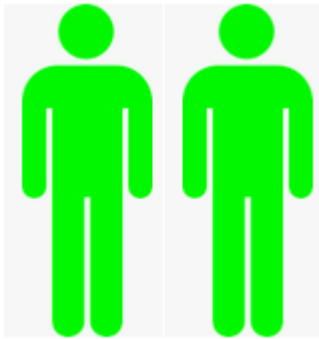

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1.Task Description/Sequence of the works

AccessTec classify the internal area of blades to be a confined space. Confined spaces are generally categorised as either low, medium or high. Our work falls into the medium risk category, a definition of which is:

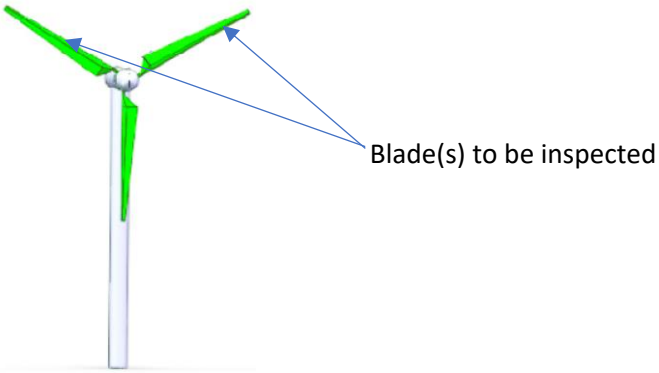


Medium: there are access issues, a realistic expectation of encountering a specified risk or possible introduction of specified risks during the work activity. If the risk of a hazardous atmosphere is significant, appropriate power assisted air filtration PPE must be used when working. There will always be one or more people positioned outside the space to control the entry and deal with emergencies.

Depending on the scope of work either inspection, LPS testing or repair will be carried out inside the blade

Justification of Confined Space Level:	All tasks involve one of the following elements: <ul style="list-style-type: none"> - Changing the environment – creation of dust and fumes (to be extracted) - Access/Egress will be difficult as the blade will need to be pitched to access specific areas 	
Team Size Required:	3	
Training Required:	Confined space entry – medium risk Rescuer: GWO Advance Rescue and/or IRATA L3	
Access/Egress	Could be difficult – hatch at waist/shoulder height – involving using a ladder	
Task effect on environment	Dust and fumes from materials used and grinding fiberglass	
Blade		Nacelle/Hub
	2 technicians working in the blade	 Rescue trained technician to remain in the hub/nacelle

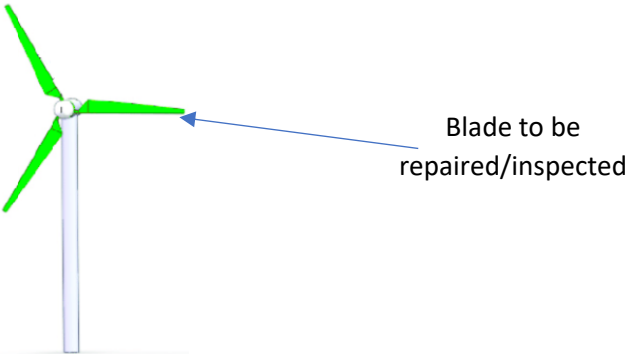


2. Access and Egress Method

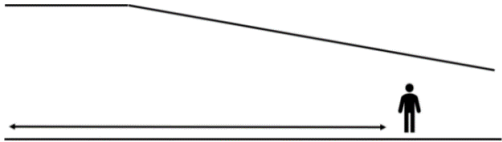

2.1 'Bunnies Ears' – Inspection of root area or LPS testing

<p>1</p>		<p>Ensure that the blade which is to be accessed is positioned in the 'bunnies' ears' position and is secured/isolated following OEM or site operator instructions.</p>
<p>2</p>		<p>Where possible, position the blade hatch into the lower position to make access, egress & rescue easier.</p> <p>Remove the blade hatch, allow to vent for 10 minutes</p>
<p>3</p>		<p>Take care when entering the blade – excess grease/moisture can be present – carry spare rags to clean.</p> <p>Remove grease cups if required to prevent damaging them.</p> <p>The technician should ensure they are wearing a head torch on entering the blade. Either set up 110v lighting or carry portable battery lighting to complete the task.</p>




