

ATEX Directive (94/9/EC) and Watson-Marlow's 505LA pumpheads



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1 Introduction

Directive 94/9/EC, commonly known as the ATEX directive, carries obligations to the person who places equipment on the market, in the EU territory, for use in potentially explosive environments. A number of pumps manufactured by Watson-Marlow Bredel are suitable for use in hazardous environments; ATEX compliant pumps from the 505LA series are listed below, in Section 2 Pump models.

Watson-Marlow's 500 series ATEX pumps have been rated as Group II, Category 2 equipment for use in gas based environments only. The pumpheads are sold individually (for use with customer specified ATEX drives) and in defined configurations complete with Watson-Marlow ATEX drives.

This document provides specific ATEX information and should be used in conjunction with the original 505L user manual (m-505l-gb-01).

2 Pump models

The following 500 series pumps are covered by this manual:

505LA ATEX pumpheads		
505LA*	053.4001.A00	505LA ATEX pumphead
505LXA*	053.4011.A00	505LXA ATEX pumphead
505LGA*	053.4010.A0G	505LGA ATEX pumphead

The following 500 series pumps are also ATEX-compliant but are dealt with in a separate document (m-atex501rla-gb-03: PB0346).

501RLA ATEX pumpheads		
501RLA*	053.0001.A00	Twin roller for 1.6mm wall thickness tubing
501RL2A*	053.0001.A20	Twin roller for 2.4mm wall thickness tubing
501RLGA*	053.0011.A0G	Twin roller for 1.6mm wall Sta-Pure tubing
501RL2GA*	053.0011.A2G	Twin roller for 2.4mm wall Sta-Pure tubing
501RLCA	053.0002.A00	Close-coupled for 1.6mm wall tubing
501RL2CA	053.0002.A20	Close-coupled for 2.4mm wall tubing
501RLCGA	053.0022.A0G	Close-coupled for 1.6mm wall Sta-Pure
501RL2CGA	053.0022.A2G	Close-coupled for 2.4mm wall Sta-Pure

* NB: these pumpheads are compatible with a number of Watson-Marlow cased drives. However, the Watson-Marlow cased drives are not ATEX compliant and must not be used in hazardous locations.

Any 500 series pumpheads not listed above are NOT suitable for use in hazardous environments (at date of issue).

3 Hazardous environments

All of Watson-Marlow's ATEX pumps are classified as Group II, Category 2 equipment under the definitions of 94/9/EC:

"Group II, Category 2 products should be designed to be capable of remaining within their operational parameters, as stated in the instruction manual, and based on a high level of protection for their intended use, in areas in which explosive atmospheres caused by mixtures of air and gases, vapours, mists or air/dust mixtures" (see page 1) "are likely to occur."

Furthermore, "The explosion protection relating to this category must function in such a way as to provide a sufficient level of safety even in the event of equipment with operating faults or in dangerous operating conditions which normally have to be taken into account".

Watson-Marlow pumps must not be used in the underground parts of mines, and in surface installations of such mines, likely to become endangered by firedamp and/or combustible dust.

NB: where two or more items of ATEX equipment are combined, the complete assembly shall carry the rating of the lowest ranking individual piece of equipment.

For further information on the correlation between ATEX zones and ATEX equipment, please refer to the Workplace Directive (1999/92/EC).

4 Operating parameters

The following tube materials can be used with the 505LA pumpheads in double “Y” or continuous tubing configurations (two separate channels). Bore sizes range from 0.5mm to 9.6mm, with 2.4mm wall thickness. Only Watson-Marlow tubing should be used to guarantee continued compliance with the ATEX directive.

