



**Machinery Directive
Risk Assessment (risk estimation and evaluation) and risk
reduction
Standard: BS EN ISO 12100:2010**

ExVeritas Report Number..... : EXV000713/A/3

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Applicant's name : Hohner Automation Ltd

Address : Units 14-16, Whitegate Industrial Estate, Wrexham, LL13 8UG, UK

Standards associated with this assessment : BS EN ISO 12100:2010

Clauses considered : All

Test procedure : ExVeritas procedures

Test item description : Geograph

Model/type reference..... : CHM–xxx Series

Code : N/A

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Note: Machinery Directive assessment is outside of ExVeritas scope of UKAS accreditation. Therefore the assessments contain therein is not UKAS accredited.

1. INTRODUCTION

This machine has been assessed with guidance from BS EN ISO 12100:2010.

The risk assessments are quantitative assessments, with ratings assigned, to identify potential risks to exposed persons and any additional safety measures required to eliminate or control the risks to an acceptable level, taking into account the relevant requirements of MHSWR and PUWER, and the practical considerations allowed by these regulations.

The table below gives the list of hazards based on EN 292-1: 1991 and Annex A of EN 292-2: 1991/A1: 1995 (the Essential Health and Safety Requirements for the Machinery Directive).

SCOPE

This risk assessment has been conducted on a finished product as manufactured by Hohner Automation.

The risk assessment considers aspects relating to delivery of a new product to their customer, setting the machine up, operation, cleaning/maintenance and storage by the customer.

The design hazards have been theoretically assessed prior to any implemented control measures (Initial Risk Column) and then re-assessed with consideration of those control measures (Final Risk Column) – see risk assessment table below.

The product is only intended for use by operators who have read and understood the product manual and have received appropriate training.

EQUIPMENT DESCRIPTION

The CHM-xxx Series Geograph/ Air Line retriever (Chameleon) is a data acquisition recorder of the rate of depth of a rotary drill held for mining operations. The equipment is constructed from an aluminium housing which is designed to be welded or bolted securely to the well head for operation. On the outer there is an ATEX approved pneumatic filter and regulator a two pulley "periscope" for guidance of the stainless steel wire which is fed to the wellhead. Internally there is air motor and drum for the wire line which is controlled by a magnetic braking system; along with an encoder for position indication and speed of the wire line.

2. MACHINE LIMITS AND RISK ASSESSMENTS

Manufacturer	Hohner Automation	Method	Numerical Scoring
Equipment	Geograph Air-line Retriever	Version	1
Model	CHM-xxx Series	Date	2015.01.12
Phase of the machine life cycle	Transportation, Assembly, Installation, Setting, Operation, Maintenance and Dismantling	Analyst	I Clark
Intended for the purpose of the equipment	See manual	Voltage supply	Intrinsically safe barrier fed encoder only
Foreseen misuse of the equipment	See manual	Operating temperature	+1 to +40°C
Skill or experience required	Trained / skill operator only	Relevant standards used	BS EN ISO 12100:2010, BS EN 953, BS EN ISO 13857.

<u>LIKELIHOOD</u>	<u>SEVERITY</u>
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5 = Certain	Death

<u>SIGNIFICANCE OF THE RISK RATING</u>			
0 – 6	=	Low	= No action required
7 – 12	=	Medium	= Warning on unit or in manual and introduce guarding and/or control
13+	=	High	= Design change to eliminate hazard and re-assess rating

Risk Assessment (risk estimation and evaluation) and risk reduction
Standard: BS+E81+A3:L13+A3:L14+A3:L+A3:L49

Machinery Directive Clause Reference	Phase	Hazards	Hazardous Events	Initial Risk			Safety Measures Taken	Final Risk		
				Likelihood	Severity	Risk Rating		Likelihood	Severity	Risk Rating
Mechanical Hazards										
EHSR 1.1.5, 1.3.7	Transportation, Installation, Assembly and Dismantling	Crushing/ Entanglement	During installation or moving of the equipment / parts.	2	2	4	The safety instructions of assembly and transportation are detailed in manual Trained personnel only to perform the work.	2	1	2
EHSR 1.1.5, 1.3.7	Transportation	Crushing	Equipment is dropped	2	2	4	Equipment has lifting lugs. User manual provide transport/lifting instructions.	2	1	2
EHSR 1.1.5, 1.3.7	Setting and Operation	Entanglement	Fingers and/or hand trapped between the rotating parts. Entanglement in wireline	3	4	12	Fixed guards provided to total enclose the rotating parts apart from top guide pulleys which are proportioned and spaced to minimise entrapment. Instruction detail wireline area to be restricted access when in normal operational	2	2	4