4	<i>Intentionally left blank</i>	Once the task is complete, empty blade of all tooling and equipment <u>ENSURE THE BLADE IS CLEAR OF ALL EQUIPMENT</u> Replace grease cups. Re-apply blade hatch.
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2.2 Blade Horizontal – Inspection/Repair



1		<p>Ensure that the blade which is to be accessed is positioned horizontally* and is secured/isolated following OEM or operator instructions.</p> <p>*The blade MUST be locked off slightly above 0° to prevent anything within the blade sliding towards the tip</p>	
2			<p>When the blade is placed in a horizontal position, access to the hub is <u>not</u> as standard.</p> <p>The pictures opposite show how to correctly access the hub when the hatch is offset.</p>
3	<p><i>Intentionally left blank</i></p>		<p>Follow steps 2 and 3 for ‘Bunnies Ears’ entry.</p> <p>Bear in mind that surfaces in the hub will not be level.</p>







4		<p>Prior to work commencing, confirm and record on the Summary RAMs the maximum distance from the root that an inspection and work can take place.</p> <p>This will be determined taking into account:</p> <ol style="list-style-type: none"> 1. Task to be undertaken 2. Working height/room 3. Impact of the work location on a rescue
5		<p>If the task been carried out is going to create dust and/or fumes, ensure extraction is set up and power assisted filter protection is been worn.</p>
6	<p><i>Intentionally left blank</i></p>	<p>Once the task is complete, empty blade of all tooling and equipment</p> <p><u>ENSURE THE BLADE IS CLEAR OF ALL EQUIPMENT</u></p> <p>Replace grease cups.</p> <p>Re-apply blade hatch.</p>

3. Plant and Equipment





Access to blade - Low Risk Confined Space	
	<p>Socket Set – for removing blade hatch</p>
	<p>Surface Cleaner - for cleaning grease/moisture in blade/hub Rags – for cleaning grease/moisture in blade/hub</p>
	<p>Lighting – head torch and or portable lighting for initial entry e.g. Makita 18v battery light (or similar)</p>

Medium Risk Confined Space due to task been carried out creating dust and/or fumes. In addition to the above items the following is required:	
	<p>Sundstrom Power Assisted Filter Protection or equivalent</p> <ul style="list-style-type: none"> - SR500 Power Unit - SR 580 Headtop and Hose - SR 510 P3 Particulate filter - SR 518 A2 Gas Filters

Rescue from blade:	
	<p>6:1 Pulley system– e.g. petzl JAG or similar</p>
	<p>Stretcher</p>

	Ascender – e.g. Petzl Acension
	Karabiner x 10
	Tape Sling x 6
	Neck Brace
	Petzl Grillion
	Full body harness with sternal and dorsal attachment points e.g. Petzl Avao

4. Personal Protective Equipment (PPE)


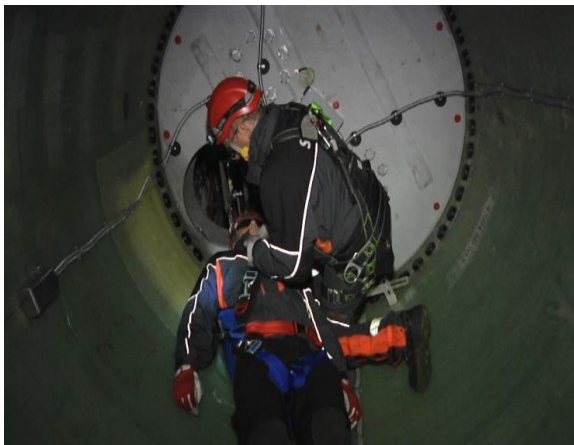


	Safety footwear and head protection use are mandatory
	Wear suitable gloves – blade hatches and edges can be sharp Grease/oil may be present
	Wear protective suit to prevent grease and oil contact with skin
	Rescuer and casualty to be wearing harness and have standard work at height equipment