Tubing: working temperature range	
Marprene	5C to 80C
Bioprene	5C to 80C
Pumpsil	-20C to 80C
STA-PURE	0C to 80C
CHEM-SURE	0C to 80C
Neoprene	0C to 80C
PVC	0C to 80C

The following parameters define the boundary of the safe working envelope - these values must not be exceeded (ATEX compliance will be invalidated):

505LA pumpheads	
Operational temperature range	-20C to 80C
Max peak pressure	2 bar *
Max continuous speed	350 rpm
Corrosion resistance	See 9 Materials of construction
Tube life	See 7 Tube life
Torque limit (drive coupling)	22Nm

* Please note that, although Sta-Pure tubing is rated at 4 bar in a standard 505LG pumphead, the ATEX version (505LGA) is limited to 2 bar.

WARNING! Do not run dry for excessive periods. Roller and tubing temperatures can exceed normal operating range.

WARNING! Do not run pumphead against a dead-end condition (closed discharge). This can lead to excessive roller and tubing temperatures and pressures in excess of the limits in the table above.

When two or more items of ATEX equipment are combined, the permissible operating envelope will be determined by the narrowest range after considering all values for a given parameter.

5 Potential pump hazards

As part of the requirements of 94/9/EC all potential hazards, including expected malfunctions, have been identified and subjected to a risk assessment. In order to prevent these ignition sources becoming effective a number of changes have been implemented (see Section 10). In addition to engineering modifications, the changes include additional operating instructions in order to specify correct usage in hazardous locations. Please refer to Sections 6-10 for further details.

Recognised ignition sources

Surface temperatures of rollers and tubing
Tube burst and subsequent spilling of pumped fluid
Mechanical failure of rotor hub
Exothermic and pyrophoric chemical reactions
Electrostatic charging of tubing and fluid
Bearing failure
Spring failure

6 Installation guidelines

Please refer to the standard 505L manual (m-505l-gb-01) for general installation instructions.

It is recommended that the chosen ATEX drive (motor/gearbox) is configured to safely reach an overload condition before the 22Nm torque limit is reached. This will prevent catastrophic failure of the rotor in the rare occurrence of a major obstruction.

Particular attention should be given to the "Do's and do not's" section regarding interfacing with suction and discharge tubing and/or pipework. It is important to ensure proper connections are made to prevent leaks.

All ATEX pumpheads include provision for the prevention and dissipation of electrostatic charge. In order to dissipate electrostatic charge effectively there must be sufficient electrical contact between the pumphead and the suitably earthed drive.

It is imperative that the 505LA pumpheads are earthed by connecting the earth terminal (circled in the photograph below) to earth (usually via a suitable point on the pump drive).

It is possible to check the effectiveness of any earth connection by measuring its electrical resistance. The resistance from any point on the safeguard to the earth terminal is typically 25 Ohms. **To ensure reliable dissipation of static the maximum resistance to earth should not exceed 1 MOhm.**

Peristaltic tubing has limited conductivity and so its use should be limited to the length adjacent to the pumphead. Electrostatic testing has determined that Watson-Marlow tubing is compliant with a II 2 G, IIB rating.



Earthed, conductive pipework should be used elsewhere in the system.

There is potential for the pumped fluid to become charged through pumping. Protective measures should be implemented at the discharge outlet to dissipate this charge safely.

The 505LA pumpheads should be run only with the track levers in the fully closed position.

7 Tube life

Only Watson-Marlow tubing should be used to guarantee continued compliance with the ATEX directive.

A number of factors contribute to the life of the tubing:

Factors influencing tube life
Normal tube fatigue - dependent on tube size, material and pumphead speed
Incorrect tube loading - see 505L manual (m-505l-gb-01) for guidance
Excess working pressure - see Section 4 Operating parameters
Chemical incompatibility - a table of tubing compatibility can be found at http://www.watson-marlow.co.uk/pdfs-global/chemcompat.pdf . Immersion kits are available from Watson-Marlow for testing.

