ATEX and UKEX Report On Equipment For Use In Potentially Explosive Atmospheres

For

Ingersoll-Rand Company

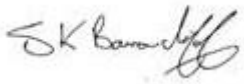
On

ARO EXP and Compact Diaphragm Pumps

Report No. TRA-051480-33-00A

28 April 2022

ATEX UKEX TEST REPORT COVER

ExTR Reference Number..... :	TRA-051480-33-00A
Compiled by + signature (ExTL) .... :	N Noroozikia 
Reviewed by + signature (ExTL).... :	S K Barrowcliff 
Approved by + signature (ExCB) ... :	A Dearden 
Date of issue ..... :	2022-04-28
Ex Testing Laboratory (ExTL) ..... :	Element Materials Technology
Address ..... :	Unit 1, Pendle Place, Skelmersdale, West Lancashire, WN8 9PN, United Kingdom.
Ex Certification Body (ExCB) ..... :	Element Materials Technology
Address ..... :	Unit 1, Pendle Place, Skelmersdale, West Lancashire, WN8 9PN, United Kingdom
ATEX Notified Body (ExCB)..... :	Element Materials Technology
Address ..... :	Zekeringstraat 33, 1014 BV, Amsterdam, Netherlands
UKCA Approved Body (ExCB)..... :	Element Materials Technology
Address ..... :	Unit 1, Pendle Place, Skelmersdale, West Lancashire, WN8 9PN, United Kingdom
Applicant's name..... :	Ingersoll-Rand Company
Address ..... :	800-A Beaty Street, Davidson, North Carolina 28036, United States of America
Standards associated with this ExTR package ..... :	EN IEC 60079-0:2018, EN ISO 80079-36:2016 & EN ISO 80079-37:2016
Clauses considered ..... :	All clauses considered
Related Amendments, Corrigenda or ISHs ..... :	N/A
Test item description..... :	ARO EXP and Compact Diaphragm Pumps
Model/type reference ..... :	PZ05X-XXX-XXX-BXX PZ10X-XXX-XXX-AXX PZ15X-XXX-XXX-AXX PZ20X-XXX-XXX-BXX PZ30X-XXX-XXX-CXX
Code (e.g. Ex __ II__ T__)..... :	Ex II 1 GD Ex h IIC/IIIC T4/T135°C Ga/Da
Rating..... :	Maximum Air Inlet pressure: PZ05X-XXX-XXX-BXX: 6.9 bar PZ10X-XXX-XXX-AXX: 8.3 bar PZ15X-XXX-XXX-AXX: 8.3 bar PZ20X-XXX-XXX-BXX: 8.3 bar PZ30X-XXX-XXX-CXX: 8.3 bar For full rating see Operator's manual

ExTR Package Contents
Assembled ExTR documents and Additional reference material:
ATEX UKCA Test Report Cover
ATEX UKCA Test Report
ATEX UKCA Test Report of National Differences: EU/EEA and Northern Ireland differences in relation to ATEX directive 2014/34/EU, Great Britain differences in relation to UKEX SI 2016 No. 1107 (as amended).
ATEX Directive (2014/34/EU) - Essential Health and Safety Requirements list
Attachment 1: Photographs
Attachment 2: Test equipment used
Attachment 3: Ignition Hazard Assessment
Attachment 4: Model Code Explanation
Attachment 5: Full specific condition for safe use and warning in manual

Manufacturer's name .....:	Ingersoll-Rand Company
Address .....:	209 N. Main Street, Bryan, OH 43506, United States of America
Trademark .....:	
Certificate No. (optional) .....:	ERO21ATEX0012X, EMA21UKEX0070X
QAN Reference Nos. .....:	ERO21QAN0001 R01, EMA21UKQAN0016 R01

Particulars: Test item vs. Test requirements

Classification of installation and use ..... :	Stationary
Ingress protection ..... :	IP20
Rated ambient temperature range (°C)..... :	The materials used for the seat, ball and diaphragm determine the ambient and pump temperature limitations, and shall be one of: T_{amb} = -20 °C to +40 °C, T_{amb} = -12 °C to +40 °C, T_{amb} = +4 °C to +40 °C, T_{amb} = 0 °C to +40 °C, T_{amb} = -12 °C to +35 °C. *See the temperature table in "Specific Conditions of Use".*

General remarks:

The test results presented in this ExTR package relate only to the item or product tested.

- "(See Attachment #)" refers to additional information appended to the ExTR package.
- "(See appended table)" refers to a table appended to the ExTR package.
- Throughout this ExTR package, a point is used as the decimal separator.
- *Where the term "N/A" appears in any part of an ExTR package, it indicates that the associated issue was considered "Not applicable" to the involved evaluation.*
- *In accordance with IECEx 02, a Receiving ExCB may request a sample of the Ex equipment and copies of the documentation referred to in an ExTR Cover.*

The technical content of this ExTR package shall not be reproduced except in full without the written approval of the Issuing ExCB and ExTL.

General remarks pertaining to this programme of test and assessment are detailed at the end of each section of the ExTR.

Test and assessment dates: 2020-11-20 to 2021-11-08

ATEX Directive and UKEX Regulations:

The equipment tested complied with the requirements of standards associated with this ExTR package (as listed on page 1 of this report). The technical documents provided in support of this application satisfied the requirement of the relevant product evaluation annexes of the ATEX directive and the UKEX Regulations.

General product information:

ARO EXP and Compact Diaphragm Pumps are non-electrical, air operated double diaphragm pumps. They are positive displacement pumps that use pressurized air to reciprocate the diaphragms. The volume change of the chambers from the diaphragms flexing flows light to medium viscosity fluids. The diaphragms can be made from various elastomers and polymers and are the barrier between the pressurized air and fluid being pumped. ARO pumps feature stall resistant design, modular air motor / fluid sections.

The pumps have metallic external components.

Pump cycling will begin as air pressure is applied and it will continue to pump and keep up with the demand. It will build and maintain line pressure and will stop cycling once maximum line pressure is reached (dispensing device closed) and will resume pumping as needed.

Basic design and operating principles are the same between models. The main difference is size. The two numbers in the first 5 digits indicate the pipe size of the pump: PD05 is ½ inch, PD10 is 1 inch, PD15 is 1.5 inch, PD20 is 2 inch, PD30 is 3 inch.

All the air motors have a major valve and pilot valve that direct pneumatic signals that cause the diaphragms to reciprocate. The pilot valve has an actuator pin that is pushed that signals when the diaphragm is at the end of the fluid intake stroke. All have diaphragms that are connected through a connecting rod with support washers behind the diaphragms. The fluid chambers are opened and closed using check balls that seal against seats. All pumps have 2 diaphragms, 4 balls and 4 seats.

The material choices can vary for external components: center body, fluid caps, inlet and outlet manifolds. For example, the PD05 models can only have an aluminum center body (exterior air motor case) while the PD10, PD15, PD20 and PD30 models have a stainless-steel option.

The material choices can also vary for internal components: check balls, seats and diaphragms. For example, the PD30 models have 8 seat material options while the PD05 models only have 3.

Manifolds starting with the PD15 and larger can have additional flange options along with NPT and BSP.

There are some minor design differences, such as additional O-rings in slightly different locations, ribbed geometry instead of smooth wall, studs instead of bolt and nut fasteners.

The model description charts for all models are given in Attachment 4 of this report.

The model description charts allow the user to identify the seat, ball and diaphragm materials and hence establish the ambient and pump temperature limitations for a particular model. See the chart under **Specific Conditions of Use**.

Details of change (applicable only when revising an existing ExTR package):

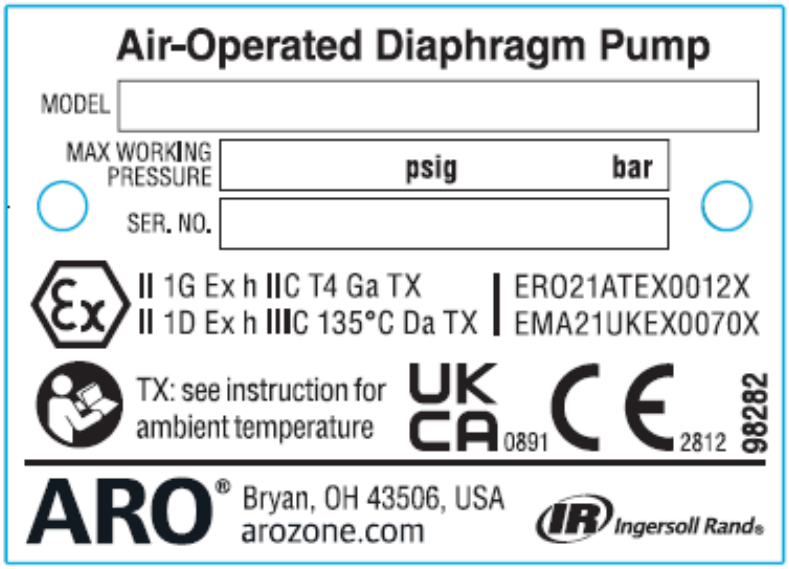
Not applicable.

Compliance strategy:

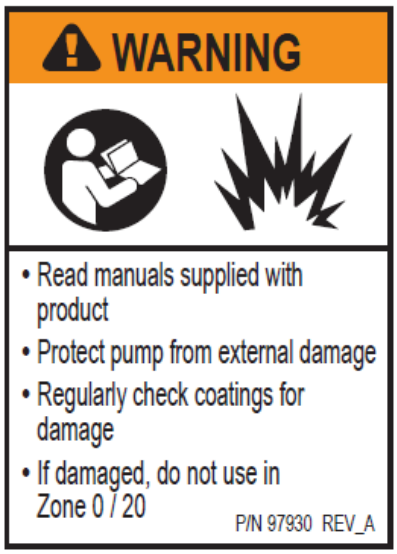
Assessment has been against the requirements of EN IEC 60079-0:2018, EN ISO 80079-36:2016 and EN ISO 80079-37:2016. The key considerations of the compliance assessment are provided below:

- Thermal rise testing was conducted to establish temperature rise on the 3” and half inch models according to EN ISO 80079-36:2016 clause 8.2. The test data and engineering evaluation identified that the T4/T135 °C temperature class would not be contravened in normal operation, expected or rare malfunction for the model in all metallic. For the model containing nonmetallic part, temperature class depend on nonmetallic the material used.
- Ingress of dust, foreign objects and liquids are not likely to cause an ignition, and hence no specific degree of protection is necessary for the purpose of ignition protection. In addition, if any dust penetrates in the pump, air and process liquid push it out once pump is running. According to 5.2.2 of ISO 80079-37 points a) and d) a level of IP20 will be enough.
- The metallic pumps are internally and externally Zone 20/0. Therefore, the ignition hazard assessment considers normal operation, foreseeable malfunction and rare malfunction for the internal parts.
- Most of the aluminium parts are anodized plus polyurethane coated to minimise the risk of paint damage in case of impact and only a few parts are Epoxy coated. A warning label and specific conditions of use to minimise the risk of any impact or paint damage.
- A SIL2 temperature monitoring for air inlet and fluid inlet temperature and a pressure monitoring for air inlet pressure of pump is used if they are not controlled within the process.

Copy of Marking Plate:



Warning label for model containing aluminum:



Details regarding 'trade agent' / 'local assembler' application in accordance with OD 203:

Not applicable.

In accordance with OD 024, testing not fully performed by ExTL staff at the above ExTL address:

N/A

National differences considered as part of this evaluation:

UK/EU/EEA differences in relation to related EN standards covering the ATEX Directive 2014/34/EU and the UKEX Regulations SI 2016 No. 1107 (as amended).

"Specific Conditions of Use":

1. The seat, ball and diaphragm materials establish the ambient, air inlet and process liquid temperature limitations. Use the temperature table below and the model code for ball, seat, diaphragm material to determine the temperature range for each pump model. Model code is explained in detail on the operator's manual.

Ambient Temperature Limits	Air Inlet and Process Fluid Temperature Limits	Ball, Seat, Diaphragm Model Code Letters Example: PZ10X-XXX-XXX-AXX									
-20°C to +40°C -4°F to +104°F	-40°C to +78°C -40°F to +172°F	AAA	AAB	AAM	AAV	ASA	ASB	ASM	ASV	AVA	AVB
		AVM	AVV	EAA	EAB	EAV	ESA	ESB	ESV	EVA	EVB
		EVV	FAA	FAB	FAV	FSA	FSB	FSV	FVA	FVB	FVV
		HAA	HAB	HAV	HSA	HSB	HSV	HVA	HVB	HVV	SAA
		SAB	SAV	SSA	SSB	SSV	SVA	SVB	SVV	---	---
-20°C to +40°C -4°F to +104°F	-29°C to +78°C -20°F to +174°F	AAC	ACA	ACB	ACC	ACM	ACV	ASC	AVC	CAA	CAB
		CAC	CAM	CAV	CCA	CCB	CCC	CCM	CCV	CSA	CSB
		CSC	CSM	CSV	CVA	CVB	CVC	CVM	CVV	EAC	ECA
		ECB	ECC	ECV	ESC	EVC	FAC	FCA	FCB	FCC	FCV
		FSC	FVC	HAC	HCA	HCB	HCC	HCV	HSC	HVC	SAC
		SCA	SCB	SCC	SCV	SSC	SVC	---	---	---	---
-12°C to +40°C +10°F to +104°F	-12°C to +78°C +10°F to +174°F	AAG	ACG	AGA	AGB	AGC	AGG	AGM	AGV	ASG	AVG
		CAG	CCG	CGA	CGB	CGC	CGG	CGM	CGV	CSG	CVG
		EAG	ECG	EGA	EGB	EGC	EGG	EGV	ESG	EVG	FAG
		FCG	FGA	FGB	FGC	FGG	FGV	FSG	FVG	GAA	GAB
		GAC	GAG	GAM	GAV	GCA	GCB	GCC	GCG	GCM	GCV
		GGA	GGB	GGC	GGG	GGM	GGV	GSA	GSB	GSC	GSG
		GSM	GSV	GVA	GVB	GVC	GVG	GVM	GVV	HAG	HCG
		HGA	HGB	HGC	HGG	HGV	HSG	HVG	KAA	KAB	KAC
		KAG	KAV	KCA	KCB	KCC	KCG	KCV	KGA	KGB	KGC
		KGG	KGV	KSA	KSB	KSC	KSG	KSV	KVA	KVB	KVC
		KVG	KVV	SAG	SCG	SGA	SGB	SGC	SGG	SGV	SSG
		SVG	---	---	---	---	---	---	---	---	---
0°C to +40°C +32°F to +104°F	0°C to +78°C +32°F to +174°F	PAA	PAC	PAG	PAV	PCA	PCC	PCG	PCV	PGA	PGC
		PGG	PGV	PSA	PSC	PSG	PSV	PVA	PVC	PVG	PVV
+4°C to +40°C +40°F to +104°F	+4°C to +78°C +40°F to +174°F	AAL	AAT	ACL	ACT	AGL	AGT	ASL	AST	ATA	ATB
		ATC	ATG	ATL	ATM	ATT	ATV	AVL	AVT	CAL	CAT
		CCL	CCT	CGL	CGT	CSL	CST	CTA	CTB	CTC	CTG
		CTL	CTM	CTT	CTV	CVL	CVT	EAL	EAM	EAT	ECL
		ECM	ECT	EGL	EGM	EGT	ESL	ESM	EST	ETA	ETB
		ETC	ETG	ETL	ETM	ETT	ETV	EVL	EVM	EVT	FAL
		FAM	FAT	FCL	FCM	FCT	FGL	FGM	FGT	FSL	FSM
		FST	FTA	FTB	FTC	FTG	FTL	FTM	FTT	FTV	FVL
		FVM	FVT	GAL	GAT	GCL	GCT	GGL	GGT	GSL	GST
		GTA	GTB	GTC	GTG	GTL	GTM	GTT	GTV	GVL	GVT
		HAL	HAM	HAT	HCL	HCM	HCT	HGL	HGM	HGT	HSL
		HSM	HST	HTA	HTB	HTC	HTG	HTL	HTM	HTT	HTV
		HVL	HVM	HVT	KAL	KAM	KAT	KCL	KCM	KCT	KGL
		KGM	KGT	KSL	KSM	KST	KTA	KTB	KTC	KTG	KTL
		KTM	KTT	KTV	KVL	KVM	KVT	PAL	PAT	PCL	PCT
		PGL	PGT	PSL	PST	PTA	PTC	PTG	PTL	PTT	PTV
		PVL	PVT	SAL	SAM	SAT	SCL	SCM	SCT	SGL	SGM
		SGT	SSL	SSM	SST	STA	STB	STC	STG	STL	STM
		STT	STV	SVL	SVM	SVT	---	---	---	---	---
-20°C to +40°C -4°F to +104°F	-23°C to +66°C -9°F to +150°F	FAU	FCU	FSU	FUA	FUC	FUU	FUV	FVU	SAU	SCU
		SSU	SUA	SUC	SUU	SUV	SVU	---	---	---	---
-12°C to +35°C +10°F to +95°F	-12°C to +66°C +10°F to +150°F	FGU	FUG	SGU	SUG	---	---	---	---	---	---
0°C to +40°C +32°F to +104°F	0°C to +66°C +32°F to +150°F	FTU	FUL	FUT	PAU	PCU	PGU	PSU	PUA	PUC	PUG
		PUU	PUV	PVU	FTU	FUL	FUT	PTU	PUL	PUT	STU
		SUL	SUT	---	---	---	---	---	---	---	---

2. Only FML-2 grease should be employed for lubrication of moving part.
3. Models containing aluminum parts cannot be used with 1,1,1-trichloroethane, methylene chloride or other halogenated hydrocarbon solvents which may react and explode.
4. Models containing aluminum must be mounted in such a manner as to eliminate the risk of sparks caused by friction or impact.
5. Regularly inspect coatings for damage and if damage occurs do not use in zone 0/20.

