Fire-fighting proportioners for producing foams

Fire-fighting foams have been a positive development in extinguishing oil fires for almost a century. Foams are produced by blending a foam concentrate that is stored in a tank at a constant proportion of 1 % 3 % or 6 % with the flow of water used in the fire-fighting system to produce a foam solution. This foam solution then arrives at the foam guns under pressure where it is mixed with air to produce the foam.

The NFPA (National Fire Protection Association in the US) recognizes the following methods of proportioning, i. e: of creating the proper solution of water and foam liquid concentrate:

- *Coupled Water-Motor Pump,*
- *Foam Nozzle Eductor,*
- *Metered Proportioning,*
- *Pressure Proportioning Tank,*
- *Pump Proportioner (Around-the-Pump)*

All methods apart from the Coupled Water-Motor Pump use Venturi eductors that are very sensitive to the viscosity of the concentrate and the water line pressure.

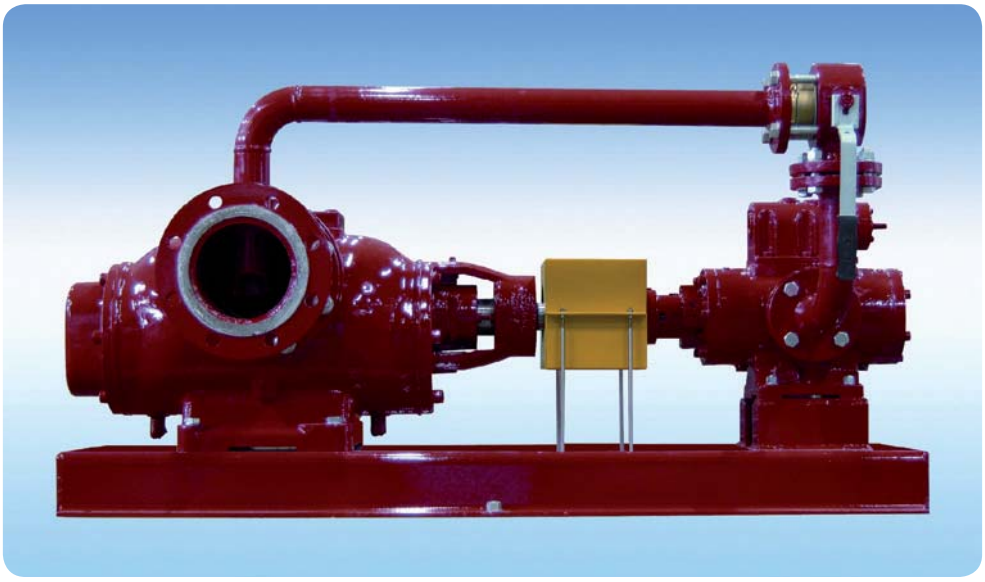

Fig. 1 A Leistritz L23NG propotioner

The innovative proportioner

The series L23NG Leistritz proportioner (Fig. 1) produces extinguishing foam in fire-fighting plants by mixing foam concentrate with water. It is self-powered since it uses the energy of the pressurised water. The principle is known as a "Coupled Water-Motor Pump", and it is recognised and described by NFPA 11 edition 2005 in para. 3.3.3 and A3.3.25.2(c)

This proportioning system (Fig. 2) consists of a volumetric water motor (1) driven by the water flow which controls a foam concentrate injection pump (2), also volumetric. The pump injects the foam concentrate, stored in the concentrate tank (A), into the water flow through the 3-way valve (3).

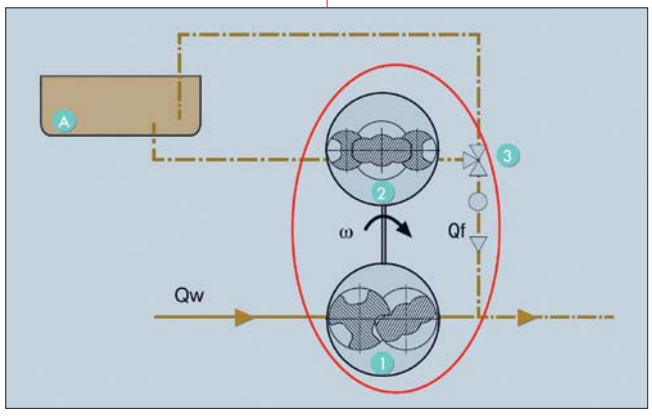

Fig. 2 The Leistritz L23NG proportioner, from Figure A3.3.27.2(c) of NFPA 11 edition 2005. Typical supply inside the red oval

The speed ω of the water motor is proportionate to the water flow Qw. The flow of AFFF concentrate Qf is proportionate to the speed and thus to the water flow. By actuating the 3-way valve it is possible to either actually inject the foam concentrate into the water flow (normal operation) or let the foam concentrate recirculate in its tank (simulated operation).