For each application it is strongly recommended that tube life should be determined by trials, prior to installation in a hazardous environment. If this is not possible, or if there is any doubt in terms of tube life then the following hazards should be recognised before installing a pump in a potentially explosive atmosphere:

Chemical reaction between spilled pumped fluid and pump materials - the materials of construction are listed in Section 9
Spilled, pumped fluid could be ignited by the surface temperature of the rollers - Watson Marlow's 505LA pumpheads have been rated as T4 (meaning that even under worst-case operating conditions the maximum surface temperature will not exceed 135C)

8 Tube materials in ATEX applications

The following Watson-Marlow tube materials are suitable for use in ATEX applications:

- Pumpsil (platinum-cured silicone)
- Marprene
- Bioprene
- Sta-Pure
- Chem-Sure
- Neoprene
- PVC

Please note from the table below that there are limitations of length that can be used for certain tube materials. Pumpsil cannot be used in any ATEX application above the specified lengths listed. When using Bioprene and Marprene there is a reduction in class suitability when they are in contact with Polyimides.

Permissible length of tubing (cm) for IIB rating:

Series	Bore (mm)	Wall (mm)	OD (mm)	Pumpsil (cm)	Sta-Pure* (cm)	Chem-Sure* (cm)	Marprene**	Bioprene**	PVC	Neoprene
840A	40.0	12.8	65.5	n/a	n/a	n/a	n/a	unlimited	n/a	n/a
825A	25.0	9.0	43.0	n/a	n/a	n/a	n/a	unlimited	n/a	n/a
701RA	25.4	4.8	35.0	29***	29***	29***	unlimited	unlimited	unlimited	unlimited
701RA	19.0	4.8	28.6	35	35	35	unlimited	unlimited	unlimited	unlimited
701RA	15.9	4.8	25.5	39	39	39	unlimited	unlimited	unlimited	unlimited
701RA	12.7	4.8	22.3	45	45	45	unlimited	unlimited	unlimited	unlimited
701RA	9.6	4.8	19.2	52	52	52	unlimited	unlimited	unlimited	unlimited
620LA	16.0	4.0	24.0	42	42	42	unlimited	unlimited	unlimited	unlimited
620LA	12.0	4.0	20.0	50	50	50	unlimited	unlimited	unlimited	unlimited
620LA	8.0	4.0	16.0	63	63	63	unlimited	unlimited	unlimited	unlimited
620RA	15.9	3.2	22.3	45	45	45	unlimited	unlimited	unlimited	unlimited
620RA	12.7	3.2	19.1	52	52	52	unlimited	unlimited	unlimited	unlimited
620RA	9.6	3.2	16.0	63	63	63	unlimited	unlimited	unlimited	unlimited
620RA	6.4	3.2	12.8	78	78	78	unlimited	unlimited	unlimited	unlimited
313DA, 501RLA, 505LA	9.6	2.4	14.4	69	69	69	unlimited	unlimited	unlimited	unlimited
313DA, 501RLA, 505LA	8.0	2.4	12.8	78	78	78	unlimited	unlimited	unlimited	unlimited
313DA, 501RLA, 505LA	6.4	2.4	11.2	89	89	89	unlimited	unlimited	unlimited	unlimited
313DA, 501RLA, 505LA	4.8	2.4	9.6	104	104	104	unlimited	unlimited	unlimited	unlimited
313DA, 501RLA, 505LA	3.2	2.4	8.0	125	125	125	unlimited	unlimited	unlimited	unlimited
313DA, 501RLA, 505LA	1.6	2.4	6.4	156	156	156	unlimited	unlimited	unlimited	unlimited
313DA, 501RLA	8.0	1.6	11.2	89	89	89	unlimited	unlimited	unlimited	unlimited
313DA, 501RLA	6.4	1.6	9.6	104	104	104	unlimited	unlimited	unlimited	unlimited
313DA, 501RLA	4.8	1.6	8.0	125	125	125	unlimited	unlimited	unlimited	unlimited
313DA, 501RLA	3.2	1.6	6.4	156	156	156	unlimited	unlimited	unlimited	unlimited
313DA, 501RLA	2.4	1.6	5.6	179	179	179	unlimited	unlimited	unlimited	unlimited
313DA, 501RLA	1.6	1.6	4.8	208	208	208	unlimited	unlimited	unlimited	unlimited
501RLA	0.8	1.6	4.0	250	250	250	unlimited	unlimited	unlimited	unlimited
501RLA	0.5	1.6	3.7	270	270	270	unlimited	unlimited	unlimited	unlimited