6. Protect pump from external damage.

7. Secure pump, connections and all contact points (bolting down at the feet) and clearance around the pump to avoid vibration and generation of contact or static spark.

8. Ensure that the pump will not exceed a maximum temperature of 25 °C lower than the auto-ignition temperature of the fluid being pumped.

9. This pump can be used in an area with zones Zone 0/20 Inside and outside the pump.

10. Potential electrostatic charging hazard – clean only with a damp cloth.

11. Certain dusts may ignite at pump surface temperature limits. Ensure proper housekeeping to eliminate dust buildup on the pump.

12. Pump operation involves the risk of producing an electrostatic charge when flowing liquids. Medium and higher conductive fluids should be used as defined by EN IEC 60079-32-1:2018 Section 7.1.4. The minimum allowed fluid conductivity shall be as follows:

    25 pS/m for fluids with dielectric constant less than 2

    50 pS/m for fluids with dielectric constant higher than 2

    100 pS/m for fluids with substantially higher dielectric constants than 2 or when it is unknown.

13. The following conditions apply if fluid temperature, air inlet temperature and air inlet pressure are not controlled within the process:

    13.1. When assembled as a complete system, the sensors using for measuring the inlet air and fluid temperature, over pressure of inlet air and excessive vibration must be connected to a monitoring and shutdown system which is sufficiently reliable and compliant with the requirements for ATEX Safety related devices as defined in Annex II Clause 1.5.1 of Directive 2014/34/EU (i.e. b2 (SIL2) as defined by EN ISO 80079-37cl 6.5).

    13.2. Trip points for the temperature and pressure monitoring system shall be set such that shutdown of the pump occurs if air inlet pressure exceeds 100 PSIG for ½ pump and 120 PSIG for all other models, or if the air inlet or fluid temperature exceeds the limitation on TEMPERATURE LIMITS table in the manual.

    13.3. The ignition protection system (IPS) when installed in be subjected to functional and accuracy tests to ensure shutdown occurs if the limits specified by the manufacturer are exceeded.

    13.4. Associated programmable electronic devices forming a part of ignition protection systems must be installed in a safe area or be suitably certified ATEX rated for the zone into which where are installed.

Other important Conditions of Use are detailed in the operator's manual and listed in attachment 5 of this test report.

Routine tests:

N/A.

Technical Documents

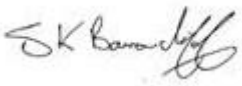
Title:	Drawing No.:	Rev. Level:	Date:
CAP, AIR	15204027	L	2022-01-12
CAP, AIR	15204035	L	2022-01-11
VALVE ADAPTER PLUG	15217722	J	2022-01-12
VALVE HOUSING	15217730	K	2022-01-12
INLET MANIFOLD	15253073	G	2022-01-12
OUTLET MANIFOLD	15253081	L	2022-01-12
FLUID CAP	20033189	R	2022-01-12
BODY, CENTER	20035812	AA	2022-01-12
FLUID CAP	20064523	V	2022-01-12
CAP, AIR	20064531	AB	2022-01-12
CAP, AIR	20065090	W	2022-01-12
CAP, FLUID	20065108	N	2022-01-12
MANIFOLD, OUTLET	20065116	P	2022-01-12
MANIFOLD, INLET	20065124	L	2022-01-12
MANIFOLD	20065645	N	2022-01-12
MANIFOLD	20065652	T	2022-01-12
CENTER BODY	20074704	F	2022-01-12
EXHAUST COVER, MACHINED	20074712	K	2022-01-12
VALVE BLOCK	20074720	K	2022-01-12
AIR CAP	20090163	U	2022-01-12
MANIFOLD, OUTLET	20090189	T	2022-01-12
MANIFOLD, INLET	20090197	M	2022-01-12
MANIFOLD, INLET	20090445	F	2022-01-12
VALVE HOUSING	20090643	L	2022-01-12
MANIFOLD, OUTLET	20090692	G	2022-01-12
BODY, CENTER	81710832	AA	2022-01-12
FLUID CAP	95935-X	F	2022-01-12
Label	97930	B	2022-01-12
Model LABEL Artwork ATEX Zone 0 Warning Label text	97930AW	B	2022-01-12
OPERATOR'S MANUAL PZ05X-XXX-XXX-BXX	97999-1932	B	2022-04-08
OPERATOR'S MANUAL PZ10X-XXX-XXX-AXX	97999-1933	B	2022-04-08
OPERATOR'S MANUAL PZ15X-XXX-XXX-AXX	97999-1934	B	2022-04-08

Title:	Drawing No.:	Rev. Level:	Date:
OPERATOR'S MANUAL PZ20X-XXX-XXX-BXX	97999-1935	B	2022-04-08
OPERATOR'S MANUAL PZ30X-XXX-XXX-CXX	97999-1936	B	2022-04-08
Model plate	98282	B	2022-01-12
Model LABEL Artwork - ATEX Zone 0 marking plate text	98282AW	B	2022-01-12
CAP, FLUID	99820524	H	2022-01-12
MANIFOLD, INLET	99820532	H	2022-01-12
MANIFOLD, OUTLET	99820540	N	2022-01-12
PLANNING CHART, 1/2" AODP METALLIC ASSY - PZ SERIES	PZ05X-XXX-XXX-BXX	C	2022-02-04
PLANNING CHART, 1" AODP METALLIC ASSY - PZ SERIES	PZ10X-XXX-XXX-AXX	C	2022-02-04
PLANNING CHART, 1-1/2" AODP METALLIC ASSY - PZ SERIES	PZ15X-XXX-XXX-AXX	C	2022-02-04
CHART, 2" AODP METALLIC ASSY - PZ SERIES	PZ20X-XXX-XXX-BXX	C	2022-02-04
PLANNING CHART, 3" AODP METALLIC ASSY - PZ SERIES	PZ30X-XXX-XXX-CXX	C	2022-02-04
RESTRICTED- PLANNING CHART, 1" AODP METALLIC ASSY - PZ SERIES	R-PZ10X-XXX-XXX-AXX	C	2022-02-04
RESTRICTED- PLANNING CHART, 1-1/2" AODP METALLIC ASSY - PZ SERIES	R-PZ15X-XXX-XXX-AXX	C	2022-02-04
RESTRICTED- PLANNING CHART, 2" AODP METALLIC ASSY - PZ SERIES	R-PZ20X-XXX-XXX-BXX	C	2022-02-04
RESTRICTED- PLANNING CHART, 3" AODP METALLIC ASSY - PZ SERIES	R-PZ30X-XXX-XXX-CXX	C	2022-02-04

*Note: The symbol " * " is included before the title of documents that are new or revised.*

Note: The symbol " - " indicates that this information was not available.

ATEX UKEX TEST REPORT
EN IEC 60079-0
Explosive atmospheres – Part 0: Equipment – General requirements

ExTR Reference Number..... :	TRA-051480-33-00A
Compiled by + signature (ExTL) .... :	N Noroozikia 
Reviewed by + signature (ExTL).... :	S K Barrowcliff 
Date of issue ..... :	2022-04-28
Ex Testing Laboratory (ExTL)..... :	Element Materials Technology
Address ..... :	Unit 1, Pendle Place, Skelmersdale, West Lancashire, WN8 9PN, United Kingdom
Applicant's name..... :	Ingersoll-Rand Company
Address ..... :	800-A Beaty Street, Davidson, North Carolina 28036, United States of America
Standard..... :	EN IEC 60079-0:2018
Test procedure..... :	Element procedures
Test Report Form Number ..... :	ExTR60079-0_7B_DS (released 2018-01)
Related Amendments, Corrigenda or ISHs	N/A

Possible test case verdicts:

- test case does not apply to the test item .....:N / A
- test item does meet the requirement .....:Pass

General remarks:
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IEC 60079-0			
Clause	Requirement – Test	Result – Remark	Verdict
1	Scope		
2	Normative references		
3	Terms and definitions		
4	Equipment grouping		
4.1	General	See clause 4.4.	Pass
4.2	Group I	Not group I equipment.	N/A
4.3	Group II	The equipment is dust group IIB.	Pass
4.4	Group III	The equipment is dust group IIIC.	Pass
4.5	Equipment for a particular explosive gas atmosphere	No specific explosive gas atmosphere.	N/A
5 See also **DS 2015/011A**	Temperatures		
	Modified (see ISO 80079-36 6.2 and Table 2)		
5.1	Environmental influences		
5.1.1	Ambient temperature	T_{amb} is marked as TX on equipment, following by “see instruction for ambient temperature”. The seat, ball and diaphragm materials establish the ambient and pump temperature limitations, and shall be one of: T_{amb} = -20 °C to +40 °C, T_{amb} = -12 °C to +40 °C, T_{amb} = +4 °C to +40 °C, T_{amb} = 0 °C to +40 °C, T_{amb} = -12 °C to +35 °C. Equipment marked with an “X” and ambient temperature is states in Specific Conditions of Use.	Pass
5.1.2	External source of heating or cooling	No external sources of heating or cooling.	N/A

IEC 60079-0			
Clause	Requirement – Test	Result – Remark	Verdict
5.2	Service temperature	Service temperature measurement not required for this equipment. The maximum surface temperature of the equipment does not depend on the equipment itself, but mainly the process.	N/A

5.3	Maximum surface temperature		
5.3.1	Determination of maximum surface temperature	Modified (see ISO 80079-36 6.2.3)	Pass
5.3.2	Limitation of maximum surface temperature		
5.3.2.1	Group I electrical equipment	Not group I equipment.	N/A
5.3.2.2	Group II electrical equipment	Modified (see ISO 80079-36 clause 6.2.5)	Pass
5.3.2.3	Group III electrical equipment		
5.3.2.3.1	Maximum surface temperature for EPL Da	Modified (see ISO 80079-36 6.2.7)	Pass
5.3.2.3.2	Maximum surface temperature for EPL Db	Modified (see ISO 80079-36 6.2.7)	Pass
5.3.2.3.3	Maximum surface temperature determined without a layer of dust for EPL Dc	Not EPL Dc equipment.	N/A
5.3.3	Small component temperature for Group I or Group II electrical equipment	Not a small component.	N/A
5.3.4	Component temperature of smooth surfaces for Group I or Group II electrical equipment	Not a component with smooth surfaces.	N/A

6	Requirements for all electrical equipment		
6.1	General	All mechanical parts of the equipment comply with this standard and standards ISO 80079-36:2016 and ISO 80079-37:2016. The manufacturer has provided a UE Declaration of Conformity (to the Machinery Directive 2006/42/EC and the ATEX directive 2014/34/EU) and a UK Declaration of Conformity (to the Machinery (Safety) Regulations 2008 (as amended) SI 2016:1107) – all applicable for this type of equipment.	Pass
6.2	Mechanical strength of equipment	See 26.4.2	Pass
6.3	Opening times	Modified (see ISO 80079-36 7.3)	N/A

IEC 60079-0			
Clause	Requirement – Test	Result – Remark	Verdict
6.4	Circulating currents in enclosures (e.g. of large electric machines)	Equipment is not subjected to circulating currents.	N/A
6.5	Gasket retention	The degree of protection does not depend on a gasketed joint.	N/A
6.6	Electromagnetic and ultrasonic energy radiating equipment	Excluded by ISO 80079-36	
7	Non-metallic enclosures and non-metallic parts of enclosures		
7.1	General		
7.1.1	Applicability	The internal components such as diaphragms, ball, seat, O-ring can be non-metallic materialls, but they are not relied on for protection.	N/A
7.1.2	Specification of materials		
7.1.2.1	General	There are no non-metallic parts relied on for protection.	N/A
7.1.2.2	Plastic materials	N/A	N/A
7.1.2.3	Elastomers	N/A	N/A
7.1.2.4	Materials used for cementing	N/A	N/A
7.2	Thermal endurance		
7.2.1	Tests for thermal endurance	There are no non-metallic parts relied on for protection. Thermal endurance test is not required.	N/A
7.2.2	Material selection	N/A	N/A
7.2.3	Alternative qualification of elastomeric sealing O-rings	N/A	N/A
7.3	Resistance to ultraviolet light	There are no non-metallic parts relied on for protection.	N/A
7.4	Electrostatic charges on external non-metallic materials		
7.4.1	Applicability	Modified (see ISO 80079-36 clause 6.7.4, 6.7.5 and 6.7.6)	Pass
7.4.2	Avoidance of a build-up of electrostatic charge for Group I or Group II	Modified (see ISO 80079-36 clause 6.7.4, 6.7.5 and 6.7.6)	Pass
7.4.3	Avoidance of a build-up of electrostatic charge for Group III	Modified (see ISO 80079-36 clause 6.7.4, 6.7.5 and 6.7.6)	Pass

IEC 60079-0			
Clause	Requirement – Test	Result – Remark	Verdict
7.5	Attached external conductive parts	N/A	N/A

8	Metallic enclosures and metallic parts of enclosures		

8.1	Material composition	Modified (see ISO 80079-36 6.4.2.1 Footnote 1) and ref. to ISO 6507-1.	Pass

8.2	Group I	Not group I equipment.	N/A

8.3	Group II	For models not containing aluminium: This clause modified (see ISO 80079-36 6.4.2.1 Footnote 1) and ref. to ISO 6507-1. For model containing aluminium according to EN ISO 80079-36:2016 clause 6.4.4: This clause applied. As more than 10% Al maybe contained that exceed the limits for EPL Ga, the equipment is marked with an “X” in accordance with item e) of 29.3 and following Specific Conditions of Uses state in user manual to avoid an ignition hazard due to impact or friction. • Regularly inspect coatings for damage and if damage occurs do not use in zone 0/20. • Protect pump from external damage. • Models containing aluminium wetted parts cannot be used with 1,1,1-trichloroethane, methylene chloride or other halogenated hydrocarbon solvents which may react and explode. • WARNING-Models containing aluminium must be mounted in such a manner as to eliminate the risk of sparks caused by friction or impact. In accordance with e) 29.4-NOTE 1 the equipment with the EPL Gb instead of Ga. Most of the aluminium parts are anodized plus polyurethane coated to minimise the risk of paint damage in case of impact and only a few parts are Epoxy coated. A warning label and Specific Conditions of Use used to minimise the risk of any impact or paint damage.	Pass

IEC 60079-0			
Clause	Requirement – Test	Result – Remark	Verdict
8.4	Group III	Modified (see ISO 80079-36 6.4.2.1 Footnote 1) and ref. to ISO 6507-1	N/A
8.5	Copper Alloys	Equipment not for use in explosive gas atmospheres.	N/A
9	Fasteners	Excluded by ISO 80079-36	
10	Interlocking devices	Excluded by ISO 80079-36	
11	Bushings	Excluded by ISO 80079-36	
12	(Reserved for future use)		
13 See also **DS 2014/001**	Ex Components	Not an Ex component approval.	N/A
14 – 23	Excluded by ISO 80079-36		
24	Documentation	Modified (see ISO 80079-36 9)	Pass
25	Compliance of prototype or sample with documents	Two samples (PD30A-AAP-AAA-C and PD05A-ASS-STT-B) subjected to the type verifications and tests comply with the manufacturer's documents.	Pass
26	Type tests		
	Modified (see ISO 80079-36 8)		
26.1	General	The samples have been tested according to EN ISO 80079-36 and EN ISO 80079-37.	N/A
26.2	Test configuration	Each test has been made in the configuration considered to be the most unfavorable.	N/A
26.3	Tests in explosive test mixtures	No such a test applied.	N/A
26.4	Tests of enclosures		
26.4.1	Order of tests		