The required percentage of the foam concentrate in the foam solution is achieved by a proper selection of the unit capacities of both hydraulic motor and injection pump. The water motor and injection pump

are both derived from Leistritz Screw Pumps of the L2NG and L3MF series respectively, which have been appreciated for decades for their legendary reliability.

The typical Leistritz supply system is shown in Fig. 2 inside the red oval and consists of the water motor, injection pump, three-way valve and injection piping, complete with non – return valve, not shown in the figure. All parts are assembled on a common base plate and are fully inter-connected. The two main units are joined by an elastic coupling, which compensates any large misalignment, with a coupling guard. OEM versions are also available.

Operating range and mix values

These proportioning systems have nominal foam flows ranging from 120 to 900 m^3/h. Larger nominal foam flow rates are available on request. The operating range as per NFPA 11 is from approx. 10–15 % to around 110 % of the nominal foam flow.

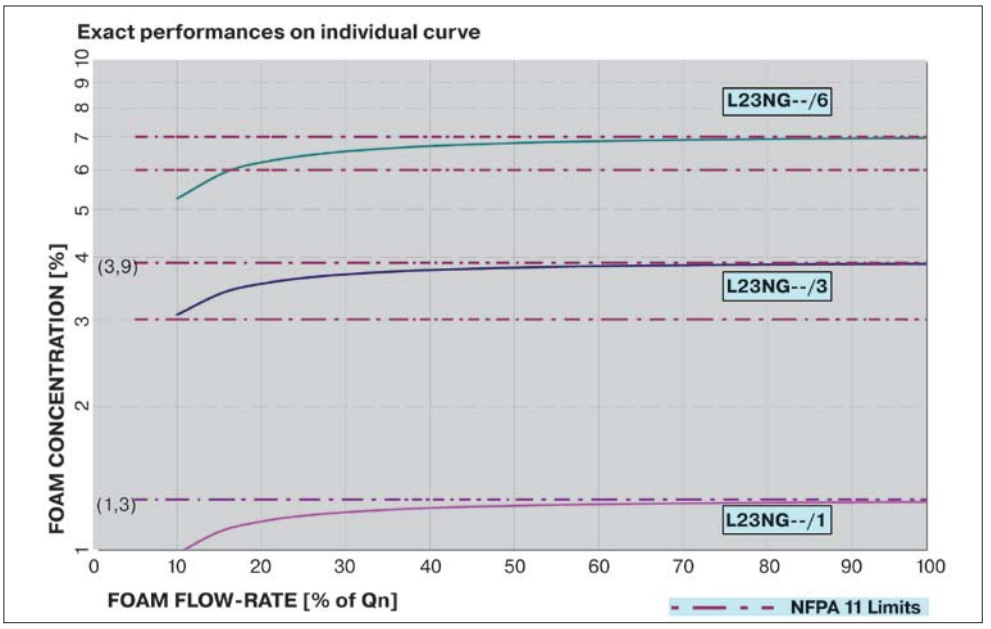

Fig. 3 Typical mixing performances

The percentages of foam concentrate in the foam are: 1 %, 3 % and 6 %. The 1 % concentration is available for larger sizes.

The highlights of this system are

- *refillable (atmospheric) foam concentrate tanks*
- *Self-calibrated*
- *Insensitive to foam concentrate viscosity*
- *Can be tested in the field without consuming foam concentrate*
- *Full compliance to NFPA 11 edition 2005, para. 3.3.3 "Coupled Water-Motor Pump"*
- *Broad operating range, even with the new NFPA11 tolerances on foam concentration.*
- *11 off-standard sizes, from 2,000 l/min to 15,000 l/min foam flow*
- *Foam concentration 1 %, 3 % and 6 % from all kinds of AFFF, AR-AFFF, fluoro-protein, protein, synthetic and plastic concentrates*
- *Seawater operation*
- *Water-resistant injection pump on request*
- *High viscosity designs for AR-AFFF*
- *robust and overload tolerant*

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