PROJECT FINAL REPORT

FINAL PUBLISHABLE SUMMARY REPORT

legiotex® Demo

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Project acronym: **Demo Legiotex**

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1. EXECUTIVE SUMMARY

LEGIOTEX® is a filter system for real-time monitoring detection and removal of human pathogens in water based systems, including the bacteria *Legionella pneumophilla*. Thanks to the unique combination of antibacterial nonwoven, sensors and control system, it ensures the retention of pathogens. Moreover, the performance of LEGIOTEX® is monitored continuously by pressure and specific filter sensors which will send a visual and acoustic alarm, with GSM reporting option, in the event a problem would be detected.

The LEGIOTEX DEMO project has been designed to bridge the gap between the results from the previous successful R&D project and the market, by means of a demonstration installation in real representative facilities. During the lifespan of the project, the LEGIOTEX® filtering system has been successfully demonstrated in three different locations, on the sanitary hot water distribution system of a nursing home in Italy, a hospital in Spain and an apartment building in Germany.

The main advantages of the LEGIOTEX® filtering system when compared with other solutions available in the market, are the following:

- Reduce risk of infection from Legionnaire's disease
- Reduce or eliminate disinfection chemicals in the water
- No combined chlorine compounds in the water, no "chlorine smell" (thermal water systems)
- Comply with laws and regulations
- Market your service/facility/product as Legionella safe
- Real-time monitoring of filter efficiency
- Low installation and operating costs
- Low maintenance
- Easily size-scalable and easy to install
- Recurring revenues from filter replacements (for water treatment companies)

Legionella is present in all aqueous media. However it becomes a threat for human health when appropriate conditions for its growth and proliferation are met, which frequently happens in large in-doors facilities using systems for climate control: cooling systems, sanitary water distribution equipment (tanks, boilers, heaters and pipes) and other equipment subject to similar conditions.

The successful exploitation of LEGIOTEX® will have an important impact on health and safety at a European level by a yearly reduction on the number of cases of legionnaire's disease. In addition, the LEGIOTEX DEMO project will be of great relevance to the SME partners of the Consortium in order to improve their competitiveness in the world area and face the main market trends described for the sectors in which they are present by means of adding to their product portfolio an innovative product able to prevent Legionella outbreaks, which complies with applicable normative and minimizes installation and maintenance costs.

2. SUMMARY DESCRIPTION OF PROJECT CONTEXT AND OBJECTIVES

LEGIOTEX DEMO project is based on the results of the previous LEGIOTEX project (FP7-SME-2007-1, GA-222111). The general objective of the previous project was the development of a water filter capable to inhibit the growth and proliferation of the bacteria belonging to the *Legionella pneumophila* family in water-based climate control equipment and sanitary water distribution systems in risk of becoming a source for legionnaire's disease outbreaks in large public and industrial facilities.

For developing the aimed filter, environmental-friendly bactericides were appropriately fixed onto nonwoven textiles, assuring a long lasting biocide effect and optimum mechanical properties. The filter was mounted onto a disposal cartridge for its quick replacement, and this within a metal housing to be easily installed in different equipment, to have an optimum fluid-dynamic behaviour and successful commercialization. In addition, the performance of the Legiotex filtering system is continuously monitored by the presence of a sensor and a control system able to detect if the bactericide rate and head loss were being kept at constant levels in order to run the appropriate alarm.

The LEGIOTEX DEMO project has been designed to bridge the gap between the results from the previous successful R&D project and the market. In consequence, the main objectives of the Demo project are the following:

1. To install the product prototype for the prevention of Legionella contamination in a demonstration installation of a representative facility in risk of becoming a source of legionnaire´s disease (a potentially fatal pneumonia-like infection) to corroborate the efficacy of the developed prototype.

2. Make and develop the necessary market studies, business plans and commercialization strategies to start the introduction in the goal market of the LEGIOTEX product system.

3. DESCRIPTION OF THE MAIN S&T RESULTS/FOREGROUNDS

LEGIOTEX DEMO project has bridged the gap between R&D and the market, by means of a demonstration installation in a real representative facilities and where the industrial validation of a new and innovative product, which comes from a successful R&D project, has be realized.

During the lifespan of the project, the LEGIOTEX® filtering system has been successfully demonstrated in three different locations, on the sanitary hot water distribution system of a nursing home in Italy, a hospital in Spain and an apartment building in Germany.

Thanks to the valuable information collected from these three demo installations it has been possible to optimized most of the components of the initial LEGIOTEX® system in order to enhance its effectiveness and made it easier to install and to maintain. In addition, based on this information, a deep analysis about the specification and main features of the LEGIOTEX® commercial product has been carried out by the consortium.

LEGIOTEX® is a filter system for real-time monitoring detection and removal of human pathogens in water based systems, including the bacteria *Legionella pneumophilla*. It will be commercialized as a product composed by:

- Filter housing
- Bio-Active filter
- Support
- Pressure Sensor
- Filter sensor
- Control Unit

The filter system will be installed in–line with the water pipes in the plumbing system. The filter is a micro porous non-woven filter, which contains biocidal substances that kill legionella and other microbes (not specific for just legionella). The biocides are incorporated in the production of the filter medium and do not leach from the filter.

The control system allows for real-time alarms or actions based on continuous measurements of the rate of biofilm formation and measurement of pressure drop over the filter.

The biosensor is mounted in the filter container and can give indications on the possible formation of biofilm in the surface of the filter or pipes through the water supply system. It is made up of two electrodes, which measure the water conductivity. When the filter is clogged or if the water in the filter is stagnant, a biofilm can start to form on the surface of the two electrodes which increases the water conductivity.