IEC 60079-0			
Clause	Requirement – Test	Result – Remark	Verdict
26.4.1.1	Metallic enclosures, metallic parts of enclosures and glass parts of enclosures	Only the Test for resistance to impact according to 26.4.2 is required that modified according to see ISO 80079-36 clause 8.3.1.	N/A
26.4.1.2	Non-metallic enclosures or non-metallic parts of enclosures		
26.4.1.2.1	General	Only the Test for resistance to impact according to 26.4.2 is required that modified according to see ISO 80079-36 clause 8.3.1.	N/A
26.4.1.2.2	Group I equipment	Equipment is a Group II and III.	N/A
26.4.1.2.3	Group II and Group III equipment	Equipment is a Group II and III.	Pass
26.4.2	Resistance to impact	Modified (see ISO 80079-36 clause 8.3.1)	N/A
26.4.3	Drop test	Equipment is for installation in a fixed location.	N/A
26.4.4	Acceptance criteria	Modified (see ISO 80079-36 clause 8.3.1)	N/A
26.4.5 See also **DS 2012/003**	Degree of protection (IP) by enclosures		
26.4.5.1	Test procedure	IP is not required. No IP test performed.	N/A
26.4.5.2	Acceptance criteria	N/A	N/A

26.5	Thermal tests		
26.5.1	Temperature measurement		
26.5.1.1	General	See ISO 80079-36 8.2	Pass
26.5.1.2	Service temperature	Not applicable for this equipment.	N/A
26.5.1.3	Maximum surface temperature	See ISO 80079-36 8.2	Pass
26.5.2	Thermal shock test	There is no glass part on the equipment. This test is not applicable for this equipment.	N/A
26.5.3	Small component ignition test (Group I and Group II)	Excluded by ISO 80079-36	

26.6	Torque test for bushings	Excluded by ISO 80079-36	

26.7	Non-metallic enclosures or non-metallic parts of enclosures		
26.7.1	General	There are no non-metallic parts relied upon for protection.	N/A
26.7.2	Test temperatures	N/A	N/A

26.8	Thermal endurance to heat	Modified (see ISO 80079-36 8.4.4)	N/A

26.9	Thermal endurance to cold	Modified (see ISO 80079-36 8.4.5)	N/A

26.10	Resistance to UV light		
26.10.1	General		

IEC 60079-0			
Clause	Requirement – Test	Result – Remark	Verdict
26.10.2	Light exposure		
26.10.3	Acceptance criteria	Not applicable for this equipment.	N/A
26.11	Resistance to chemical agents for Group I equipment	Not group I equipment.	N/A
26.12	Earth continuity	Excluded by ISO 80079-36	
26.13	Surface resistance test of parts of enclosures of non-metallic materials	N/A	N/A
26.14	Measurement of capacitance	Excluded by ISO 80079-36	
26.15	Verification of ratings of ventilating fans	Excluded by ISO 80079-36	
26.16	Alternative qualification of elastomeric sealing O-rings	N/A	N/A
26.17	Transferred charge test		
26.17.1	Test equipment	Transferred charge test not required.	N/A
26.17.2	Test sample	N/A	N/A
26.17.3	Test procedure	N/A	N/A
27	Routine tests	No routine tests required.	N/A
28	Manufacturer's responsibility		
28.1	Conformity with the documentation	All the documentation conforms with the mechanical construction.	Pass
28.2	Certificate	Manufacturer’s responsibility	Pass
28.3	Responsibility for marking	Manufacturer’s responsibility for marking the equipment in accordance with ISO 80079-36, clause 11.2.	Pass
29	Marking		
	Modified (see ISO 80079-36 11)		
29.1	Applicability	No marking provided. See ISO 80079-36, clause 11.	Pass

IEC 60079-0			
Clause	Requirement – Test	Result – Remark	Verdict
29.2	Location	See ISO 80079-36, clause 11.	Pass
29.3	General	See ISO 80079-36, clause 11.	Pass
29.4	Ex marking for explosive gas atmospheres	See ISO 80079-36, clause 11.	Pass
29.5	Ex marking for explosive dust atmospheres	See ISO 80079-36, clause 11.	Pass
29.6	Combined types (or levels) of protection	No combined types of protection.	N/A
29.7	Multiple types of protection	No multiple types of protection.	N/A
29.8	Ga equipment using two independent Gb types (or levels) of protection	No such an equipment	N/A
29.9	Boundary wall	No boundary wall.	
29.10	Ex Components	Not Ex component equipment	N/A
29.11	Small Ex Equipment and small Ex Components	Not small Ex equipment or small Ex component.	N/A
29.12	Extremely small Ex Equipment and extremely small Ex Components	Not extremely small Ex equipment or extremely small Ex component.	N/A
29.13	Warning markings	Warning: "Do not perform maintenance or repairs in an area where explosive atmospheres are present. Prior to maintenance, ensure unit is unplugged and fully de-energized." Warning – potential electrostatic charging hazard – see instructions The pump is labeled with many other warnings not listed in table 18 of the EN IEC 60079-0:2018. These warning are all stated in operator's manual.	Pass
29.14	Cells and batteries	No cells or batteries.	N/A

IEC 60079-0			
Clause	Requirement – Test	Result – Remark	Verdict
29.15	Electric machines operated with a converter	Not operated with a converter.	N/A
29.16	Examples of marking	Informative.	Noted
30	Instructions		
30.1	General	Instructions contain all the relevant information.	Pass
30.2	Cells and batteries	Excluded by ISO 80079-36	
30.3	Electrical machines	Excluded by ISO 80079-36	
30.4	Ventilating fans	Excluded by ISO 80079-36	
30.5	Cable glands	No cable glands.	N/A
Annex A (Normative)	Supplementary requirements for cable glands	Excluded by ISO 80079-36	
Annex B (Normative)	Requirements for Ex Components		
Table B.1	Applicability of clauses to Ex Components	Not an Ex component.	N/A
Annex C (Informative)	Example of rig for resistance to impact test		
Annex D (Informative)	Electric machines connected to converters		
Annex E (Informative)	Temperature evaluation of electric machines		
Annex F (Informative)	Guideline flowchart for tests of non-metallic enclosures or non-metallic parts of enclosures (26.4)		
Annex G (Informative)	Guidance flowchart for tests of cable glands		
Annex H (Informative)	Shaft voltages resulting in motor bearing or shaft brush sparking Discharge energy calculation		

Measurement Section, including Additional Narrative Remarks (as deemed applicable)
N/A

ATEX UKEX TEST REPORT
ISO 80079-36
Explosive atmospheres – Part 36:
Non-electrical equipment for explosive atmospheres –
Basic method and requirements

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Compiled by + signature (ExTL).... :	N Noroozikia
Reviewed by + signature (ExTL) ... :	S K Barrowcliff
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Ex Testing Laboratory (ExTL) ..... :	Element Materials Technology
Address ..... :	Unit 1, Pendle Place, Skelmersdale, West Lancashire, WN8 9PN, United Kingdom
Applicant's name ..... :	Ingersoll-Rand Company
Address ..... :	800-A Beaty Street, Davidson, North Carolina 28036, United States of America
Standard ..... :	EN ISO 80079-36:2016
Test procedure ..... :	Element procedures
Test Report Form Number ..... :	ExTR80079-36_1A (released 2016-04)

Instructions for Intended Use of Ex Test Report:
An Ex Test Report provides a clause-by-clause documentation of the initial evaluation and testing that verified compliance of an item or product with an IEC, ISO or IEC/IEEE Ex standard or technical specification. This Ex Test Report is part of an ExTR package that may include other Ex Test Report, Addendum, National Differences and Partial Testing documents, along with a single ExTR Cover. An Ex Test Report is to be compiled and reviewed by the ExTL. The Issuing ExCB indicates final approval of the Ex Test Report as part of the overall ExTR package on the associated ExTR Cover.

Possible test case verdicts:

- test case does not apply to the test item……..:N/A

- test item does meet the requirement……...:Pass

General remarks:
The test results presented in this Ex Test Report relate only to the item or product tested.

- "(see Attachment #)" refers to additional information appended to this document.
- "(see appended table)" refers to a table appended to this document.
- Throughout this document, a point "." is used as the decimal separator.

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ISO 80079-36			
Clause	Requirement – Test	Result – Remark	Verdict
1	Scope		
2	Normative references		
3	Terms and definitions		
4	EPL and equipment groups		
4.1	EPL	Equipment is EPL Ga/Gb and Da/Db. Equipment has been assessed against the requirements of this standard and EN ISO 80079-37.	Pass
4.2	Group I	Not group I equipment.	N/A
4.3	Group II	Equipment is IIC.	Pass
4.4	Group III	Equipment is IIIC.	Pass
4.5	Equipment for specific explosive gas atmospheres	Equipment is IIC/IIIC.	N/A
5	Ignition hazard assessment		
5.1	General requirements	Equipment complies with the requirements of this standard and EN ISO 80079-37 type of protection constructional safety “c”. The equipment is Category 1 internally and externally. Therefore, the ignition hazard assessment has considered possible ignition sources present during normal operation, foreseeable malfunction and rare malfunction for the internal parts. The Manufacturer has provided an UKCA and EU DOC detailing conformity against the applicable industrial standards.	Pass
5.2	Procedure of ignition hazard assessment		
5.2.1	Formal Ignition hazard identification and assessment	See Ignition Hazard Assessment appended at the end of this report.	Pass
5.2.2	Group I equipment assessment		
5.2.2.1	For EPL Ma equipment	Equipment is EPL Da/Db.	N/A
5.2.2.2	For EPL Mb equipment	Equipment is EPL Da/Db.	N/A

ISO 80079-36			
Clause	Requirement – Test	Result – Remark	Verdict
5.2.3	Group II and III equipment assessment		
5.2.3.1	For EPL Ga or Da	The ignition hazard assessment has considered possible ignition sources during normal operation, foreseeable malfunction and rare malfunction for the internal areas.	Pass
5.2.3.2	For EPL Gb, Db	The Ignition Hazard Assessment has considered possible ignition sources under normal operation and foreseeable malfunction for the external parts of the equipment.	Pass
5.2.3.3	For EPL Gc or Dc	Equipment is not EPL Gc or Dc.	N/A
5.2.4	Assessment with malfunctions	Ignition sources present under normal operation, foreseeable malfunction and rare malfunction are considered. Considerations include failure of parts which could ignite a flammable/combustible substance or consequently become or create an ignition source.	Pass
5.2.5	Basic information necessary for the ignition hazard assessments	See Ignition Hazard Assessment appended at the end of this report.	Pass
5.2.6	Ignition hazard assessment report	See Ignition Hazard Assessment appended at the end of this report.	Pass
6	Assessment of possible ignition sources and control means		
6.1	General	Ignition hazard assessment based on reference to EN1127-1 and the requirements of this clause.	Pass
6.2	Hot surfaces		
6.2.1	General	The maximum surface temperature of the equipment does not depend on the equipment itself, but mainly the process but however, tests has been conducted to determine the maximum surface temperature under clause 8.2.	Pass

ISO 80079-36			
Clause	Requirement – Test	Result – Remark	Verdict
6.2.2	Ambient temperatures	T_{amb} is marked as TX on equipment, following by “see instruction for ambient temperature”. The seat, ball and diaphragm materials establish the ambient and pump temperature limitations: T_{amb} = -20 °C to +40 °C, T_{amb} = -12 °C to +40 °C, T_{amb} = +4 °C to +40 °C, T_{amb} = 0 °C to +40 °C, T_{amb} = -12 °C to +35 °C. Equipment marked with an “X” and ambient temperature is states in Specific Conditions of Use.	Pass
6.2.3	Establishing the maximum surface temperature	Maximum surface temperature measurement test has been stablished under worst case working conditions and applying rare Malfunctions: 1) Operating at high air inlet pressure 2) Operating without securing enough down at the feet (pump was walking) to submitting maximum vibration or 3) Dry run	Pass
6.2.4	Group I equipment	Group II/III Equipment.	N/A
6.2.5	Group II equipment	Equipment is marked T4/T135°C.	Pass
6.2.6	Special cases for Group I and Group II equipment		
6.2.6.1	Small surface areas	No small surface area	N/A
6.2.6.2	Enclosed volumes	Enclosed volumes	N/A
6.2.6.3	External hot surfaces	Non-capability to ignite not considered under the ignition hazard assessment.	N/A
6.2.7	Group III equipment		
6.2.7.1	General	Equipment is marked T4/T135°C.	Pass
6.2.7.2	Maximum surface temperature determined without a dust layer	When the pump runs - the adiabatic expansion of compressed air from the air motor cools the pumps. When the pump is stationary there is nothing other than the environment and fluid inside the pump to change increase it's temperature. However, the temperature rise test has been conducted to determine the maximum surface temperature under clause 8.2.	Pass
6.2.7.3	Maximum surface temperature with respect to dust layers	Maximum surface temperature not determined with respect to a dust layer. The equipment marked with the symbol “X” to indicate the specific condition of use in documentation to prevent dust build-up.	N/A

ISO 80079-36			
Clause	Requirement – Test	Result – Remark	Verdict
6.3	Flames and hot gases (including hot particles)	Pump will not generate heat. See ignition hazard assessment.	N/A
6.4	Mechanically generated sparks and hot surfaces		
6.4.1	General	Refer to ignition hazard assessment. It was considered that the design of the equipment and specific conditions of safe use would mitigate any ignition risk due to mechanically generated sparks.	Pass
6.4.2	Assessment of sparks generated by single impacts		

ISO 80079-36			
Clause	Requirement – Test	Result – Remark	Verdict
6.4.2.1	Assessment of single impact sparks as Potential Ignition Sources	Following impact between metal parts considered in ignition hazard assessment. Internal impact: - Stainless Balls impact metal housing and seat - Pilot Rod contacts Washer. Parts are steel or Stainless Steel. Compact is a smooth push - Diaphragm rod impacts backup washer. Manual assembly instructions specify to apply thread locker and apply proper torque. For 3" pumps, there is also a cushion between the backup washer and diaphragm to prevent failure. For most running conditions the actuation speed will be less than 1m/s and impact energy less than 500J. Friction and impact can only occur if the sliding mechanism has been damaged or is not maintained or serviced per supplied instructions. External impact: - Impact between metal tools and metallic parts. - Impact between external metal object and metallic parts on pump. To prevent external impact Manual indicates relevant warning, caution and specific condition for safe use: Warning: "Do not perform maintenance or repairs in an area where explosive atmospheres are present." Specific Conditions of Use-Regularly inspect coatings for damage and if damage occurs do not use in zone 0/20. Specific Conditions of Use-Models containing aluminum parts cannot be used with 1,1,1-trichloroethane, methylene chloride or other halogenated hydrocarbon solvents which may react and explode. Specific Conditions of Use-Models containing aluminum must be mounted in such a manner as to eliminate the risk of sparks caused by friction or impact. Specific Conditions of Use- Protect the pump from external damage. In addition, the pump labeled with a warning label to avoid any risk of impact and paint damage.	
6.4.2.2	Assessment of single impact sparks as effective ignition sources	See Clause 6.4.1.	Pass

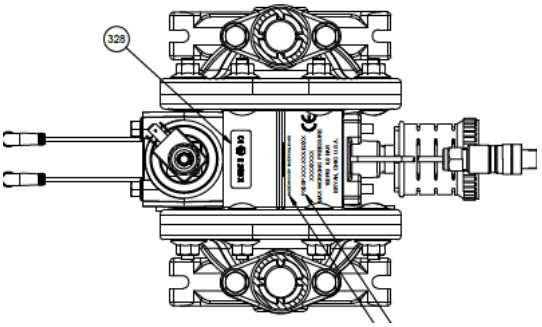
ISO 80079-36			
Clause	Requirement – Test	Result – Remark	Verdict
6.4.3	Assessment of sparks and hot surfaces generated by friction	See ignition hazard assessment. The moving parts within the air valve assembly that can contact other parts (Center Rod sliding in Sleeve). Proper Lubrication is provided during assembly and repair to prevent friction. When pump is running - adiabatic cooling and freezing occurs in air motor and air caps - If parts wear then the assembly will seize and stick without heat build-up. Vibration reduces clearance between moving and stationary parts of the equipment and causing friction. Installation Instructions have the following warning, “Secure pump, connections and all contact points to avoid vibration and generation of contact or impact spark”. Manual indicates relevant warnings, caution and information (like bolting down at the feet or clearance around the pump) to mitigate any ignition risk due to sparks or hot surfaces generated by friction under normal operation and foreseeable malfunction.	Pass
6.4.4	External equipment parts containing light metals	The external parts Centre Body, Fluid Caps or Manifold may be in aluminum (light metal). See 6.4.2.1 for external impact consideration. For aluminum housing model, Manual indicates: -Warning Explosion Hazard. Models containing Aluminum wetted parts cannot be used with 1,1,1-trichloroethane, methylene chloride or other halogenated hydrocarbon solvents which may react and explode. Also according to IEC EN 60079-0:2018 clause 8.3 a specific condition of safe use and warning label to avoid any risk of impact and paint damage. See below: -Regularly inspect coatings for damage and if damage occurs do not use in zone 0/20. -Models containing aluminum parts cannot be used with 1,1,1-trichloroethane, methylene chloride or other halogenated hydrocarbon solvents which may react and explode. -Models containing aluminum must be mounted in such a manner as to eliminate the risk of sparks caused by friction or impact. - Protect the pump from external damage.	Pass
6.5	Electrical ignition sources except stray current	No electrical part	N/A