* If length limit exceeded for Sta-Pure and Chem-Sure, ATEX rating reduced to IIA

** Marprene and Bioprene rated IIA when in contact with Polyimides

*** 25.4mm tube not suitable for use in REA pumpheads

9 Servicing and cleaning requirements

If aggressive liquids are spilled onto the pumphead, the head should be removed and cleaned with a mild detergent. First, isolate the pump from the mains power supply and remove the track by lifting the levers at either side of the pumphead. Remove the tubing by stretching the element over the pegs (or remove the clamps for continuous tubing). To detach the pumphead from the drive, remove the two screws located in the backplate.

The cleaning procedure above should be used to limit the build-up of dust (which can become electrostatically charged and/or heated by friction).

Avoid exposing the bearing seals to solvents for more than one minute. See m-505l-gb-01, Section 9 Maintenance, for details.

The moving parts of the rotor should be checked from time to time for freedom of movement. Roller bearings are sealed and do not require lubricating.

Because of the importance of dissipating electrostatic charge the earthing leads must be regularly checked for signs of corrosion.

10 Materials of construction: 505LA pumphheads

Description	Part No.	Material	Finish
Spindle - roller (knurled) *	MN2582T	Stainless steel 303S31	
Rotor	MN0547T	Aluminium HP30 TF	Anodised
Cradle - extrusion *	MN2583C	Aluminium 6063	Painted
Cradle - extrusion	MN0839C		
Track - extrusion	MN0840C	Aluminium 6063	Anodised
Rod - locking	MN0843T	Stainless steel 303S31	
Spacer - locking rod	MN0844T	Nylatron GS	
Lever - locking rod	MN0850T	Stainless steel 303S31	
Shaft - drive	MN0845T	Stainless steel 303S31	
Shaft - drive (505LXA)	MN0860T	Stainless steel 303S31	
Plate - front	MN0846S	Aluminium 5083	Painted
Plate - rear	MN0847S	Aluminium 5083	Painted
Cover - adaptor	MN0862S	Aluminium 5083	Painted
Plate - end	MN1029C	Aluminium 5083	Painted
Tube - guide	MN1206T	Stainless steel 303S31	
Spring	SG0002	Stainless steel	
Ball bearings - roller spindles	BB0027	Carbon steel	
Ball bearings - drive shaft	BB0014	Carbon steel	
Foot	FB0001	Nylatron and rubber	
Screws	various	Stainless steel	
Washers	various	Nylon or stainless steel	
Side assembly	MNA0335A	Aluminium 6063 and stainless 302S26	Painted
Side assembly (505LXA)	MNA0364A		
Side assembly *	MNA0695A		
Adaptor assembly	MNA0338A	Speedal 2011	Painted
Roller assembly	MNA0370A		
Roller - tube	MN0544T	Stainless steel 316S11	
End cap - rollers *	MN2586T	POM-C (ESD) conductive acetyl	
Bush and collar assembly	MNA0638A	Nylatron and aluminium	
Earth strap - fastener *		Carbon spring steel BS1449	Nickel plating
Earth strap - lead 200mm *	MNA0693A	Copper	Tin coating
Earth strap - lead 140mm *	MNA0694A	Copper	Tin coating

* Components marked with an asterisk are unique to the ATEX 505LA series of pumphheads.

