

absorbers and guided type fall arresters on a flexible anchorage line during fall arresting. *Safety Science* 2004; 42: 519-536.

10. European Committee for Standardization (CEN). Personal protective equipment against falls from a height – Retractable type fall arresters. Standard No. EN 360:2002. Brussels, Belgium, 2002.
11. European Committee for Standardization (CEN). Personal protective equipment against falls from a height – Self locking arrester on flexible anchorage line. Standard No. EN 353-2:2002. Brussels, Belgium, 2002.
12. European Committee for Standardization (CEN). Personal protective equipment against falls from a height – Full body harnesses. Standard No. EN 361:2002. Brussels, Belgium, 2002.
13. Miura, N, Sulowski, AC. *Fundamentals of fall protection. Introduction to horizontal lifelines*. Ed. International Society for Fall Protection, Toronto, 1991: 217-283.
14. FprCEN/TS 16415:2012 Personal fall protection equipment – Anchor devices – Recommendations for anchor devices for use by more than one person simultaneously.
15. European Committee for Standardization (CEN). Personal protective equipment against falls from a height – Test methods. Standard No. EN 364:1992. Brussels, Belgium, 1992.
16. Sulowski AC. Assessment of maximum arrest force in fall arresting systems. In: *Fundamentals of fall protection*. Ed. Sulowski AC. Toronto, Canada: International Society for Fall Protection; 1991, pp. 165 – 192.
17. Robinson L. Development of a technique to measure the dynamic loading of safety harness and lanyard webbing. HSL/2006/37.
18. Baszczyński K, Jachowicz M. Load-Elongation Characteristics of Connecting and Shock-Absorbing Components of Personal Fall Arrest Systems. *Fibres & Textiles in Eastern Europe* 2012; 20, 6A(95): 78 – 85.
19. Baszczyński K. Modeling the performance of selected textile elements of personal protective equipment protecting against falls from a height during fall arrest. *Fibres & Textiles in Eastern Europe* 2013; 21, 4(100): 130 – 136.
20. Bedogni V, Manes A. A constitutive equation for the behavior of a mountaineering rope under stretching during a climber's fall. *Procedia Engineering* 2011; 10: 3353-3358.
20. <http://www.imagesystems.se/image-systems-motion-analysis/products/tema-motion.aspx>
21. <http://www.originlab.com/>

Received 13.05.2014 Reviewed 25.07.2014



INSTITUTE OF BIOPOLYMERS AND CHEMICAL FIBRES

LABORATORY OF ENVIRONMENTAL PROTECTION

The Laboratory works and specialises in three fundamental fields:

■ **R&D activities:**

- research works on new technology and techniques, particularly environmental protection;
- evaluation and improvement of technology used in domestic mills;
- development of new research and analytical methods;

■ **research services** (measurements and analytical tests) in the field of environmental protection, especially monitoring the emission of pollutants;

■ **seminar and training activity** concerning methods of instrumental analysis, especially the analysis of water and wastewater, chemicals used in paper production, and environmental protection in the paper-making industry.

Since 2004 Laboratory has had the accreditation of the Polish Centre for Accreditation No. AB 551, confirming that the Laboratory meets the requirements of Standard PN-EN ISO/IEC 17025:2005.



Investigations in the field of environmental protection technology:

- Research and development of waste water treatment technology, the treatment technology and abatement of gaseous emissions, and the utilisation and reuse of solid waste,
- Monitoring the technological progress of environmentally friendly technology in paper-making and the best available techniques (BAT),
- Working out and adapting analytical methods for testing the content of pollutants and trace concentrations of toxic compounds in waste water, gaseous emissions, solid waste and products of the paper-making industry,
- Monitoring ecological legislation at a domestic and world level, particularly in the European Union.

A list of the analyses most frequently carried out:

- Global water & waste water pollution factors: COD, BOD, TOC, suspended solid (TSS), tot-N, tot-P
- Halogenoorganic compounds (AOX, TOX, TX, EOX, POX)
- Organic sulphur compounds (AOS, TS)
- Resin and chlororesin acids
- Saturated and unsaturated fatty acids
- Phenol and phenolic compounds (guaiacols, catechols, vanillin, veratrols)
- Tetrachlorophenol, Pentachlorophenol (PCP)
- Hexachlorocyclohexane (lindane)
- Aromatic and polyaromatic hydrocarbons
- Benzene, Hexachlorobenzene
- Phthalates
- Carbohydrates
- Glycols
- Polychloro-Biphenyls (PCB)
- Glyoxal
- Tin organic compounds

Contact:

INSTITUTE OF BIOPOLYMERS AND CHEMICAL FIBRES
ul. M. Skłodowskiej-Curie 19/27, 90-570 Łódź, Poland
Małgorzata Michniewicz Ph. D.,
tel. (+48 42) 638 03 31, e-mail: michniewicz@ibwch.lodz.pl