<p><u>LIKELIHOOD</u></p> <p>1 = Improbable 2 = Remote 3 = Possible 4 = Probable 5 = Certain</p>	<p><u>SEVERITY</u></p> <p>No Injury or property damage Minor Injury or damage will be sustained requiring first aid Lost Time Accident - 3 or more days off work due to the injury Major Injury; may require hospitalisation or extended absence Death</p>
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EHSR 1.3.4	All phases	Cutting	Sharp edges around the equipment or parts	1	2	2	External corners are rounded wherever possible.	1	2	2
EHSR 1.3.4	Setting and Operation	Cutting or severing	Operator's hands / fingers possibly get cut when handling or installing parts	1	2	2	PPE advised in manual for safety manual handling	1	2	2
EHSR 1.3.7, 1.3.8	Setting and Operation	Entanglement	Access to the wireline maintenance / inspection.	2	2	4	Only trained personnel permitted to perform the maintenance / inspection tasks. Maintenance instructions are provided in manual.	1	2	2
EHSR 1.6	Setting and Operation	Impact & entanglement Severing	The wireline snaps heads toward to the operator due mechanical failure.	3	4	12	Area of wireline limited access Regular checks on the wire condition as recommended in the maintenance manual. Instruction detail wireline area to be restricted access when in normal operational	2	3	6
EHSR 1.3.7	-	Shearing	None identified	-	-	-	-	-	-	-
EHSR 1.3.7	-	Stabbing, puncture	None identified	-	-	-	-	-	-	-
EHSR 1.3.7	Operation	Friction, abrasion	Rubbing of outer pulleys on operator	2	2	4	Limited access for operators under normal use Area where PPE is used when access is required	2	1	2
EHSR 1.3.2	Operation	High pressure fluid injection	None identified	-	-	-	-	-	-	-

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EHSR 1.3.2, 1.3.3.	Operation	Unexpected ejection of machine parts or fluids.	Spinning drum and brake mechanism Pneumatics	2	4	8	Fixed guard provided for large spinning parts Pneumatic system only low pressure Normal operation is remote Area where PPE is used when access is required	1	2	2
Electrical Hazards										
EHSR 1.5.1, 1.7.1.2	Setting, Operation and Maintenance	Direct contact	Contact with electrical components or wiring during maintenance, operation or assembly etc.	2	1	2	Low voltage (intrinsically safe) equipment	1	1	1
EHSR 1.5.1, 1.7.1.2	Setting, Operation and Maintenance	Indirect contact	Contact with electrical components or wiring during maintenance or assembly. Parts of the equipment structure could become live due to fault condition.	2	1	2	All equipment structures, electrical equipment are to be earth bonded. Low voltage (intrinsically safe) equipment	1	1	1
EHSR 1.5.2, 1.7.1.2	Setting, Operation and Maintenance	Electrostatics	Touching electrostatically charged parts of the equipment.	2	1	2	The equipment is mainly constructed from steel which is earthed	1	1	1
EHSR 1.5.16	-	Lightning	None identified	-	-	-	-	-	-	-
EHSR 1.5.11	-	Thermal radiation	None identified	-	-	-	-	-	-	-

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Thermal Hazards										
EHSR 1.5.5	Setting, Operation and Maintenance	Burns and scalds	Contact with hot surfaces, e.g. magnetic break	3	2	6	Heat generated by the brake during normal operation. Temperature rise test performed and hot surfaces identified. Brake system is enclosed and not accessible during normal operation	2	1	2
EHSR 1.5.5	Setting, Operation and Maintenance	Objects or materials with a high or low temperature	None identified	-	-	-	-	-	-	-
EHSR 1.5.5	-	Radiation from heat sources	None identified	-	-	-	-	-	-	-
Hazards associated with environment in which the machine is used										
EHSR 1.5.5	-	Dust and fog	None identified	-	-	-	-	-	-	-
EHSR 1.5.11	-	Electromagnetic disturbance	None identified	-	-	-	-	-	-	-