5. Safety Content

Rescue Plan	See Appendix B – Rescue Plan				
First Aid	A first aid kit will be available at all times including a spine board. All injuries and near misses, regardless of how minor are to be reported to customer and the AccessTec project manager. First aid measures for particular substances are outlined in COSHH assessments.				
Weather	WTG Location	External – Spinner, Blade and Tower	Internal Nacelle	Internal Hub/Blade	Internal Tower
	Maximum average wind speed	12m/s	24m/s	18m/s	24m/s


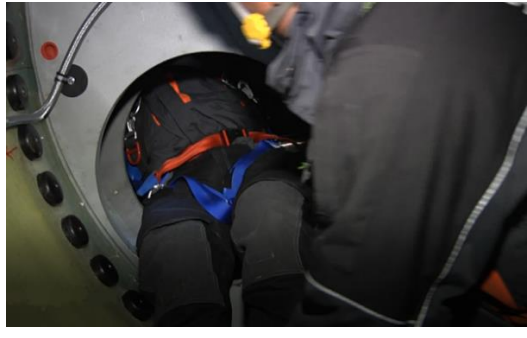
Appendix A – Risk Assessment

Appendix B – Rescue Plan




1		<p>Raise the Alarm – Following site procedures and inform correct personnel that an incident has occurred, and a rescue is being taken place. If local teams are in the area, ask for help</p>
2		<p>Before entering blade check for any potential hazards which may cause harm to the rescue party. Also plan an exit route for the casualty and check for any potential hazards on route. e.g. Chemical Spills, Harmful Gases etc</p> <p>Assess the casualty's condition. If he/she can rescue themselves then the rescuer may aid when necessary without the use of mechanical aid.</p>
3	 	<p>If it is deemed mechanical aid is required, put the casualty onto the stretcher.</p> <p>Lay Casualty on the stretcher and attach the straps following the colour coded system – i.e. attach blue to blue etc..</p>

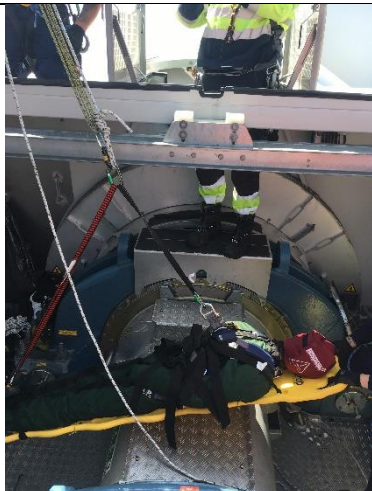
4	 A rescue technician wearing a red helmet and safety harness is positioned inside a turbine blade hatch, preparing to assist a casualty.	<p>Position the casualty as close to the blade hatch as possible.</p>
5	 A rescue technician in a red helmet is shown attaching a pulley system to the top of a stretcher inside the turbine blade.	<p>Attach the pulley system to the top of the stretcher.</p> <p>One rescue technician will remain in the blade and one rescue technician will be in the hub.</p> <p>When selecting anchor points, either use designated anchors or points that are considered structurally sound.</p>
6	 A rescue technician is shown inside the turbine blade, secured with a Petzl Grillion backup system attached to an anchor point, ready to assist with lifting a casualty.	<p>Whenever the casualty is lifted off the ground a backup must be attached. To achieve this, attach the Petzl Grillion to the centre lifting point of the stretcher with the opposite end attached to an anchor point. This can also be used to assist in lifting the casualty.</p>

Hatch Low

6	<p>Hub:</p> 	<p>Using a combination of the pulley system in the hub and physically manipulating the casualty in the blade and hub, move the casualty from the blade into the hub</p>
	<p>Blade:</p> 	