ISO 80079-36			
Clause	Requirement – Test	Result – Remark	Verdict
6.6	Stray electric currents, cathodic corrosion protection		
6.6.1	Internal sources	This ignition source is not significant for mechanical equipment; the equipment is not capable of generating stray electric currents.	N/A
6.6.2	External sources	No external sources	N/A
6.7	Static electricity		
6.7.1	General	Spark discharges and propagating brush discharges have been considered as possible effective ignition sources, see ignition hazard assessment. For equipment used in dust atmospheres, brush discharges are not an effective ignition source.	Pass
6.7.2	Connection facilities for earthing conducting parts	Manual contains grounding information	Pass
6.7.3	Prevention of highly efficient charge generating mechanisms (leading to propagating brush discharges on non-conductive layers and coatings)	Equipment is not susceptible to electrostatic charging mechanisms.	N/A
6.7.4	Equipment group I	Group II/III Equipment.	N/A
6.7.5	Equipment group II	For the internal non-metallic part: Air flow through the inlet of the pump and fluid flow passing the diaphragms are not likely to generate a charged condition as the path to ground is readily accessed. For the external non-metallic part: To avoid the ignition due to electrostatic charges the following warning and specific condition of safe use is considered: • warning – potential electrostatic charging hazard – see instructions • specific condition of safe use: potential electrostatic charging hazard - clean only with a damp cloth.	Pass
6.7.6	Equipment group III	No restriction for group III	N/A
6.8	Adiabatic compression and shock waves	Equipment is installed in a system with a pressure relief valve to relieve the possibility of overpressure condition. Therefore, adiabatic shock will not occur without a rare malfunction.	N/A

ISO 80079-36			
Clause	Requirement – Test	Result – Remark	Verdict
6.9	Exothermic reactions, including self-ignition of dusts	Not applicable for this equipment, requirement for end user. Manual indicates "Warning Explosion Hazard. Models containing aluminum wetted parts cannot be used with halogenated hydrocarbon solvents which may react and explode."	N/A
7	Additional considerations		
7.1	Dust deposits and other material in the gap of moving parts	See Ignition Hazard Assessment. Dust can only migrate into pump's air motor when pump is stopped. When pump runs, air keeps any dust away.	N/A
7.2	Dust deposits and other material in the flame arresters incorporated in the equipment	No flame arrestors.	N/A
7.3	Opening times of enclosures	It is not applicable for this equipment, because the pump cannot be opened more quickly than the time necessary for an ignition source to become non-effective. Following warning is also provided in operator's manual: Warning - Do not perform maintenance or repairs in an area where explosive atmospheres are present.	N/A
7.4	Non-metallic enclosures and non-metallic parts of the equipment		
7.4.1	General	No non-metallic components relied upon for protection type. The maximum allowed temperature for the process fluid is dependent upon the material used in the equipment. Certificate and warning markings shall include temperature limitations for non-metallic materials. Max allowable process temp determined by component with lowest max allowable temp. Product Temperature Limits (diaphragm, ball, seat) listed in Manual.	Pass
7.4.2	Specification of the materials	Specifications of the materials listed above are sufficiently documented.	Pass
7.4.3	Thermal endurance	No non-metallic components relied upon for protection type. Thermal endurance is not applicable.	N/A

ISO 80079-36			
Clause	Requirement – Test	Result – Remark	Verdict
7.5	Removable parts	All the parts are combined together with fasteners that need a special tool or key to remove.	N/A
7.6	Materials used for cementing	No cemented parts.	N/A
7.7	Light transmitting parts	No light transmitting parts.	N/A
7.8	Stored energy	Equipment is not designed to be de-energised when an explosive atmosphere is detected.	N/A
8	Verification and tests		
8.1	General	The equipment was subjected to the appropriate tests listed in 8.2 and 8.3.1.	Pass
8.2	Determination of the maximum surface temperature		
8.2.1	General	The maximum surface temperature of the equipment does not depend on the equipment itself, but mainly the process but however, tests has been conducted to determine the maximum surface temperature under clause 8.2. This test confirm that the temperature class is T4/T135°C for all metallic models.	Pass
8.2.2	Hot Surface Ignition Test		
8.2.2.1	General	Not applicable for this equipment.	N/A
8.2.2.2	Procedure	N/A	N/A
8.2.2.3	Acceptance criteria	N/A	N/A
8.3	Mechanical tests		
8.3.1	Test for resistance to impact	Resistance to impact test was performed on the sample 1/2 inch in aluminum PD05A-ASS-STT-B. About the 3 inch sample PD30A-AAP-AAA-C, due to the equipment's robust construction there was no single point on the equipment that a 7 J impact would compromise the construction to a point where the explosion protection would be affected. Compliance by inspection.	Pass
8.3.2	Drop test	Equipment is for installation in a fixed location.	N/A
8.3.3	Required results	The sample withstand the 7J impact test at ambient temperature.	Pass

ISO 80079-36			
Clause	Requirement – Test	Result – Remark	Verdict
8.4	Additional tests of non-metallic parts of the equipment relevant for explosion protection		
8.4.1	Test temperatures	C	N/A
8.4.2	Tests for Group I equipment	Group II/III Equipment.	N/A
8.4.3	Tests for Group II and III equipment		
8.4.4	Thermal endurance to heat	No non-metallic components relied upon for protection type.	
8.4.5	Thermal endurance to cold	No non-metallic components relied upon for protection type.	
8.4.6	Resistance to chemical substances for Group I equipment	Group II/III Equipment.	N/A
8.4.7	Mechanical resistance tests	Resistance to impact test has been performed according to 8.3.1.	Pass
8.4.8	Surface resistance test of non-conductive parts of the equipment relevant for explosion prevention and protection	No test required.	N/A
8.4.9	Thermal shock test	Not applicable for this equipment, no glass parts.	N/A
9	Documentation		
9.1	Technical documentation	The documentation supplied gave a full and accurate description of the explosion safety aspects of the equipment.	Pass
9.2	Conformity with the documentation	The sample inspected complied with the documentation provided.	Pass
9.3	Certificate	Manufacturer’s responsibility	Pass
9.4	Responsibility for marking	Manufacturers responsibility	Pass
10	Instructions	Instructions contain all the relevant information.	Pass
11	Marking		

ISO 80079-36			
Clause	Requirement – Test	Result – Remark	Verdict
11.1	Location	The marking label is on a main (central) part on the exterior of the pump.  The label is in 304 stainless steel plate and secure by impacting two metal tacks P/N 98984 or drive screws P/N Y60-30, marked as follows in 11.2.	Pass
11.2	General	a) INGERSOLL-RAND COMPANY and address b) Model is included c) Ex symbol is included d) Equipment is marked: II 1 GD Ex h IIC/IIIC T4/T135°C Ga/Da e) See d) f) See d) g) See d) h) See d) i) TX j) Serial number is included k) Certificate number: ERO21ATEX0012X, EMA21UKEX0070X l) X included m) No additional marking n) Marking all on the same line	Pass
11.3	Warning markings	Warning-Do not perform maintenance or repairs in an area where explosive atmospheres are present. Warning – potential electrostatic charging hazard – see instructions	Pass
11.4	Marking on very small equipment	Not very small equipment.	N/A
11.5	Examples of marking	Informative.	Noted

ISO 80079-36			
Clause	Requirement – Test	Result – Remark	Verdict

Annex A (informative)	Methodology for confirming the EPL

Annex B (informative)	Explanation of the ignition hazard assessment procedure

Annex C (informative)	Examples of ignition hazard assessment

Annex D (normative)	Charging tests with non-conductive materials	To avoid the ignition due to electrostatic charges the following warning and specific condition of safe use is considered. No test required. • Warning – potential electrostatic charging hazard – see instructions • Clean only with a damp cloth.	N/A

Annex E (informative)	Consideration of misuse which can reasonably be anticipated during ignition hazard assessment procedure

Annex F (informative)	Development of different types of incendive electrostatic discharges

Annex G (normative)	Protection concepts of types of protection "d", "p" and "t" acceptable for non-electrical equipment	No such a protection concept	N/A

Annex H (informative)	Volume dependence of auto-ignition temperature

Annex I (informative)	Relationship between Equipment protection levels (EPLs) and zones

Measurement Section, including Additional Narrative Remarks (as deemed applicable)

Test	**Test method**	**Summary of results**
Temperature rise: (EN ISO 80079-36, 8.2) Date: 2021-08-16 to 18-08-021	A 3” pump PD30A-AAP-AAA-C and a ½” PD05A-ASS-STT-B have been subjected each to two thermal rise tests wet (with water) and dry run. Malfunctions applied: 1) Operating at high air inlet pressure 11 bar (more than 8.3 bar + 10%) for 3” and at 7.5 bar (6.9 bar +10%) for ½”	Maximum permissible surface temperature is 108 °C (80%) at the upper ambient of 40 °C. The maximum surface temperature measured at the 3” sample’s air cap is 69.9 °C

Test record:
TRA-51480

2) Operating without securing enough at the feet, so pump was walking and was submitting maximum vibration or
3) Dry run

3" pump PD30A-AAP-AAA-C

5 hours of wet run / 2 hours of dry run / 2021-08-16

Location of thermocouples	Maximum temp rise (K)		Maximum surface temperature for +40°C (°C)	
	Wet run At 26.1°C	Dry run At 24.5°C	Wet run	Dry run
1 fluid outlet	10.2	8	50.2	48
2 major valve	12.3	10.1	52.3	50.1
3- air cap	29.9	13	**69.9**	53
4-ambient				
5-AC-Lo-behind diaphragm left	4.5	2.6	44.5	42.6
6-AC Ro - behind diaphragm right	6.3	3.8	46.3	43.8
7-AM1- main body	11.1	7.1	51.1	47.1
8-AM2- shaft cover	18	9.9	58	49.9
9- AC IR- air cap internal right	12.5	7	52.5	47
10-AC IL- air cap internal left	11.6	6.8	51.6	46.8

½" PD05A-ASS-STT-B

2 hours of wet run on 2021-08-17 / 4 hours of dry run on 2021-08-18

Channel/Location of thermocouples	Maximum temp rise (K)		Maximum surface temperature for +40°C (°C)	
	Wet run At 23.7°C	Dry run At 22.1°C	Wet run	Dry run
4-ambient				
5- AC IR- air cap internal right	17.1	11.2	**57.1**	51.2
6- AC IL- air cap internal left	14.5	9.9	54.5	49.9
7- AM1- main body	13.7	16.7	53.7	56.7
9- behind diaphragm left	10.5	7.3	50.5	47.3

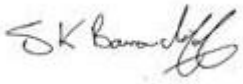
for the maximum ambient temperature of +40 °C.

Equipment marked T4/T135 °C.

Pass

	Other location of ½" sample checked regularly during the test by thermic camera and no points found hotter than 3" sample.	
Resistance to impact according to EN ISO 80079-36:2016, 8.3.1 Date: 2021-08-18 Test record: TRA-51480	A half inch diaphragm pump, PD05A-ASS-STT-B, that contains external aluminum parts was submitted to impact test in an ambient temperature of 16.6 °C under 7J on four different points.    	No damage - Pass

ATEX UKEX TEST REPORT
ISO 80079-37
Explosive atmospheres – Part 37:
Non-electrical equipment for explosive atmospheres –
Non electrical type of protection constructional safety "c", control of ignition source "b", liquid immersion "k"

ExTR Reference Number ..... :	TRA-051480-33-00A
Compiled by + signature (ExTL).... :	N Noroozikia 
Reviewed by + signature (ExTL) ... :	S K Barrowcliff 
Date of issue..... :	2022-04-28
Ex Testing Laboratory (ExTL) ..... :	Element Materials Technology
Address ..... :	Unit 1, Pendle Place, Skelmersdale, West Lancashire, WN8 9PN, United Kingdom.
Applicant's name ..... :	Ingersoll-Rand Company
Address ..... :	800-A Beaty Street, Davidson, North Carolina 28036, United States of America
Standard ..... :	EN ISO 80079-37:2016
Test procedure ..... :	Element procedures
Test Report Form Number ..... :	ExTR80079-37_1A (released 2016-04)

Instructions for Intended Use of Ex Test Report:
An Ex Test Report provides a clause-by-clause documentation of the initial evaluation and testing that verified compliance of an item or product with an IEC, ISO or IEC/IEEE Ex standard or technical specification. This Ex Test Report is part of an ExTR package that may include other Ex Test Report, Addendum, National Differences and Partial Testing documents, along with a single ExTR Cover. An Ex Test Report is to be compiled and reviewed by the ExTL. The Issuing ExCB indicates final approval of the Ex Test Report as part of the overall ExTR package on the associated ExTR Cover.

Possible test case verdicts:

- test case does not apply to the test item……:N / A

- test item does meet the requirement……...:Pass

General remarks:
The test results presented in this Ex Test Report relate only to the item or product tested.

- "(see Attachment #)" refers to additional information appended to this document.
- "(see appended table)" refers to a table appended to this document.
- Throughout this document, a point "." is used as the decimal separator.

The technical content of this Ex Test Report shall not be reproduced except in full without the written approval of the Issuing ExCB and ExTL.

ISO 80079-37			
Clause	Requirement – Test	Result – Remark	Verdict
1	Scope		
2	Normative references		
3	Terms and definitions		
4	Determination of suitability	The equipment has been subjected to an ignition hazard assessment in accordance with EN ISO EN 80079-36.	Pass
5	Requirements for equipment with Type of Protection constructional safety “c”		
5.1	General requirements	Equipment complies with the requirements of this standard, EN ISO 80079-36 and EN IEC 60079-0. The manufacturer has declared conformity against applicable industrial safety standards.	Pass
5.2	Ingress protection		
5.2.1	General	Dust can only migrate into pump's air motor when pump is stopped. When pump runs, air keeps any dust away. A filter capable of filtering out particles larger than 50 microns should be used on the air supply (specified as a warning in manual). Ingress of dust, foreign objects and liquids are not likely to cause an ignition, no specific degree of protection is necessary for the purpose of ignition protection. According to 5.2.2 of EN ISO 80079-37 points a) and d) an IP20 will be enough.	Pass
5.2.2	Ingress protection in special cases	See Clause 5.2.1	Pass
5.3	Seals for moving parts		
5.3.1	Unlubricated gaskets, seals, sleeves, bellows and diaphragms	FML-2 grease used for moving parts. That lubricant is to be used when being assembled or repaired, otherwise it is not needed. All moving parts need to be lubricated are identified in operator’s manual.	Pass
5.3.2	Stuffing box seals (packed glands)	No stuffing box seals.	N/A
5.3.3	Lubricated seals	See 5.3.1	Pass

ISO 80079-37			
Clause	Requirement – Test	Result – Remark	Verdict
5.4	Equipment lubricants, coolants and fluids	FML-2 grease used. Flash point of FML-2 is 240 °C. Note- in general an auto-ignition temperature is higher than the flash point. When the pump runs - the adiabatic expansion of compressed air from the air motor cools the pumps.	Pass
5.5	Vibration	Manual provides necessary information to avoid vibration: - Secure pump, connections and all contact points to avoid vibration and generation of contact or static spark. - Secure the diaphragm pump legs to a suitable surface to insure against damage by vibration.	Pass
5.6	Requirements for moving parts		
5.6.1	General	See Ignition Hazard Assessment, all moving parts are identified. In addition, the Operator's Manual provides necessary information to avoid unsafe vibration, impact or friction: - Secure pump, connections and all contact points to avoid vibration and generation of contact or static spark. - Secure the diaphragm pump legs to a suitable surface to insure against damage by vibration. - Provide a clean work surface to protect sensitive internal moving parts from contamination from dirt and foreign matter during service disassembly and reassembly.	Pass
5.6.2	Clearance	All moving parts are located in a Zone 0/20 should be lubricated. The Operator's Manual provides necessary consideration to maintain clearance between moving and stationary parts.	Pass
5.6.3	Lubrication	The proper lubrication (FML-2 grease) is to be used when being assembled or repaired, otherwise it is not needed. If there is loss of lack of lubrication this causes wear and then the pump slows down and ultimately stops as the pressure loss increases. The same for the balls and seats, once they are worn the seal between them the fluid flow declines and eventually will stop.	Pass
5.7	Requirements for bearings		
5.7.1	General	No bearing. Only two balls and seat exist. See 5.6.	N/A
5.7.2	Lubrication	No bearing	N/A