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EHSR 1.5.5	-	Moisture	None identified	-	-	-	-	-	-	
EHSR 1.5.5	-	Snow	None identified	-	-	-	-	-	-	
EHSR 1.5.5	-	Wind	None identified	-	-	-	-	-	-	
EHSR 1.5.5	-	Lightning	None identified	-	-	-	Site installation consideration	-	-	
EHSR 1.5.5	-	Hot or cold temperature	None identified	-	-	-	-	-	-	
Hazards generated by noise										
EHSR 1.5.8	-	Hearing loss	Excessive noise during operation	2	2	4	User to risk assess area of use and provide suitable PPE where required.	1	2	2
EHSR 1.5.8	-	Manufacturing Process (e.g. pressing, grinding, stamping etc)	None identified	-	-	-	-	-	-	

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EHSR 1.5.8	-	Whistling pneumatics	Fault condition of pneumatic system	2	1	2	Remote isolation of pneumatic system	1	1	1
EHSR 1.5.8	-	Worn parts	None identified	-	-	-	Critical parts replaced before wear becomes a risk. Manual states change out times of the critical parts.	-	-	-
EHSR 1.5.8	-	Interference with speech	None identified	-	-	-	No significant noise provided by the equipment.	-	-	-
Hazards generated by radiation										
EHSR 1.5.10	-	Low, radio and micro wave frequencies	None identified	-	-	-	-	-	-	-
EHSR 1.5.10	Setting, Operation and Maintenance	Optical radiation (e.g. Infra-red, visible and UV)	None identified	-	-	-	-	-	-	-
EHSR 1.5.10	-	Ionising radiation source	None identified	-	-	-	-	-	-	-
EHSR 1.5.12	-	Laser	No laser None identified	-	-	-	-	-	-	-
Hazards generated by materials and substances										
EHSR 1.1.3, 1.5.13	Maintenance	Harmful fluids, gases, mist and dust	None identified	-	-	-	A risk assessment will need to be performed by the user before use.	-	-	-

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EHSR 1.5.6, 1.5.7	Operation	Fire or explosion	Electrical fault leading to fire	2	2	4	EN 13463-1 Ignition Hazard Assessment report of the equipment is provided. Intrinsically safe equipment	1	2	2
EHSR 1.1.3, 1.5.13	-	Biological	None identified	-	-	-	-	-	-	-
Hazards generated by vibration										
EHSR 1.5.9	-	Hand held equipment	None identified	-	-	-	-	-	-	-
EHSR 1.5.9	-	Misalignment of moving parts	None identified	-	-	-	-	-	-	-
EHSR 1.5.9	Operation	Unbalanced rotating parts	Wire drum	2	2	4	Drum protected by the enclosure, Drum damage limited by replacement of wearing parts before failure	1	2	2
Hazards related to ergonomics										
EHSR 1.1.6	Transportation, Assembly, Installation and Dismantling	Unhealthy postures, excessive efforts	Operator installing and lifting the equipment or parts.	3	2	6	Manual specifies the weight for equipment and parts. The installation/transportation instructions for the equipment/parts are provided in the manual. Suitable lifting guidelines advised in manual. Only trained personnel allowed to perform the task.	2	2	4

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EHSR 1.1.2d, 1.1.6	Setting and Operation	Inadequate consideration of human anatomy	Controls, adjustment points	2	2	4	Controls limited to simple operation with short time exposure, Trained operators only	2	1	2
EHSR 1.1.2d, 1.1.6	Setting and Operation	Neglected use of personal protective equipment	Inappropriate use of PPE, e.g. safety shoes, respiratory mask and safety gloves etc.	3	2	6	Use of PPE training will be given to the operators by the end user.	2	2	4
EHSR 1.1.2b	Operation	Mental overload, underload, stress	None identified	-	-	-	Training will be given to the operators by the end user. Work schedule will be well organised by the end user.	-	-	-
EHSR 1.1.2b, 1.1.2d	Operation	Human error, human behaviour	Illogical operation or not following operation instructions.	2	2	4	Simplistic controls. All operators will be trained. All operation procedures / sequences are included in manual. e.g. lifting, installation, transportation, control etc The control system / sequences are well designed for preventing illogical operations. Information for lifting, installation, transportation and assembly to other equipment are provided in manual The end user is responsible for providing training to their operators.	2	1	2