Hatch High

7		<p>Pully system rigged above the hub hatch and passed through into the blade.</p> <p>The pully system should be attached to the stretcher as shown, NOT the harness of the casualty.</p>
8		<p>The rescue technician in the hub is to begin hauling the casualty. Rescue technician in the blade to support the stretcher to prevent any lateral movement</p> <p>Haul until the casualty is in the position shown. Place a backup (grillion) in the casualty to prevent them falling sideways.</p> <p>Move the pully system from the blade hatch lifting point to a lifting point in the hub</p>
9		<p>Hauling to recommence with the assistance of the technician in the blade who will lift the feet end of the stretcher.</p> <p>The technician in the hub will control the stretcher as it passes from the blade and into the hub.</p> <p>A backup device will be used to lower the feet end of the stretcher.</p>

10		<p>When the casualty is in the hub and secure (stretcher on the checker plate and no risk of falling off) move the pulley system into the nacelle.</p> <p>With one technician in the nacelle and one in the hub, use the same combination of the pulley system and physical manipulation to move the casualty from the hub to the nacelle.</p> <p>Complete the rescue to the ground following standard GWO working at height training.</p>
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AccessTec Risk Assessment

Task:	Internal Blade Access and Rescue	Initial assessment Date:	26/11/2020	Rev:	1	AT RAM 012
Location:	Wind Turbines	Date of last review:	04/02/2022			
Author:	Alex Mountain	Date of next review	03/02/2025	Designation:		
Activities	Hazards	Initial risk rate Likelihood x Severity =	Safety Controls	Residual risk rate Likelihood x Severity =	Y/N	Action required Remarks

HAZARD CATEGORY – WHAT MIGHT GO WRONG												
	Member of public	Operatives	Other		Member of public	Operatives	Other		Members of public	Operatives	Other	
1	Fall from height (person)	✓		17	Exposure to vibration *				Other Hazards			
2	Trip / fall on same level	✓		18	Repetitive motion / action			34	Risk of Service Strike – OHL & U/G			
3	Fall down stairs/steps			19	Collision – moving objects/vehicles			35	Trapped / Crushed body parts			
4	Struck by moving object			20	Fire / flammable Atmosphere			36	Confined Spaces			
5	Struck by falling object			21	Explosion			37	Access / Egress			
6	Collapse / overturning			22	Drowning			38	Struck / trapped by Vehicles/Mobile Plant Movements			
7	Trapped between objects			23	Asphyxiation			39	Stuck by Winch Bond			
8	Strike stationary object			24	Loss of containment – liquid/gas			40	Exposure at sea			
9	Manual handling	✓		25	Adverse weather			41	Extreme working over water			
10	Contact with tools / equipment / etc			26	Sharp objects		✓	42	Travel			
11	Contact with projectiles			27	Radiation *			43	De-Hydration			
12	Contact with electricity			29	Exposure to fumes / dust			Other Considerations				
13	Contact with air / water /pressure / pressurised gas / gas / liquid			30	Young persons			1	Pregnant women			
14	Contact with heat / cold			31	New or expectant mothers			2	Waste products			
15	Contact with hazardous substance	✓		32	Environmental threat			3	Lone workers			
16	Exposure to noise			33	Asbestos *			4				

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Working and Rescuing from a Blade	Falls from Height	3x4 12 (Medium)	<ul style="list-style-type: none"> Clip on when climbing between the nacelle and hub. The hub will offset when working in a horizontal blade. When performing a rescue ensure 2 x points of contact are maintained during when there is potential for a fall 	1x3 3 (Low)	N	
Working inside a blade	Trip/Fall-Tooling and equipment on the blade base -	4x3 12 (Medium)	<ul style="list-style-type: none"> Worksite and access routes to be kept clear of any material as often as is practical. Good housekeeping - All tools & equipment to be stored neatly and out of the way of any walkway. Remove any waste collected daily. Use of appropriate lightning when working inside a blade. 	2x3 6 (Low)	N	
Working inside a blade	Trip/Fall-Moisture or grease on blade surface	3x3 9 (Medium)	<ul style="list-style-type: none"> Always assess the surface floor of the blade on entry. Clean the blade surface with rags when any moisture/grease has collected. Wear appropriate PPE – tyvex suit and nitrile gloves 	1x3 3 (Low)	N	
Working inside a blade	Equipment or technician sliding down a blade if looked off <0°	3x4 12 (Medium)	<ul style="list-style-type: none"> Ensure the blade is locked off slightly above 0° Check the blade is clear of tooling/materials before exiting Before leaving, listen carefully when rotating the hub for any rattling noises inside the blade that has been worked on – this could indicate something has been left in the blade 	1x4 4 (Low)	N	
Rescuing from a Blade	Manual Handling	3x3 9 (Medium)	<ul style="list-style-type: none"> Where possible use the pulley system to move the causality Work as a team to move the causality – lead rescue technician to give instructions on where and when to move the causality Practice good manual handling techniques in accordance with GWO manual handling training 	2x3 6 (Low)	N	