The pressure sensors, installed upstream and downstream of the filter, detect the differential pressure and, consequently, the potential pressure losses of the filter. If the differential pressure

increases above a threshold set on the detector, it means that the filter may be clogged or it may not operate correctly.

The pressure sensors and the biosensor are connected to a detector which detects the data measured by the instruments and, through a USB port and specific software; is able to report them on a PC.

The key features and attributes of the LEGIOTEX® filtering system are the following:

- Operating guarantee of 6 month
- Bactericidal filter medium
- Environmentally friendly, biodegadable biocide that does not leach into the water
- Filter cartridge reusable and recyclable
- Online monitoring of the water system for the growth of biofilm
- Real-time monitoring of filter efficacy
- Configurable alarm system able to be connected to central control rooms of installations
- Easy installation and maintenance

The filter system can be made in a wide range of dimensions and is easily size scalable. The limiting factor upwards is the retention volume within the filter, but when larger volumes of water or higher flow rates need to be treated than can be achieved by just upsizing the filter, then solutions like mounting several filters in series (it is a modular system) or recirculation may be employed to allow for proper treatment.

4. POTENTIAL IMPACT AND MAIN DISSEMINATION ACTIVITIES AND EXPLOITATION OF RESULTS

The LEGIOTEX® filtering system will primary impact on the market of the water treatment equipment for indoors climate control and water distribution systems. The end-user segment identified to be the most interesting for this filter system are the nursing homes (and other health-care institutions), hotels, spa facilities and cruise ships, due to the number of documented cases of Legionnaires's disease outbreaks in these types of facilities and the severe negative consequences they suffer if they are the cause of an outbreak.

The main advantages of the LEGIOTEX® filtering system when compared with other solutions available in the market, are the following:

- Reduce risk of infection from Legionnaire's disease
- Reduce or eliminate disinfection chemicals in the water
- No combined chlorine compounds in the water, no "chlorine smell" (thermal water systems)
- Comply with laws and regulations
- Market your service/facility/product as Legionella safe
- Real-time monitoring of filter efficiency
- Low installation and operating costs
- Low maintenance
- Easily size-scalable and easy to install
- Recurring revenues from filter replacements (for water treatment companies)

The successful exploitation Demo Legiotex will have an important impact on health and safety at European level by a yearly reduction of 1,500 legionnaire's disease cases and 150 potential deaths, which will mean savings of up to 300 million € to the European economy.

For operational monitoring and risk management, regulations for control of Legionella rely on measuring parameters that show whether systems are working properly. LEGIOTEX® filtering system will strengthen this approach being a preventive continuous system with real-time monitoring of bactericide efficacy. Finally, LEGIOTEX® filtering system will help reducing the environmental pollution related to water treatment systems from the use of biodegradable biocides and reducing the generation of industrial waste by being developed as a recyclable filtering fabric and reusable cartridges or mounting structures.

DISSEMINATION ACTIVITIES

All the members of the consortium have contributed to the dissemination according to their capabilities and own means. The LEGIOTEX DEMO dissemination has been structured as follows:

- LEGIOTEX DEMO website: www.legiotex.eu

  A dedicated website has been created and regularly updated to describe the project, the Consortium and promote its progress and results to its target audience

- Presence on the website of all partners

- Promotion and dissemination materials: dedicated commercial materials (brochures, Technical data Sheet, and template material) have been produce in order to be able to contact potential customers and disseminate the advantages of the LEGIOTEX® filtering system.

- Organization of workshops: Logrotex, in collaboration with ADER (Agencia de Desarrollo Económico de La Rioja) and Club de Marketing de la Rioja, organized at ESDIR (Escuela Superior de Diseño) a workshop to get ideas on new LEGIOTEX® non-woven applications. The workshop had an important impact and the Spanish Newspaper "ABC" published an article on tis online magazine.

- Wikipedia site: in order to disseminate LEGIOTEX DEMO project results a dedicated Wikipedia article was produced with information about the project main objectives, status and partners.

- Video clip: A dedicated video showing the different components of the LEGIOTEX® filtering system as well as its maintenance was produced. This video will be very useful when approaching potential customers. In addition, the video has been uploaded on YouTube (http://www.youtube.com/watch?v=MvkKt9Fy7iU) and it is linked to all partners' websites.

- Direct communication with End Users: taking the opportunity of important activities or milestones during the project, the Consortium decided to publish this information in Twitter.

EXPLOITATION OF RESULTS

The LEGIOTEX DEMO project will be of great relevance to the SME partners of the Consortium in order to improve their competitiveness in the world area and face the main market trends described for the sectors in which they are present. The internal value chain of the LEGIOTEX DEMO project is very clear: Logrotex is responsible for the filter material, Minerva is responsible for the biofilm monitoring technology, and Idrodepurazione is responsible for integrating all parts to a complete Legiotex filter system. Therefore, it will be an opportunity for Idrodepurazion to improve its competitive position by offering an innovative product able to prevent Legionella outbreaks, which complies with applicable normative and minimizes installation and maintenance costs. It will be an opportunity for Logrotex to produce and commercialize a high-tech application of nonwoven fabrics using an environmental-friendly biocide for LEGIOTEX®. And finally, it will be an opportunity for Minerva to commercialize a high-tech electronics control system development.

The results from the LEGIOTEX DEMO project could be commercialized as a few different potential products:

- Filter system with sensor and control system

- Filter system without sensor and control system
- Shower head with LEGIOTEX® filter
- LEGIOTEX® filter material (non-woven antibacterial) (e.g. adapted to a commercial housing)
- Biofilm sensor and control system

5. ADDRESS OF PROJECT PUBLIC WEBSITE AND RELEVANT CONTACT DETAILS

CONSORTIUM MEMBERS

Partner	Short name	Country
Logrotex S.A	LOGROTEX	Spain
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