ISO 80079-37			
Clause	Requirement – Test	Result – Remark	Verdict
5.7.3	Chemical compatibility	No bearing	N/A
5.8	Requirements for power transmission systems		
5.8.1	Gear drives	No power transmission system. Clause 5.8 not considered.	N/A
5.8.2	Belt drives		
5.8.2.1	Belt drive categories	N/A	N/A
5.8.2.2	Electrostatic charging	N/A	N/A
5.8.2.3	Belt tension	N/A	N/A
5.8.2.4	Belt alignment	N/A	N/A
5.8.2.5	Earthing and bonding	N/A	N/A
5.8.2.6	Detection of mechanical faults	N/A	N/A
5.8.3	Chain drives	N/A	N/A
5.8.4	Other drives	N/A	N/A
5.8.5	Hydrostatic, hydrokinetic and pneumatic equipment		
5.8.5.1	Hot surfaces	N/A	N/A
5.8.5.2	Hydrostatic and hydrokinetic equipment	N/A	N/A
5.8.5.3	Pneumatic equipment	N/A	N/A
5.9	Requirements for clutches and variable speed couplings		
5.9.1	General	No clutches or variable speed couplings employed on equipment.	N/A
5.9.2	Slipping	N/A	N/A
5.9.3	Friction	N/A	N/A
5.10	Flexible couplings	No flexible couplings.	N/A
5.11	Requirements for brakes and braking systems		
5.11.1	Brakes used only for stopping in emergency	No brakes or braking systems.	N/A
5.11.2	Service brakes (including friction brakes and fluid based retarders)	N/A	N/A
5.11.3	Parking brakes	N/A	N/A
5.12	Requirements for springs and absorbing elements	No springs or absorbing element	Pass
5.13	Requirements for conveyor belts		

ISO 80079-37			
Clause	Requirement – Test	Result – Remark	Verdict
5.13.1	Electrostatic requirements	No conveyor belts.	N/A
5.13.2	Materials	N/A	N/A
5.13.3	Belt tension	N/A	N/A
5.13.4	Alignment	N/A	N/A
5.13.5	Earthing and bonding	N/A	N/A
6	Requirements for equipment with Type of Protection control of ignition source “b”		
6.1	General	A temperature and pressure ignition protection system is employed to guard against possible high temperatures of inlet air and liquid, overpressure of inlet air pressure. Specific conditions of use require a b2 system.	Pass
6.2	Determination of the control parameters		
6.2.1	General	Trip points for the temperature and pressure monitoring system shall be set such that shutdown of the pump occurs if air inlet pressure exceeds 100 PSIG for ½ pump and 120 PSIG for all other model, or if the air inlet or fluid temperature exceeds the limitation on TEMPERATURE LIMITS table.	Pass
6.2.2	Determination of the safety critical values	Trip points for the temperature have suitable safety margin (20% of the temperature class) to provide ignition protection. No margin could be determined for over pressure.	Pass
6.3	Ignition prevention system design and settings		
6.3.1	Determining the performance requirements or operating characteristics	See 6.2.1	
6.3.2	Instructions	The Specific Conditions of Use in operators manual stats: When assembled as a complete system, the sensors using for measuring the inlet air and fluid temperature and over pressure of inlet air must be connected to a monitoring and shutdown system which is sufficiently reliable and compliant with the requirements for ATEX Safety related devices as defined in Annex II Clause 1.5.1 of Directive 2014/34/ EU (i.e. b2 (SIL2) as defined by EN ISO 80079-37cl 6.5).	Pass
6.3.3	System lockout	The ignition protection system is to be provided by the end user/installer. The specific conditions of use define the system.	Pass
6.3.4	Operator intervention	Operator intervention not required.	N/A
6.4	Ignition protection of sensors and actuators	Requirement for the end user/installer.	N/A
6.5	Ignition protection types		

ISO 80079-37			
Clause	Requirement – Test	Result – Remark	Verdict
6.5.1	Ignition protection type b1	Ignition protection type b2 required.	N/A
6.5.2	Ignition protection type b2	The specific conditions of use define the requirement for a b2 system to be provided by the end user/installer. The user manual details the functional test methodology. The user manual details the functional test frequency.	Pass
6.5.3	Application of ignition protection types	Ignition protection type b2 required.	Pass
6.5.4	Requirements for ignition protection types	The end user/installer is to provide the b2 ignition protection system in accordance with the specific conditions of use.	Pass
6.5.5	Programmable electronic devices	The end user/installer is to provide the ignition protection system in accordance with the specific conditions of use of the pump. Specific condition of use states that: 'Associated programmable electronic devices forming a part of ignition protection systems must be installed in a safe area or be suitable certified ATEX rated for the zone into which they are installed.'	Pass
7	Requirements for equipment with Type of Protection liquid immersion "k"	Protection concept 'k' not employed by the equipment.	N/A
8	Type tests		
8.1	Type tests for equipment with Type of Protection constructional safety "c"	See EN ISO 80079-36	Pass
8.2	Type tests for equipment with Type of Protection control of ignition source "b"		
8.2.1	Determination of control parameters	A temperature and pressure ignition protection system is employed to guard against possible high temperatures of inlet air and liquid, overpressure of inlet air pressure. Specific conditions of use require a b2 system.	Pass
8.2.2	Function and accuracy check of the ignition protection system	IPS is to be supplied by the end user. A Specific Conditions of Use is detailed on the certificate stating that: "The ignition protection system (IPS) for the temperature sensor when installed is to be subjected to functional and accuracy tests to ensure shutdown occurs if the limits specified by the manufacturer are exceeded."	Pass
8.3	Type tests for equipment with Type of Protection liquid immersion "k"		

ISO 80079-37			
Clause	Requirement – Test	Result – Remark	Verdict
8.3.1	General	N/A	N/A
8.3.2	Increased pressure test on enclosed equipment having a sealed enclosure that contains static, or flowing protective liquid	N/A	N/A
8.3.3	Overpressure test on enclosed equipment having a vented enclosure	N/A	N/A
9	Documentation		
9.1	Documentation for equipment with Type of Protection constructional safety “c”	Documentation contains all necessary information as stipulated in this standard and EN ISO 80079-36.	Pass
9.2	Documentation for equipment with Type of Protection control of ignition sources “b”	The installation, operation and maintenance manual detail the operational requirements of the IPS.	N/A
9.3	Documentation for equipment with Type of Protection liquid immersion “k”	Protection concept ‘k’ not employed by the equipment.	N/A
10	Marking		
10.1	General	Documentation contains all necessary information as stipulated in this standard and EN ISO 80079-36.	Pass
10.2	Safety devices	No safety devices utilized by the equipment.	N/A
Annex A (informative)	Approach and application: equipment with Type of Protection “c”		
Annex B (normative)	Test requirements		
B.1	"Dry run" type test for lubricated sealing arrangements	No lubricated sealing arrangements.	N/A
B.2	Type test for determining the maximum engaging time of clutch assembly	No clutch assembly.	N/A

ISO 80079-37			
Clause	Requirement – Test	Result – Remark	Verdict

Annex C (informative)	Methodology: equipment with Type of Protection “b”

Annex D (informative)	Approach to assign the required ignition protection type used for equipment to achieve different EPL

Annex E (informative)	Information on functional safety concept

Measurement Section, including Additional Narrative Remarks (as deemed applicable)
None.

ATEX and UKEX TEST REPORT of NATIONAL DIFFERENCES

ExTR Reference Number..... :	TRA-051480-33-00A
Compiled by + signature (ExTL) .... :	N Noroozikia
Reviewed by + signature (ExTL).... :	S K Barrowcliff
Date of issue ..... :	2022-04-28
Ex Testing Laboratory (ExTL) ..... :	Element Materials Technology
Address ..... :	Unit 1, Pendle Place, Skelmersdale, West Lancashire, WN8 9PN, United Kingdom
Applicant's name..... :	Ingersoll-Rand Company
Address ..... :	800-A Beaty Street, Davidson, North Carolina 28036, United States of America
Country/Region ..... :	Great Britain (United Kingdom other than Northern Ireland)
Standards..... :	UKEX SI 2016 No. 1107 (as amended) ATEX Directive 2014/34/EU
Test procedure ..... :	N/A
Test Report Form Number ..... :	ExTR National Differences_3 (released 2018-02) Element form XRF528C 12.0

Instructions for Intended Use of ExTR of National Differences:
An ExTR of National Differences is to supplement an ExTR or ExTR Addendum, with a separate such document issued for each intended country / region. All National Differences of the intended country / region are to be tabulated and remarked upon as part of this document, even those that are not applicable. An ExTR of National Differences is to be compiled and reviewed by the ExTL. The Issuing ExCB indicates final approval of the ExTR of National Differences as part of the overall ExTR package on the associated ExTR Cover.

Possible test case verdicts:

- test case does not apply to the test item ..... :N / A

- test item does meet the requirement ..... :Pass

General remarks:

The test results presented in this ExTR of National Differences relate only to the item or product tested. Only clauses and manufacturer's documents impacted by this document are detailed.

- "(see Attachment #)" refers to additional information appended to this document.
- "(see appended table)" refers to a table appended to this document.
- Throughout this document, a point is used as the decimal separator.

NATIONAL DIFFERENCES			
GREAT BRITAIN (UNITED KINGDOM OTHER THAN NORTHERN IRELAND)			
EHSR	Requirement – Test	Result – Remark	Verdict

Schedule 1 – UKEX SI 2016:1107 (amended) - Essential Health and Safety Requirements			
5(1)(a)	Marking - Name, registered trade name or registered trade mark, and address of the manufacturer.	The Manufacturer name and address were included in the marking of the product.	Pass
5(1)(b)	Marking - UKCA mark	The UKCA mark was included in the marking of the product.	Pass
5(1)(b)	Marking – Identification number of the notified body involved in the production control phase	Marking of the identification number is not required. The equipment was category 2 non-electrical equipment and therefore a notified body is not involved in the production control phase.	N/A
5(1)(e)	Marking - Year of construction	The year of construction was included in the marking of the product.	Pass
6(1)	Instructions – requirement for translation of instructions suitable for country of use	A declaration document was completed by the manufacturer.	Pass
6(1)	Instructions - requirement for paper copies of instructions	A declaration document was completed by the manufacturer.	Pass
6(3)	Sales literature – requirement for non-contradictory statements	A declaration document was completed by the manufacturer.	Pass

NATIONAL DIFFERENCES			
EUROPEAN UNION, EEA, AND NORTHERN IRELAND			
EHSR	Requirement – Test	Result – Remark	Verdict

Annex II - ATEX 2014/34/EU - Essential Health and Safety Requirements			
1.0.5	Marking - Name, registered trade name or registered trade mark, and address of the manufacturer.	The Manufacturer name and address were included in the marking of the product.	Pass
1.0.5	Marking - CE mark	The CE mark was included in the marking of the product.	Pass
1.0.5	Marking – Identification number of the notified body involved in the production control phase	Marking of the identification number is not required. The equipment was category 2 non-electrical equipment and therefore a notified body is not involved in the production control phase.	N/A
1.0.5	Marking - Year of construction	The year of construction was included in the marking of the product.	Pass
1.0.6(b)	Instructions – requirement for translation of instructions suitable for country of use	A declaration document was completed by the manufacturer.	Pass

NATIONAL DIFFERENCES			
EUROPEAN UNION, EEA, AND NORTHERN IRELAND			
EHSR	Requirement – Test	Result – Remark	Verdict
1.0.6	Instructions - requirement for paper copies of instructions	A declaration document was completed by the manufacturer.	Pass
1.0.6(d)	Sales literature – requirement for non-contradictory statements	A declaration document was completed by the manufacturer.	Pass

NATIONAL DIFFERENCES			
GREAT BRITAIN (UNITED KINGDOM OTHER THAN NORTHERN IRELAND)			
EHSR	Requirement – Test	Result – Remark	Verdict

Schedule 1 – UKEX SI 2016:1107 (amended) - Essential Health and Safety Requirements			
5(1)(a)	Marking - Name, registered trade name or registered trade mark, and address of the manufacturer.	The Manufacturer name and address were included in the marking of the product.	Pass
5(1)(b)	Marking - UKCA mark	The UKCA mark was included in the marking of the product.	Pass
5(1)(b)	Marking – Identification number of the notified body involved in the production control phase	This identification number of the Approved Body was included in the marking of the product.	Pass
5(1)(e)	Marking - Year of construction	The year of construction was included in the marking of the product.	Pass
6(1)	Instructions – requirement for translation of instructions suitable for country of use	A declaration document was completed by the manufacturer.	Pass
6(1)	Instructions - requirement for paper copies of instructions	A declaration document was completed by the manufacturer.	Pass
6(3)	Sales literature – requirement for non-contradictory statements	A declaration document was completed by the manufacturer.	Pass

NATIONAL DIFFERENCES			
EUROPEAN UNION, EEA, AND NORTHERN IRELAND			
EHSR	Requirement – Test	Result – Remark	Verdict

Annex II - ATEX 2014/34/EU - Essential Health and Safety Requirements			
1.0.5	Marking - Name, registered trade name or registered trade mark, and address of the manufacturer.	The Manufacturer name and address were included in the marking of the product.	Pass

NATIONAL DIFFERENCES			
EUROPEAN UNION, EEA, AND NORTHERN IRELAND			
EHSR	Requirement – Test	Result – Remark	Verdict
1.0.5	Marking - CE mark	The CE mark was included in the marking of the product.	Pass
1.0.5	Marking – Identification number of the notified body involved in the production control phase	This identification number of the Notified Body was included in the marking of the product.	Pass
1.0.5	Marking - Year of construction	The year of construction was included in the marking of the product.	Pass
1.0.6(b)	Instructions – requirement for translation of instructions suitable for country of use	A declaration document was completed by the manufacturer.	Pass
1.0.6	Instructions - requirement for paper copies of instructions	A declaration document was completed by the manufacturer.	Pass
1.0.6(d)	Sales literature – requirement for non-contradictory statements	A declaration document was completed by the manufacturer.	Pass

Note: In the context of CE marking, EN IEC 60079-0:2018 Annexes ZY.1 to ZY.6 and EN ISO 80079-36:2016 Annexes ZB address these items as "Additional Information relating to the European ATEX Directive 2014/34/EU"

Measurement Section, including Additional Narrative Remarks (as deemed applicable)

The technical documentation has also been assessed against the documentation requirements of the relevant Schedules of the UKEX Regulations and the Annexes of the ATEX Directive 2014/34/EU.

A list of Essential Health and Safety Requirements (EHSR) and their links to the standards applied, is given in the table on the following page.