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Entering the blade and rescuing	Sharp Edge – blade hatch	3x2 6 (Low)	<ul style="list-style-type: none"> Apply edge protection on blade hatch Wear cut 5 gloves 	2x2 4 (Low)	N	
Working inside a wind turbine blade	Sealed Confined Space – potential for low O ²	2x3 6 (Low)	<ul style="list-style-type: none"> Allow the blade to vent for 10 minutes prior to entry when removing the blade hatch. Ensure a clear airflow from the nacelle to the blade is established. Use of extraction system to promote healthy air flow 	1x3 3 (Low)	N	
Working inside a wind turbine blade	Confined space - One point of entrance/ exit	3x3 9 (Medium)	<ul style="list-style-type: none"> At least one member of the working party must be rescue trained and remain outside of the blade Appropriate rescue kit on standby Additional rescue technician on standby to assist in the blade A rescue plan will be in place and a drill will be carried out at the start of a job by all team members 	1x3 3 (Low)	N	
Working inside a wind turbine blade	Confined space – environment altered due to work activities	3x3 9 (Medium)	<ul style="list-style-type: none"> Power assisted filter protection will be worn or An escape set for each team member will be present 	1x3 3 (Low)	N	

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RISK RATING TABLE								
		INCREASING LIKELIHOOD →						
INCREASING SEVERITY ↓			Very Unlikely 1	Unlikely 2	Possible 3	Likely 4	Very Likely 5	
			Little or no chance of occurrence	Conceivable but would require multiple failure of systems & controls	Could happen when additional factors are present but unlikely to occur	Not certain to happen but additional factors may result in an accident	Almost inevitable that an accident would occur	
	Negligible 1	No Disruption to operations		1 LOW	2 LOW	3 LOW	4 LOW	5 LOW
		Potential for slight injury						
		Potential for slight effect						
	Slight 2	Brief Disruption to operations		2 LOW	4 LOW	6 LOW	8 MED	10 MED
		Potential for minor injury						
Potential for minor effect								
Moderate 3	Partial Shutdown		3 LOW	6 LOW	9 MED	12 MED	15 HIGH	
	Potential for major injury							
	Potential for local effect							
High 4	Disruption to operations		4 LOW	8 MED	12 MED	16 HIGH	20 HIGH	
	Potential for single fatality							
	Potential for major effect							
V High 5	Major Disruption to operations		5 LOW	10 MED	15 HIGH	20 HIGH	25 HIGH	
	Potential for local damage							
	Potential for multiple fatalities							
		Potential for massive effect						
		Potential for extensive damage						

"HUMAN FACTORS MUST BE CONSIDERED IN ALL TASKS, BUT THE RISK POTENTIAL IS NOT QUANTIFIABLE" CARRY OUT SITE SPECIFIC RA BEFORE WORK COMMENCES.

Risk	= the likelihood of the harm being realised	Rating	Key to risk rating:
Hazard	= something with the potential to cause harm	1-6	= Low
L	Likelihood/probability	8 - 12	= Significant / Medium
S	Severity	15-25	= Unacceptable / HIGH
R	Risk		
RR	Residual Risk Rating		