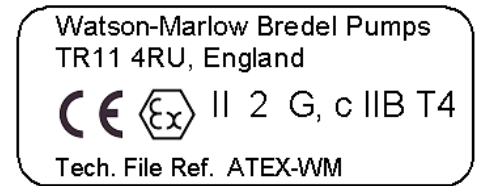
11 Summary of modifications

The table below defines the modifications made to standard 505L pumpheads for them to satisfy the requirements of the II 2 G, c IIB T4 ATEX rating:

ATEX features of the 505LA pumpheads	
Conductive rotor assembly	Roller end-caps have been replaced with conductive POM-C (ESD) Knurled roller pin: Cuts through anodising on rotor end-plates to reduce electrical resistance to earth
Earth strap	Earthing straps connect the track assemblies to the main body of the pumphead (and to an extension pumphead, if fitted)
ATEX label	This is a requirement of the Directive and includes the ATEX rating for the pumphead (Group II Category 2 for gas, T4)
ATEX manual	This is an addendum to the existing manual and includes ATEX-specific information

12 ATEX marking

The 505LA pumpheads have been marked with the following labels:



13 Replacements

Spares and replacements should be ordered through Watson-Marlow Bredel Pumps or through an official representative. **Only Watson-Marlow spares and replacements should be used in order to guarantee continued compliance with the ATEX Directive.**

Watson-Marlow's policy is to provide spare parts for all products for a minimum of seven years from discontinuation. The ability to implement this policy is not entirely within Watson-Marlow's control and cannot be guaranteed, but every effort will be made to honour this policy.

Watson-Marlow Bredel Pumps can be contacted at:



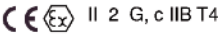

*Watson-Marlow Bredel Pumps
Falmouth
Cornwall
TR11 4RU
England*

*Tel: +44 (0)1326 370370
Fax: +44 (0)1326 376009*

*Email: support@watson-marlow.co.uk
Web: www.watson-marlow.com*

14 Manufacturer's Declarations

505L pumphead

			
Watson-Marlow Limited Falmouth Cornwall TR11 4RU England		Declaration of Conformity	
Description	505LA ATEX compliant peristaltic pumpheads		
Products	053.4001.A00 505LA 053.4011.A00 505LXA 053.4010.A0G 505LGA	505LA ATEX PUMPHEAD 505LA ATEX EXT PUMPHEAD 505LA ATEX GORE PUMPHEAD	
Conformity	This document certifies that the above equipment complies with the requirements of Directive 94/9/EC (the "ATEX" directive).		
Rating	The pumps are rated as Group II, Category 2 equipment, with a T4 temperature classification, for use in gas based environments. 		
Standards	EN13463-1:2001 EN13463-5:2003 CLC/TR 50404:2003		
Manufacturer	Watson-Marlow Bredel Pumps, TR11 4RU, England.		
Notified body	Full details of the conformity assessment procedure can be found in the technical reference file, "ATEX-WM". In accordance with the requirements of Directive 94/9/EC a copy of this file has been archived with the following notified body: Intertek (CE 0359), KT22 7SB, England.		
Date	25 th April 2007		
Signature	 Christopher Gadsden, Managing Director, Watson-Marlow Limited		

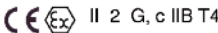

Complete ATEX pumps



Watson-Marlow Limited
Falmouth
Cornwall
TR11 4RU
England



Declaration of Conformity

Description	500 Series, ATEX compliant, configured peristaltic pumps
Products	501D (F, V, X & P variant) ATEX close-coupled pumps, configured with 501RLA, 505LA, 313DA or 314DA families of ATEX compliant pumpheads.
Conformity	This document certifies that the above equipment complies with the requirements of Directive 94/9/EC (the "ATEX" directive).
Rating	The pumps are rated as Group II, Category 2 equipment, with a T4 temperature classification, for use in gas based environments. 
Standards	EN13463-1:2001 EN13463-5:2003 CLC/TR 50404:2003
Manufacturer	Watson-Marlow Bredel Pumps, TR11 4RU, England.
Notified body	Full details of the conformity assessment procedure can be found in the technical reference file, "ATEX-WM". In accordance with the requirements of Directive 94/9/EC a copy of this file has been archived with the following notified body: Intertek (CE 0359), KT22 7SB, England.
Date	25 th April 2007
Signature	 Christopher Gadsden, Managing Director, Watson-Marlow Limited