ESSENTIAL HEALTH AND SAFETY REQUIREMENTS

UKEX	ATEX	Harmonised Standards applied	EHSR	EN IEC 60079	EN ISO 80079	EN ISO 80079
EHSR	**EHSR**	**EN IEC 60079 or EN ISO 80079 part**	**N/A**	**0**	**36**	**37**
-	**1.**	**Common requirements for equipment and protective systems**				
-	**1.0**	**General requirements**	**N/A**	**0**	**36**	**37**
2(1) & 2(2)	1.0.1	Principles of integrated explosion protection		x	x	
2(3) & 2(4)	1.0.2	Analysis of possible operating faults		x	x	
3	1.0.3	Special checking and maintenance conditions		x	x	
4	1.0.4	Surrounding area conditions		x	x	
5	1.0.5	Marking		x	x	
6	1.0.6	Instructions		x	x	x
-	**1.1**	**Materials**	**N/A**	**0**	**36**	**37**
7(1)	1.1.1	Materials not to trigger off explosion		x		x
7(2)	1.1.2	Effect of explosive atmosphere on materials		x		
7(3)	1.1.3	Changes in characteristics of materials and combinations thereof		x	x	x
-	**1.2**	**Design and construction**	**N/A**	**0**	**36**	**37**
8(1)	1.2.1	Design with regard to technological knowledge		x	x	x
8(2)	1.2.2	Components for incorporation or replacement		x	x	
9	1.2.3	Enclosed structures and prevention of leaks				x
10	1.2.4	Dust deposits		x	x	
11	1.2.5	Additional means of protection		x		
12	1.2.6	Safe opening		x	x	
13	1.2.7	Protection against other hazards		x		
14	1.2.8	Overloading of equipment		x	x	
15	1.2.9	Flameproof enclosure systems	x			
-	**1.3**	**Potential ignition sources**	**N/A**	**0**	**36**	**37**
16	1.3.1	Hazard arising from different ignition sources		x	x	x
17	1.3.2	Hazards arising from static electricity		x	x	x
18	1.3.3	Hazards arising from stray electric and leakage currents		x	x	
19	1.3.4	Hazards arising from overheating			x	x
20	1.3.5	Hazards arising from pressure compensation operations			x	
-	**1.4**	**Hazards arising from external effects**	**N/A**	**0**	**36**	**37**
21(1)	1.4.1	Safe function in changing external conditions		x	x	x
21(2)	1.4.2	Withstanding attack by aggressive substances		x	x	

ESSENTIAL HEALTH AND SAFETY REQUIREMENTS

UKEX	ATEX	Harmonised Standards applied	EHSR	EN IEC 60079	EN ISO 80079	EN ISO 80079
EHSR	**EHSR**	**EN IEC 60079 or EN ISO 80079 part**	**N/A**	**0**	**36**	**37**
-	**1.5**	**Requirements in respect of safety related devices**	**N/A**	**0**	**36**	**37**
22(1)	1.5.1	General requirements for safety related devices	x			
22(2) to 22(5)	1.5.2	Safety device failure	x			
22(6)	1.5.3	Restart lockouts	x			
23	1.5.4	Control and display units	x			
24(1)	1.5.5	Devices with a measuring function	x			
24(2)	1.5.6	Checking accuracy and serviceability	x			
24(3)	1.5.7	Safety Factor	x			
25	1.5.8	Risk arising from software	x			
-	**1.6**	**integration of safety requirements relating to the system**	**N/A**	**0**	**36**	**37**
26(1)	1.6.1	Manual override of automatic processes	x			
26(1) & 26(2)	1.6.2	Emergency shutdown	x			
27	1.6.3	Hazards arising from power failure	x			
28	1.6.4	Hazards arising from connections	x			
29	1.6.5	Placing of warning devices as parts of equipment	x			
-	**2.**	**Supplementary requirements in respect of equipment**				
-	**2.0**	**Requirements for equipment in category M 1 of equipment group I**				
-	**2.0.1**	**Requirements applicable to equipment in category M 1 of equipment group I**	**N/A**	**0**	**36**	**37**
30(1) to 30(4)	2.0.1.1	Equipment design and construction	x			
30(5)	2.0.1.2	Dust penetration	x			
30(6)	2.0.1.3	Surface Temperature	x			
30(7) & 30(8)	2.0.1.4	Opening	x			
-	**2.0.2**	**Requirements applicable to equipment in category M 2 of equipment group I**	**N/A**	**0**	**36**	**37**
31(1) & 31(2)	2.0.2.1	Equipment means of protection	x			
31(3)	2.0.2.2	Opening	x			
31(4)	2.0.2.3	Dust protection	x			
-	**2.1**	**Requirements for category 1 of equipment group II**				
-	**2.1.1**	**Explosive atmospheres caused by gases, vapours or mists (Category 1 G)**	**N/A**	**0**	**36**	**37**

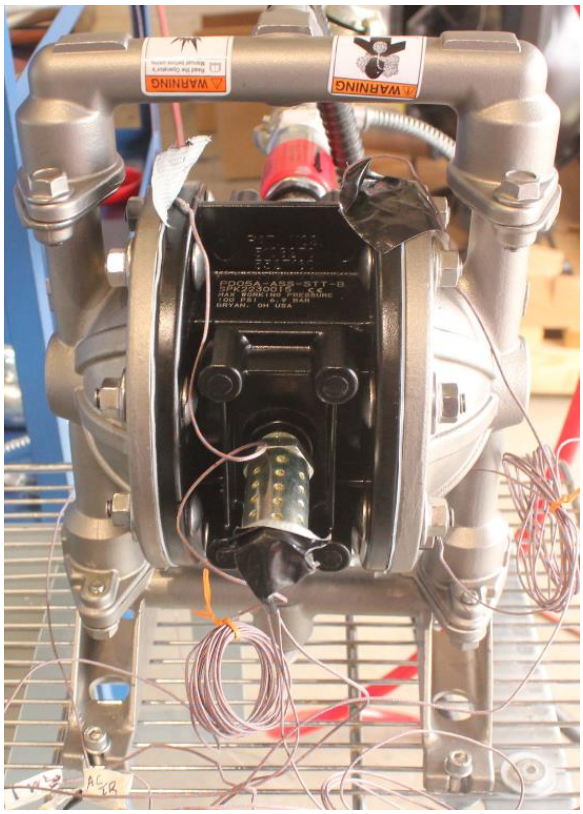
ESSENTIAL HEALTH AND SAFETY REQUIREMENTS

UKEX	ATEX	Harmonised Standards applied	EHSR	EN IEC 60079	EN ISO 80079	EN ISO 80079
EHSR	**EHSR**	**EN IEC 60079 or EN ISO 80079 part**	**N/A**	**0**	**36**	**37**
32(1) & 32(2)	2.1.1.1	Equipment design and construction		x	x	x
32(3) & 32(4)	2.1.1.2	Surface Temperature		x	x	x
32(5) & 32(6)	2.1.1.3	Opening		x	x	x
-	**2.1.2**	**Explosive atmospheres caused by air/dust mixtures (Category 1 D)**	**N/A**	**0**	**36**	**37**
33(1) & 33(2)	2.1.2.1	Equipment design and construction		x	x	x
33(3) & 33(4)	2.1.2.2	Dust penetration		x	x	x
33(5)	2.1.2.3	Surface Temperature		x	x	x
33(6)	2.1.2.4	Opening		x	x	x
-	**2.2**	**Requirements for category 2 of equipment group II**				
-	**2.2.1**	**Explosive atmospheres caused by gases, vapours or mists (Category 2 G)**	**N/A**	**0**	**36**	**37**
34(1)	2.2.1.1	Equipment design and construction		x	x	x
34(2)	2.2.1.2	Surface Temperature		x	x	x
34(3)	2.2.1.3	Opening		x	x	x
-	**2.2.2**	**Explosive atmospheres caused by air/dust mixtures (Category 2 D)**	**N/A**	**0**	**36**	**37**
35(1)	2.2.2.1	Equipment design and construction		x	x	x
35(2)	2.2.2.2	Surface Temperature		x	x	x
35(3)	2.2.2.3	Dust protection		x	x	x
35(4)	2.2.2.4	Opening		x	x	x
-	**2.3**	**Requirements for category 3 of equipment-group II**				
-	**2.3.1**	**Explosive atmospheres caused by gases, vapours or mists (Category 3 G)**	**N/A**	**0**	**36**	**37**
36(1)	2.3.1.1	Equipment design and construction	x			
36(2)	2.3.1.2	Surface Temperature	x			
	2.3.2	**Explosive atmospheres caused by air/dust mixtures (Category 3 D)**	**N/A**	**0**	**36**	**37**
37(1)	2.3.2.1	Equipment design and construction	x			
37(2)	2.3.2.2	Surface Temperature	x			
37(3)	2.3.2.3	Internal dust risk	x			
-	**3.**	**Supplementary requirements for protective systems**				

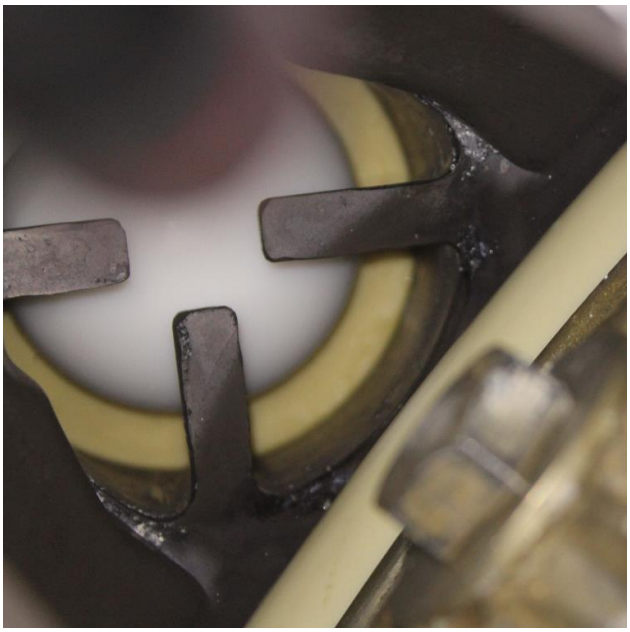
ESSENTIAL HEALTH AND SAFETY REQUIREMENTS

UKEX	ATEX	Harmonised Standards applied	EHSR	EN IEC 60079	EN ISO 80079	EN ISO 80079
EHSR	**EHSR**	**EN IEC 60079 or EN ISO 80079 part**	**N/A**	**0**	**36**	**37**
-	**3.0**	**General requirements**	**N/A**	**0**	**36**	**37**
38(1)	3.0.1	Dimensioned	x			
38(2)	3.0.2	Design and positioning	x			
38(3)	3.0.3	Power failure	x			
38(4)	3.0.4	Outside interference	x			
-	**3.1**	**Planning and design**	**N/A**	**0**	**36**	**37**
39(1)	3.1.1	Characteristics of materials	x			
39(2)	3.1.2	Containment	x			
39(3)	3.1.3	Accessories	x			
39(4)	3.1.4	Pressure	x			
40	3.1.5	Pressure relief	x			
41	3.1.6	Explosion suppression systems	x			
42	3.1.7	Explosion decoupling systems	x			
43	3.1.8	Integration	x			

ATTACHMENT 1 – PHOTOGRAPHS

Photograph 1 – 3" DIAPHRAGM PUMP	Photograph 2 – 1/2" DIAPHRAGM PUMP
	
Drawing reference: PX30X-XXX-XXX-CXXX	Drawing reference: PX05X-XXX-XXX-BXXX

Photograph 4 – ball and seat	Photograph 5 – ball, seat and muffler
	
Drawing reference: PX30X-XXX-XXX-CXXX	Drawing reference: PX30X-XXX-XXX-CXXX

Photograph 6 – body and seat

Drawing reference: PX05X-XXX-XXX-BXXX

ATTACHMENT 2 – TEST EQUIPMENT USED

IEC60079-0				
Clause(s)	**Test(s)**	**Equipment**	**Inventory**	**Cal due**
EN ISO 80079-36:2016, 8.2	Determination of the maximum surface temperature	Hygrometer	TRLS 468	2022-03-17
EN ISO 80079-36:2016, 8.2	Determination of the maximum surface temperature	Grapthec temperature logger	TRLS 447	2022-07-29
EN ISO 80079-36:2016, 8.2	Determination of the maximum surface temperature	Thermometer	TRLS 377	2022-07-18
EN ISO 80079-36:2016, 8.2	Determination of the maximum surface temperature	Pressure gauge	TRLS 376	2021-11-22
EN ISO 80079-36:2016, 8.2	Determination of the maximum surface temperature	Doosan Compressor (calibrated with Pressure gauge TRLS 376)	--	--
EN ISO 80079-36:2016, 8.2	Determination of the maximum surface temperature	Timer	TRLS402	2022-03-18
EN ISO 80079-36:2016, 8.3.1	Drop test	Thermometer	TRLS 468	2022-03-17
EN ISO 80079-36:2016, 8.3.1	Drop test		TRLS 417	2021-10-19
EN ISO 80079-36:2016, 8.3.1	Drop test	Impact weight	TRLS 213	2021-10-10

ATTACHMENT 3 - IGNITION HAZARD ASSESSMENT

Key models in ignition hazard Assessment table column 2:

A:

PZ05A-XAX-XXX-X PZ05A-XCX-XXX-X PZ05A-XSX-XXX-X
PZ10A-XAX-XXX-X PZ10A-XCX-XXX-X PZ10A-XSX-XXX-X
PZ15A-XAX-XXX-X PZ15A-XCX-XXX-X PZ15A-XSX-XXX-X
PZ20A-XAX-XXX-X PZ20A-XCX-XXX-X PZ20A-XSX-XXX-X
PZ30A-XAX-XXX-X PZ30A-XCX-XXX-X PZ30A-XSX-XXX-X
PZ05S-XCX-XXX-X PZ05S-XSX-XXX-X
PZ10S-XCX-XXX-X PZ10S-XSX-XXX-X
PZ15S-XCX-XXX-X PZ15S-XSX-XXX-X
PZ20S-XCX-XXX-X PZ20S-XSX-XXX-X
PZ30S-XCX-XXX-X PZ30S-XSX-XXX-X

B:

PZ05A-XAX-XXX-X PZ05A-XCX-XXX-X PZ05A-XSX-XXX-X
PZ10A-XAX-XXX-X PZ10A-XCX-XXX-X PZ10A-XSX-XXX-X
PZ15A-XAX-XXX-X PZ15A-XCX-XXX-X PZ15A-XSX-XXX-X
PZ20A-XAX-XXX-X PZ20A-XCX-XXX-X PZ20A-XSX-XXX-X
PZ30A-XAX-XXX-X PZ30A-XCX-XXX-X PZ30A-XSX-XXX-X

C:

PZ05X-XX-XXL-X PZ05X-XXX-XXT-X
PZ10X-XX-XXL-X PZ10X-XXX-XXT-X
PZ15X-XX-XXL-X PZ15X-XXX-XXT-X
PZ20X-XX-XXL-X PZ20X-XXX-XXT-X
PZ30X-XX-XXL-X PZ30X-XXX-XXT-X

Number	Models (see key above)	Ignition hazard		Assessment of the frequency of occurrence without application of an additional measure					Measures applied to prevent the ignition source becoming effective			Frequency of occurrence including measures applied					
		Potential ignition source	Description / basic cause	Normal operation	Foreseeable malfunction	Rare malfunction	Not relevant	Reasons for assessment	Description of the measure applied	Basis	Technical Documentation	Normal operation	Foreseeable	Rare malfunction	Not relevant	Resulting equipment category in respect of this ignition hazard	Necessary restrictions
1	A	Hot Surface	Process and ambient temperature heating up pump	X				Process and ambient temperature heating up pump during operation	The maximum surface temperature of the equipment does not depend on the equipment itself, but the process and the environment. The relevant information has been given in the instructions for use and the equipment has been marked T4 according to the test results. When the pump runs - the adiabatic expansion of compressed air from the air motor cools the pumps. When the pump is stationary there is nothing other than the environment and fluid inside the pump to change increase it's temperature -The maximum surface temperature is determined under the most adverse conditions. - A temperature monitoring system to measure air inlet and fluid inlet temperature is recommended as this determines the ultimate temperature of the pump.	- EN ISO 80079-36, Clause 6.2. -Max allowable process and environment temp is determined by envelope component with lowest max allowable temp - for metals listed this is 660C or higher. - The pump does not create a temperature increase and does not have any ignition hazard based on temperature - the pump temperature is the result of the environment and the fluid being processed - Lab Test Reports: 12863R (40Cwith solenoid), 18064R (59C worst case C-PVDF), 14503R -Warning in PZ Model Operator Manuals for monitoring temperature and vibrations surrounding the pump	- PZ model operator manuals contain temperature tables for ambient, fluid and air inlet temperatures based on materials of construction. - Material specs for ALU, SST, and CI - ALU melting point is 660C and beyond most fluid temp being pumped - other metals have higher melting points - Use outside temperature rated conditions listed is considered Misuse (80079-36:E.5)				X	Ga Da	T4
2	A	Hot Surface	Friction between stationary and moving parts	X				Frictional heat during operation	The only moving parts that can cause frictional heat are located in the air valve assembly. Testing was performed to show the air valve assembly does not heat up during use. Also, the air acts as a heat exchanger when passing through the assembly. -When pump runs - plain air from distant compressor source flows past this interface and keeps any environment gas or dust away - When pump is not running no motion of this interface occurs - the location of the interface and running condition including rare malfunction prevent any possible hazard here from becoming effective	- Lab Test Reports: 12863R (40Cwith solenoid), 18064R (59C worst case C-PVDF), 14503R Per EN ISO 80079-36 section 6.4.2.2 (impact) and 6.4.3 (friction) - the speeds of actuation matter - For most running conditions the actuation speed will be less than 1m/s and 15m/s. Friction and impact can only occur if the sliding mechanism has been damaged or is not maintained or serviced per supplied instructions. The most likely condition is when the pump is running dry and this will accelerate the cycling. The zones within the pump where friction or impact could occur if not properly serviced and damaged are in the air stream supplied from distant compressor - thus refreshed from any combustible environment - When pump is running - cooling and freezing occurs in air motor - If parts wear then the assembly could seize and stick without heat buildup since any heat buildup if it did occur would be carried away by the air flow. - Wear and tear of pump will shows as reduced flow / cycle rate performance at a set pressure point for the same viscosity. - Lab test reports also shows that pumps stay at or below the temperature of the fluid pumped - Each pump size family per material configuration is lab tested to >30Million cycles with multiple samples	General Information Manual S-631 and all PZ model operator manuals contain temperature limits and description for air quality and lubrication needed for air motor. Pump documentation supplied also indicate maintenance requirements - Use outside rated conditions listed is considered Misuse (80079-36:E.5)				X	Ga Da	T4
3	A	Hot Surface	Ingress of dust				X	Dust can migrate into pump's air motor when pump is stopped.	Testing has confirmed that air motor temperatures do not change much above ambient during use or after stopping. The pumped fluid compression may heat the fluid slightly and the air motor running cools the assembly. The pumped fluid moves away from the pump - (otherwise it is not a pump.) When pumps runs - air is consumed and positively displaces any dust that may have settled near air motor or muffler Extensive running of pump tends to cool the pumps due to air adiabatic expansion When the pump stalls - the pump temperature will equilibrate to the environment, fluid pumped and the coolness of the air motor temperatures	Lab Test Report: 12863R, 18064R Documentation such as S-631 instructions and other ARO manuals provide warning to pump to pipe the air motor exhaust away to a safe and remote location. This is not only true when pumping flammable or hazardous materials but also when used in a dusty environment. Plumbing the air motor exhaust away prevents the agitation of any dust that may be settled on or near the pump. Heat up of pump due to pump running is thus not an issue Creating dust from settlement can be avoided by plumbing the air motor exhaust away - hence the reason why threaded connections are provided for the air motor exhaust	General Information Manual S-631 and all PZ model operator manuals provide warning to pump to pipe the air motor exhaust away to a safe and remote location. This is not only true when pumping flammable or hazardous materials but also when used in a dusty environment. Plumbing the air motor exhaust away prevents the agitation of any dust that may be settled on or near the pump Use outside warning conditions listed is considered Misuse (80079-36:E.5)				X	Ga Da	T4