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EHSR 1.2.2	Setting and Operation	Inadequate manual controls	Operating the equipment	2	3	6	Simplistic controls. All operators will be trained by the end user. The control functions and control sequence are referenced in manual.	2	2	4
EHSR 1.2.2	Setting and Operation	Inadequate design or location of indicators or control devices	Operating the equipment	2	1	2	The location of control devices are at a suitable position and easy to be reached by operator.	2	1	2
EHSR 1.1.4	Setting, Operation and Maintenance	Dazzling, shadow, stroboscopic effect	None identified	-	-	-	The end user must ensure that there is no stroboscopic effect or shadow in operating area.	-	-	-
EHSR 1.1.6	-	Inadequate design or location of VDU	None identified	-	-	-	-	-	-	-
Hazards due to errors of control system										
EHSR 1.2.1	Setting and Operation	Failure / disorder of the control system	Control system limited to pneumatic supply.	3	1	3	No hazard from loss of air supply	2	1	2
EHSR 1.2.1, 1.2.6	Setting and Operation	Restoration of energy supply after an interruption	Unexpected system start after energy restored	-	-	-	None identified	-	-	-

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EHSR 1.2.1, 1.5.11	Setting and Operation	External influences on electrical equipment	Abnormal operation due to EMI interference	-	-	-	None identified	-	-	-
EHSR 1..21	Setting and Operation	Errors in the software	None identified	-	-	-	None identified	-	-	-
EHSR 1.2.1, 1.2.2	Setting, Operation and Maintenance	Errors by the operator	Abnormal operation due to operator error	2	3	6	Simple operation controls. All controls are identified and labelled with functions. All operators will be trained by the end user. Operation procedures are stated in manual	2	2	4
EHSR 1.2.1	Setting and Operation	Impossibility of stopping the machine in the best possible conditions.	During normal operation	2	2	4	Wireline movement is controlled by end user system. End user to assess the risk	2	1	2
Other hazards										
EHSR 1.2.6	Setting, Operation and Maintenance	Failure of the power supply	No power supply	-	-	-	-	-	-	-

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EHSR 1.5.4	Assembly, Installation and Maintenance	Errors of fitting	Components connected incorrectly during assembly / maintenance	3	2	6	Installation instructions advise	2	1	2
EHSR 1.3.2	Setting, Operation and Maintenance	Break up during operation (e.g. overloaded, overstressed, over-pressured etc)	Mechanical components breakup due to overstress or overload	2	2	4	All components are so designed within an adequate safety margins on maximum loads. Large moving parts enclosed	2	1	2
EHSR 1.3.1	All phases	Loss of stability / overturning of equipment	During operation, e.g. operating the equipment on a slope	1	1	1	The equipment is to be secured to larger metallic chassis	1	1	1
EHSR 1.5.15	All phases	Slip, trip and fall of person	Wireline or cables on floor.	3	2	6	The operator must ensure the floor is clear	2	2	4
EHSR 1.3.2	Setting, Operation and Maintenance	Inadequate mechanical strength – inadequate working coefficients.	Mechanical components could fail due to inadequate mechanical strength.	3	2	6	All components are designed within an adequate safety margin on maximum loads. Manual to advise regular checks.	2	2	4
EHSR 1.2.2	Setting and Operation	Unexpected movement of equipment	During operation, e.g. operate the equipment on slope	2	2	4	Installation manual specifies mounting arrangements.	2	2	4

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3 **CONCLUSION**

The risk assessments, detailed above, highlights the additional safety measures applied in order to reduce the associated risks to an acceptable level. The implementation of these safety measures provide a level of risk reduction that is considered to satisfy the Essential Health and Safety requirements of the Machinery Directive.