Number	Models (see key above)	Ignition hazard		Assessment of the frequency of occurrence without application of an additional measure					Measures applied to prevent the ignition source becoming effective			Frequency of occurrence including measures applied					
		Potential ignition source	Description / basic cause	Normal operation	Foreseeable malfunction	Rare malfunction	Not relevant	Reasons for assessment	Description of the measure applied	Basis	Technical Documentation	Normal operation	Foreseeable	Rare malfunction	Not relevant	Resulting equipment category in respect of this ignition hazard	Necessary restrictions
4	A	Hot Surface	Insulation effects due to dust layering		X			Increased surface temperature during operation	Note in General Information Manual telling customer not to allow dust build-up. When pump runs the air motor cools the pump The pump does not create heat - any pump temperature increase is an effect of the environment and the fluid pumped less the cooling effect of the running air motor When the pump stalls - the pump temperature will even out to the environment, fluid pumped and the coolness of the air motor temperatures	Max allowable process temp determined by component on pump model with lowest max allowable temp. This information is contained in the S-631 and PZ model operator manuals.	General Information Manual S-631 and all PZ model operator manuals contain warnings about dust build-up and max allowable temp limits Also note warning to plumb air motor exhaust away from dusty environments - Use outside rated temperature conditions listed and warnings in instructions is considered Misuse (80079-36:E.5)				X	Ga Da	T4
5	A	Flames and Hot Gases	Overheating of non-metallic materials			X		Can lead to smoldering and then burning	The maximum allowed temperature for the process fluid is dependent upon the material used in the equipment. Certificate and warning markings shall include temperature limitations for non-metallic materials. The metallic pump is not capable of generating a flame - the pump has no source of ignition. Extreme high temperature due to environmental causes, such as fire, may cause degradation of the non-metallic seals for fluid containment and cause fluid pump leakage	Max allowable process temp determined by component with lowest max allowable temperature. Per ISO 80079-36 section 6.4.2.2 (impact) and 6.4.3 (friction) - the speeds of actuation matter - For most running conditions the actuation speed will be less than 1m/s and 15m/s. friction and impact can only occur if the sliding mechanism has been damaged or is not maintained or serviced per supplied instructions. The most likely condition is when the pump is running dry and this will accelerate the cycling The areas that if damaged or worn out are away from any combustible material and are engulfed and refreshed and supplied with air from distant compressor. If necessary the used low pressure air from air motor can be plumbed away.	Product Temperature Limits Pages General Information Manual S-631 and all PZ model operator manuals - Use outside temperature rated conditions listed and warnings is considered Misuse (80079-36:E.5)				X	Ga Da	T4
6	A	Mechanical Generated Sparks (Impact /Friction)	Friction between stationary and moving parts	X				Frictional spark	-The moveable parts within the air valve assembly that can make contact with other parts (Center Rod sliding in Sleeve). -Proper Lubrication is provided during assembly to prevent friction. -The sliding components are pressure containing seals. Lack or loss of lubrication results in wear on the seal surface which ultimately stalls the pump once pressure cannot be contained. -When pump runs - plain air from distant compressor source flows past this interface and (shields) keeps any environment gas or dust away. When pump not running no motion of this interface occurs - the location of the interface and running condition including rare malfunction prevent any possible hazard here from becoming effective	- Lab Test Reports: 12863R (40Cwith solenoid), 18064R (59C worst case C-PVDF), 14503R Per ISO 80079-36 section 6.4.2.2 (impact) and 6.4.3 (friction) - the speeds of actuation matter - For most running conditions the actuation speed will be less than 1m/s and 15m/s. friction and impact can only occur if the sliding mechanism has been damaged (area mal function) or is not maintained or serviced per supplied instructions (foreseeable malfunction). The most likely condition is when the pump is running dry and this will accelerate the cycling - When pump is running - adiabatic cooling and freezing occurs in air motor and air caps - If parts wear then the assembly will seize and stick without heat buildup. - Wear and tear of pump will shows as reduced flow performance at a set pressure point until seal fails and pump stops. - Lab test reports also shows that pumps stay at or below the temperature of the fluid pumped - Each pump size family per material configuration is lab tested to 5+ Million cycles with multiple samples - Lab tests have never demonstrated any frictional spark	Operator's Manual, BOM, Lubricant Data Sheet (General Information Manual such as S-631 contains temperature limits and description for air quality and lubrication and other warnings needed for air motor and pump maintenance and servicing - Use outside rated conditions listed and warnings is considered Misuse (80079-36:E.5)				X	Ga Da	T4
7	A	Mechanical Generated Sparks (Impact /Friction)	Undue Vibration		X			Resulting in reducing clearance between moving and stationary parts of the equipment	End user shall avoid installation in areas with high vibration. Installation instructions are followed from the Installation, Operation and Maintenance manual. Installation Instructions have the following warning, "Secure pump, connections and all contact points to avoid vibration and generation of contact or impact spark"	- Diaphragm pumps vibrate due to reciprocating motion and are required to be bolted down at the feet. If not bolted down the vibration could cause pump to 'walk' and fatigue and fail the connection joints causing leakage of fluid pumped - For maintenance reasons clearance around the pump is also required.	General Information Manual S-631 and all PZ model operator manuals have warnings. - Use outside rated conditions listed is considered Misuse (80079-36:E.5)				X	Ga Da	T4

Number	Models (see key above)	Ignition hazard		Assessment of the frequency of occurrence without application of an additional measure					Measures applied to prevent the ignition source becoming effective			Frequency of occurrence including measures applied					
		Potential ignition source	Description / basic cause	Normal operation	Foreseeable malfunction	Rare malfunction	Not relevant	Reasons for assessment	Description of the measure applied	Basis	Technical Documentation	Normal operation	Foreseeable	Rare malfunction	Not relevant	Resulting equipment category in respect of this ignition hazard	Necessary restrictions
8	A	Mechanical Generated Sparks (Impact)	Stainless Balls impact metal housing and seat	X				Impact Spark from metal to metal contact	Steel balls and seats are internal components to the pump. Impact is dampened and 'shielded' during pumping since these components are insulated / engulfed by the pumped media. Dry operated pumps have nearly no ball lift, thus nearly no impact occurs. Limit metal alloy content to less than 7.5% magnesium. Ignition hazards are low enough risk that the ignition source is not considered to become an effective in normal operation or expected malfunction.	Per ISO 80079-36 section 6.4.2.2 (impact) and 6.4.3 (friction) - the speeds of actuation matter - For most running conditions the actuation speed will be less than 1m/s and 15m/s. friction and impact can only occur if the sliding mechanism has been damaged or is not maintained or serviced per supplied instructions. The most likely condition is when the pump is running dry and this will accelerate the cycling	Bill of Materials and drawings of components illustrate the materials of construction				X	Ga Da	N/A
9	A	Mechanical Generated Sparks (Impact)	Pilot Rod (item 118) contacts Washer (item 5). Parts are steel or Stainless Steel	X				Impact Spark from metal to metal contact	Pilot rod contact with the diaphragm washer is a smooth push, not an impact with enough energy to cause a spark. Limit metal alloy content to less than 7.5% magnesium. Ignition hazards are low enough risk that the ignition source is not considered to become an effective in normal operation or expected malfunction.	Per ISO 80079-36 section 6.4.2.2 (impact) and 6.4.3 (friction) - the speeds of actuation matter - For most running conditions the actuation speed will be less than 1m/s and 15m/s. friction and impact can only occur if the sliding mechanism has been damaged or is not maintained or serviced per supplied instructions. The most likely condition is when the pump is running dry and this will accelerate the cycling	Bill of Materials and drawings of components illustrate the materials of construction				X	Ga Da	N/A
10	A	Mechanical Generated Sparks (Impact)	Diaphragm rod (item #1) impacts backup washer (item 5)		X			Impact Spark from metal to metal contact	Manual assembly instructions specify to apply thread locker and apply proper torque. For 3" pumps, there is also a cushion (Item 196) between the backup washer (Item 5) and diaphragm (Item 8 or 7) to prevent failure.	Field experience / proven design. Only air on air side or when diaphragm breaks either partially or totally floods the chamber and displaces air. Pump stops when air loss is excessive Per ISO 80079-36 section 6.4.2.2 (impact) and 6.4.3 (friction) - the speeds of actuation matter - For most running conditions the actuation speed will be less than 1m/s and 15m/s. Friction and impact can only occur if the sliding mechanism has been damaged or is not maintained or serviced per supplied instructions. The most likely condition is when the pump is running dry and this will accelerate the cycling.	Installation, Operation and Maintenance manual.			X		Gb Db	Specific condition of safe use
11	A	Mechanical Generated Sparks (Impact)	Impact between metal tools and metallic parts.	X				Mechanically generated sparks due to Impact of metallic tools with the equipment during installation and replacement of parts.	Manual indicates warning: "Do not perform maintenance or repairs in an area where explosive atmospheres are present."	materials of construction. Steel striking steel needs to hit at 600 m/s straight on to generate a spark according to army Aberdeen proving ground report ARBRL-MR-02820 March 1978 (page 19) and generate > 135 N-M kinetic energy For metals to spark - the impact needs to be such that small chips of metal break off the surface when the metal is struck. -Do impact test and make it irrelevant	General Information manual (S-631), Installation, Operation and Maintenance manual.			X		Gb Db	Specific condition of safe use
12	A	Mechanical Generated Sparks (Impact)	Impact between external metal object and metallic parts on pump.			X		Mechanically generated sparks due to Impact of external metal object.	Manual indicates Caution: "Protect the pump from external damage."	materials of construction optional Impact test as described in 80079-36	General Information manual (S-631), Installation, Operation and Maintenance manual.			X		Gb Db	Specific condition of safe use

Number	Models (see key above)	Ignition hazard		Assessment of the frequency of occurrence without application of an additional measure					Measures applied to prevent the ignition source becoming effective			Frequency of occurrence including measures applied					
		Potential ignition source	Description / basic cause	Normal operation	Foreseeable malfunction	Rare malfunction	Not relevant	Reasons for assessment	Description of the measure applied	Basis	Technical Documentation	Normal operation	Foreseeable	Rare malfunction	Not relevant	Resulting equipment category in respect of this ignition hazard	Necessary restrictions
13	A	Mechanical Generated Sparks (Impact)	Spool (item 111) plastic part contacting metal plug (item 107).				X	Impact Spark	Spool (Item 111) is made from plastic	Plastic part striking metal does not create a spark due to impact - plus the straight on velocity change (energy) is not high enough to create a spark. Per ISO 80079-36 section 6.4.2.2 (impact) and 6.4.3 (friction) - the speeds of actuation matter - For most running conditions the actuation speed will be less than 1m/s and 15m/s. friction and impact can only occur if the sliding mechanism has been damaged or is not maintained or serviced per supplied instructions. The most likely condition is when the pump is running dry and this will accelerate the cycling	Part drawing / BOM				X	Ga Da	N/A
14	A	Stray Electric Currents & Catholic Corrosion	The ignition source is not significant for mechanical equipment				X	N / A	This ignition source is not significant for mechanical equipment; the equipment is not capable of generating stray electric currents.	N / A	N / A				X	N / A	N / A
15	A	Electrical Apparatus	Not significant for non-electrical equipment.	X				Electrical equipment creating sparks or hot surfaces	This ignition source is not significant for mechanical equipment. This applies to our non-electronic interface pumps.	N / A	N / A				X	Ga Da	N/A
16	A	Static Electricity	Fluid being pumped and / or air flow through air motor (including muffler) from customer's compressed air supply.	X				Static charge on internal non-metallic parts, or isolated metal parts.	Proper grounding of all ATEX-rated pumps.	L-4816, 18053R, TR 20054 UL-79 & 30+ years of field experience. Test reports of metallic and conductive non-metallic pumps show static electricity does not build up Air flow through the inlet of the pump is not likely to generate a charged condition as the path to ground is readily accessed as indicated by test report results Fluid flow passing the diaphragms is unlikely to generate a charged condition since it too has a path to ground that is readily accessed	General Product Safety Info (General Information Manual contains grounding information). Service Bulletin #1-13 or pump manual explains our exception to ISO 80079-36:2016 Clause 6.7.5.c and Table 8.			X		Ga Da	Specific condition of safe use
17	A	Static Electricity	Incentive Brush Discharge	X				Static Brush Discharge by user/ operator	Proper grounding of all ATEX-rated pumps.	L-4816, 13098R, 18053R, TR 20054	General Product Safety Info (General Information Manual contains grounding information).			X		Ga Da	Specific condition of safe use
18	A	Static Electricity	Incentive Brush Discharge	X				Charging of housing components	Proper grounding of all ATEX-rated pumps.	L-4816, 13098R, 18053R, TR 20054	General Product Safety Info (General Information Manual contains grounding information).			X		Ga Da	Specific condition of safe use
19	A	Lightning	This ignition source is not significant for this equipment				X	N / A	This ignition source is not significant for mechanical equipment, and is the end user's responsibility	N / A	N / A				X	N/A	N / A
20	A	Radio Frequency 10(4)Hz to 3 x 10(12) Hz	This ignition source is not significant for this equipment				X	N / A	This ignition source is not significant for mechanical equipment, and is the end user's responsibility	N / A	N / A				X	N / A	N / A

Number	Models (see key above)	Ignition hazard		Assessment of the frequency of occurrence without application of an additional measure					Measures applied to prevent the ignition source becoming effective			Frequency of occurrence including measures applied					
		Potential ignition source	Description / basic cause	Normal operation	Foreseeable malfunction	Rare malfunction	Not relevant	Reasons for assessment	Description of the measure applied	Basis	Technical Documentation	Normal operation	Foreseeable	Rare malfunction	Not relevant	Resulting equipment category in respect of this ignition hazard	Necessary restrictions
21	A	Electro magnet ic 3x10(1 1)Hz to 3 x10(15) Hz	This ignition source is not significant for this equipment				X	N / A	This ignition source is not significant for mechanical equipment, and is the end user's responsibility	N / A	N / A				X	N / A	N / A
22	A	Ionizing radiatio n	This ignition source is not significant for this equipment				X	N / A	This ignition source is not significant for mechanical equipment, and is the end user's responsibility	N / A	N / A				X	N / A	N / A
23	A	Ultraso nic	This ignition source is not significant for this equipment				X	N / A	This ignition source is not significant for mechanical equipment, and is the end user's responsibility	N / A	N / A				X	N / A	N / A
24	A	Adiabat ic Compr ession & Shock Waves	High temperatures from adiabatic shock waves			X		Pressure containing equipment	N / A – Not relevant source of ignition for equipment for use in Group II and Group III atmospheres. Equipment is installed in a system with a pressure relief valve to relieve the possibility of overpressure condition. Therefore, adiabatic shock will not occur without a rare malfunction.	Industry Practice.	General Information Manual S-631 and all PZ model operator manuals			X		Ga Da	N / A
25	A	potenti al ignition source	Chemical Reaction				X	Pump housing made from aluminum used to pump halogenated hydrocarbon fluids could result in an explosion	Manual indicates "Warning Explosion Hazard. Models containing aluminum wetted parts cannot be used with halogenated hydrocarbon solvents which may react and explode."	N / A	General Information Manual S-631 and all PZ model operator manuals				X	Gb Db	N / A
26	B	potenti al ignition source	Material of construction restrictions				X	Pump models which contain more the 10% aluminum	Materials used in the construction of enclosures of Group II equipment for Ga shall not contain, by mass, more than: 10 % in total of aluminum, magnesium, titanium and zirconium, with no more than 7,5 % in total of magnesium, titanium and zirconium;	ISO 80079-0 section 8.3	General Information Manual S-631; all PZ model operator manuals and markings on individual pumps				X	Gb Db	N / A
27	B	potenti al ignition source	Material of construction restrictions				x	Pump models which contain more the 10% aluminum	'Materials used in the construction of enclosures of Group II equipment for Ga shall not contain, by mass, more than: 10 % in total of aluminum, magnesium, titanium and zirconium, with no more than 7,5 % in total of magnesium, titanium and zirconium; Protective coatings are on all aluminum parts.	ISO 80079-0 section 8.3	"General Information Manual S-631; all PZ model operator manuals and markings on individual pumps. Including warnings and label on aluminum pumps which exceed the content and where surface coatings are protective. "				X	Gb Db	N / A

Number	Models (see key above)	Ignition hazard		Assessment of the frequency of occurrence without application of an additional measure					Measures applied to prevent the ignition source becoming effective			Frequency of occurrence including measures applied					
		Potential ignition source	Description / basic cause	Normal operation	Foreseeable malfunction	Rare malfunction	Not relevant	Reasons for assessment	Description of the measure applied	Basis	Technical Documentation	Normal operation	Foreseeable	Rare malfunction	Not relevant	Resulting equipment category in respect of this ignition hazard	Necessary restrictions
28	A	Static electricity	Non-conductive diaphragms, seats and balls become charged from non-conductive fluid flow. This charge may not bleed to earthed ground before dry running.	x				The conductivity of the fluid is not defined	'Proper earthing of the equipment is required. Non-conductive diaphragms and seats surrounded by earthed frames. The ball is only momentarily not touching an earthed frame in transient state. In order to create and accumulate charge flow of non-conductive fluid is required. While the pump is full of fluid there cannot be an explosive atmosphere. Non-conductive parts may hold charge when container is emptied and begins to dry run.	IEC/TS 60079-32-1 7.1.4 7.2.4	"Warning - pump operation involves the risk of producing an electrostatic charge when flowing liquids. Medium and higher conductive fluids should be used as defined by EN IEC 60079-32-1:2018 Section 7.1.4. The minimum allowed fluid conductivity shall be as follows: •25 pS/m for fluids with dielectric constant less than 2. •50 pS/m for fluids with dielectric constant higher than 2. •100 pS/m for fluids with substantially higher dielectric constants than 2 or when it is unknown.				X	Gb Db	N / A
29	C	Static electricity	PTFE diaphragms have a Santoprene backer	x				rubbing of different materials	'Both parts are surrounded by earthed frames and fixed together both on the ID and OD. Both are similar on the triboelectric series, wanting to take electrons resulting in minimal charge potential. The fluid side will be in contact with conductive fluid and the air side has compressed air from a remote source outside of the zone, therefore the presence of explosive atmosphere would only in rare malfunctions.	IEC/TS 60079-32-1 7.1.4 7.2.4	Warning - pump operation involves the risk of producing an electrostatic charge when flowing liquids. Medium and higher conductive fluids should be used as defined by EN IEC 60079-32-1:2018 Section 7.1.4. The minimum allowed fluid conductivity shall be as follows: •25 pS/m for fluids with dielectric constant less than 2. •50 pS/m for fluids with dielectric constant higher than 2. •100 pS/m for fluids with substantially higher dielectric constants than 2 or when it is unknown.				X	Gb Db	N / A

ATTACHMENT 4 – MODEL CODE EXPLANATION

PZ05X-XXX-XXX-BXX

MODEL DESCRIPTION CHART

Model Code Explanation

PZ05 X - X X S - X X X - B X X

Center Body Material
A - Aluminum

Fluid Connection
A - 1/2 - 14 NPTF - 1
B - Rp 1/2 (1/2 - 14 BSP, parallel)

Fluid Caps & Manifold Material
A - Aluminum
S - Stainless Steel

Hardware Material
S - Stainless Steel

Seat Material
F - Aluminum
P - Polypropylene
S - 316 Stainless Steel

Ball Material
A - Santoprene
C - Hytrel
G - Nitrile
S - Stainless Steel
T - PTFE
U - Polyurethane
V - Viton

Diaphragm Material
A - Santoprene
C - Hytrel
G - Nitrile
L - Long Life PTFE
T - PTFE
U - Polyurethane
V - Viton

Revision
B - Revision

Specialty Code 1 (Blank if no Speciality Code)
0 - Standard Valve Block

Specialty Code 2 (Blank if no Speciality Code)
0 - No Option

NOTICE: All possible options are shown in the chart, however, certain combinations may not be recommended. Consult a representative or the factory if you have questions concerning availability.

PZ10X-XXX-XXX-AXX

MODEL DESCRIPTION CHART

Model Code Explanation

PZ10 X - X X X - X X X - A X X

Center Body Material

A - Aluminum
S - Stainless Steel

Fluid Connection

A - 1 - 11-1/2 NPTF - 2
B - 1 - 11 BSP
F - 1" ANSI / DIN Flange (Raised Face)

Fluid Caps & Manifold Material

A - Aluminum
C - Cast Iron
S - Stainless Steel

Hardware Material

P - Plated Steel
S - Stainless Steel

Seat Material

A - Santoprene
C - Hytrel
E - Carbon Steel
F - Aluminum
G - Nitrile
H - Hard 440 Stainless Steel
S - 316 Stainless Steel

Ball Material

A - Santoprene
C - Hytrel
G - Nitrile
S - Stainless steel
T - PTFE
V - Viton

Diaphragm Material

A - Santoprene
C - Hytrel
G - Nitrile
L - Long Life PTFE
M - Medical Grade Santoprene
T - PTFE
V - Viton

Revision

A - Revision

Specialty Code 1 (Blank if no Speciality Code)

0 - Standard Valve Block

Specialty Code 2 (Blank if no Speciality Code)

0 - No Option

NOTICE: All possible options are shown in the chart, however, certain combinations may not be recommended. Consult a representative or the factory if you have questions concerning availability.

PZ15X-XXX-XXX-AXX

MODEL DESCRIPTION CHART

Model Code Explanation

PZ15 X - X X X - X X X - A X X

Center Body Material

A - Aluminum
S - Stainless Steel

Fluid Connection

A- 1-1/2 - 11-1/2 NPTF-1
B- Rp 1-1/2 (1-1/2 - 11 BSP, parallel)
Y- 1-1/2" A.N.S.I. / DIN Flange

Fluid Caps & Manifold Material

A- Aluminum
C- Cast Iron
S- Stainless Steel

Hardware Material

P- Plated Steel
S- Stainless Steel

Seat Material

A- Santoprene*
C- Hytrel*
E- Carbon Steel
F- Aluminum
G- Nitrile
H- Hard 440 Stainless Steel
S- 316 Stainless Steel

Ball Material

A- Santropene*
C- Hytrel*
G- Nitrile
S- 316 Stainless steel
T- PTFE
V- Viton*

Diaphragm Material

A- Santoprene*
C- Hytrel*
G- Nitrile
L- Long Life PTFE
M- Medical Grade Santoprene
T- Santoprene*, PTFE
V- Viton*

Revision

A- Revision

Specialty Code 1 (Blank if no Speciality Code)

0- Standard Valve Block

Specialty Code 2 (Blank if no Speciality Code)

0- No option

NOTICE: All possible options are shown in the chart, however, certain combinations may not be recommended. Consult a representative or the factory if you have questions concerning availability.

PZ20X-XXX-XXX-BXX

MODEL DESCRIPTION CHART

Model Code Explanation

PZ20 X - X X X - X X X - B X X

Air Motor / Air Cap Material

A - Aluminum
S - Stainless Steel

Fluid Connection

A - 2 - 11-1/2 NPT - 1
B - Rp 2 (2 - 11 BSP parallel)
F - 2" ANSI / DIN Flange

Fluid Caps & Manifold Material

A - Aluminum
C - Cast Iron
S - Stainless Steel

Hardware Material

P - Carbon Steel
S - Stainless Steel

Seat Material

A - Santoprene
C - Hytrel
E - Carbon Steel
F - Aluminum
G - Nitrile
H - Hard 440 Stainless Steel
K - PVDF
S - 316 Stainless Steel

Ball Material

A - Santoprene
C - Hytrel
G - Nitrile
S - Stainless steel
T - PTFE
V - Viton

Diaphragm Material

A - Santoprene
C - Hytrel
G - Nitrile
L - Long Life PTFE
M - Medical Grade Santoprene
T - PTFE / Santoprene
V - Viton

Revision

B - Revision

Specialty Code 1 (Blank if no Speciality Code)

0 - Standard Valve Block

Specialty Code 2 (Blank if no Speciality Code)

0 - No Option

NOTICE: All possible options are shown in the chart, however, certain combinations may not be recommended. Consult a representative or the factory if you have questions concerning availability.

PZ30X-XXX-XXX-CXX

MODEL DESCRIPTION CHART

Model Code Explanation

PZ30 X - X X X - X X X - C X X

Air Motor / Air Cap Material

A - Aluminum
S - Stainless Steel

Fluid Connection

A - 3 - 8 NPTF - 1
B - Rp 3 (3 - 11 BSP parallel)
D - 3" ANSI Flange (4-holes)
F - 3" DIN Flange (8-holes)

Fluid Caps and Manifold Material

A - Aluminum
C - Cast Iron
S - Stainless Steel

Hardware Material

P - Carbon steel
S - Stainless Steel

Seat Material

A - Santoprene
C - Hytrel
E - Carbon steel
F - Aluminum
G - Nitrile
H - Hard 440 Stainless Steel
K - PVDF
S - 316 Stainless Steel

Ball Material

A - Santoprene
C - Hytrel
G - Nitrile
T - PTFE
V - Viton

Diaphragm Material

A - Santoprene
B - Santoprene (backer)
C - Hytrel
G - Nitrile
L - Long Life PTFE
T - PTFE / Santoprene
V - Viton

Revision

C - Revision

Specialty Code 1 (Blank if no Speciality Code)

0 - Standard Valve Block

Specialty Code 2 (Blank if no Speciality Code)

0 - No Option

NOTICE: All possible options are shown in the chart, however, certain combinations may not be recommended. Consult a representative or the factory if you have questions concerning availability.

ATTACHMENT 5 – FULL SPECIFIC CONDITION FOR SAFE USE AND WARNINGS IN MANUAL

- These pumps can be used in an area with Zone 0/20 inside and outside the pump.
- WARNING - Non-compliance with any of these special conditions could create an ignition source that may ignite any potentially explosive atmospheres.
- WARNING - POTENTIAL ELECTROSTATIC CHARGING HAZARD. Clean only with a damp cloth.
- WARNING - STATIC SPARK. Can cause explosion resulting in severe injury or death. Ground pump and pumping system.
- Sparks can ignite flammable material and vapors.
- The pumping system and object being sprayed must be grounded when it is pumping, flushing, recirculating or spraying flammable materials such as paints, solvents, lacquers, etc. or used in a location where surrounding atmosphere is conducive to spontaneous combustion. Ground the dispensing valve or device, containers, hoses and any object to which material is being pumped.
- Use the pump grounding lug provided on metallic pumps for connection of a ground wire to a good earth ground source. Use Aro Part No. 66885-1 Ground Kit or a suitable ground wire.
- Pumps that will operate in environments defined as “hazardous locations” or “Potentially Explosive Atmospheres” must only be installed, connected and set-up by qualified personnel with knowledge and understanding of protection classes, regulations and provisions for apparatus in hazardous areas, for the region where the pump will operate.
- Secure pump, connections and all contact points (feet must be bolted) and provide clearance around the pump to avoid vibration and generation
- of contact or static spark.
- Consult local building codes and electrical codes for specific grounding requirements. After grounding, periodically verify continuity of electrical path to ground. Test with an ohmmeter from each component (e.g., hoses, pump, clamps, container, spray gun, etc.) to ground to ensure continuity. Ohmmeter should show 0.1 ohms or less.
- Submerse the outlet hose end, dispensing valve or device in the material being dispensed if possible. (Avoid free streaming of material being dispensed.)
- Use hoses incorporating a static wire or use groundable piping.
- Use a grounded exhaust hose between the pump and the muffler. (Refer to minimum size under Installation.)
- Use proper ventilation.
- Keep flammables away from heat, open flames and sparks.
- Keep containers closed when not in use.
- WARNING - For models containing aluminum enclosures. Pumps must be mounted in such a manner as to eliminate the risk of sparks caused by friction or impact.
- Protect pump from external damage.
- Regularly inspect coatings for damage and if damage occurs do not use in Zone 0/20.
- WARNING - Explosion hazard. Models containing aluminum wetted parts cannot be used with 1,1,1-trichloroethane, methylene chloride or other halogenated hydrocarbon solvents which may react and explode.
- WARNING - Explosion hazard: Ensure that the pump will not exceed a maximum temperature of 25° C (77° F) lower than the auto ignition-temperature of the fluid being pumped.
- Check pump motor section, fluid caps, manifolds and all wetted parts to assure compatibility before using with solvents of this type.

- WARNING - If elevated temperatures or inlet pressure levels are detected, shut the pump off and discontinue its use until it can be inspected and/or repaired.
- The following conditions apply if fluid temperature, air inlet temperature and air inlet pressure are not controlled within the process:
    - When assembled as a complete system, the sensors using for measuring the inlet air and fluid temperature and over pressure of inlet air must be connected to a monitoring and shutdown system which is sufficiently reliable and compliant with the requirements for ATEX Safety related devices as defined in Annex II Clause 1.5.1 of Directive 2014/34/ EU (i.e. b2 (SIL2) as defined by EN ISO 80079-37cl 6.5).
    - Associated programmable electronic devices forming a part of ignition protection systems must be installed in a safe area or be suitably certified ATEX rated for the zone into which where are installed.
    - The ignition protection system, when installed, is to be subjected to functional and accuracy tests to ensure shutdown occurs if the limits specified by the manufacturer are exceeded.
    - Trip points for the temperature and pressure monitoring system shall be set such that shutdown of the pump occurs if air inlet pressure exceeds 100 PSIG for ½ pump and 120 PSIG for all other model, or if the air inlet or fluid temperature exceeds the limitation Manual.
- WARNING - Do not perform maintenance or repairs in an area where explosive atmospheres are present. Prior to maintenance, ensure unit is unplugged and fully de-energized.
- NOTICE- Only FML-2 grease should be employed for lubrication of moving part.
- WARNING - Maximum surface temperature limits. Maximum temperatures are based on mechanical stress only. Certain chemicals will significantly reduce maximum safe operating temperature. Consult the chemical manufacturer for chemical compatibility and temperature limits.
- The actual surface temperature of the pumps depend on the running conditions of the pump, the materials of construction, the temperature of the fluid pumped, and the environmental conditions.
- For ambient, process fluid and air inlet temperature see the temperature table in manual.
- Ensure proper housekeeping to eliminate dust buildup on the pump. Certain dusts may ignite at pump surface temperature limits, as noted in manual.
- For use in Explosive Gas Atmospheres the TEMPERATURE range rating is limited by the materials & seals used in the construction per possible product configuration. Material temperature limitations are provided and must not be exceeded in the application. The pumps follow ISO 80079-36:2016: Ex h IIC Ga.
- For use in Explosive Dust Atmospheres the TEMPERATURE range rating is limited by the materials & seals used in the construction per possible product configuration. Material temperature limitations are provided and must not be exceeded in the application. The pumps follow ISO 80079-36:2016: Ex h IIIC Da.
- Pump operation involves the risk of producing an electrostatic charge when flowing liquids. Medium and higher conductive fluids should be used as defined by EN IEC 60079-32-1:2018 Section 7.1.4. The minimum allowed fluid conductivity shall be as follows:

  25 pS/m for fluids with dielectric constant less than 2

  50 pS/m for fluids with dielectric constant higher than 2