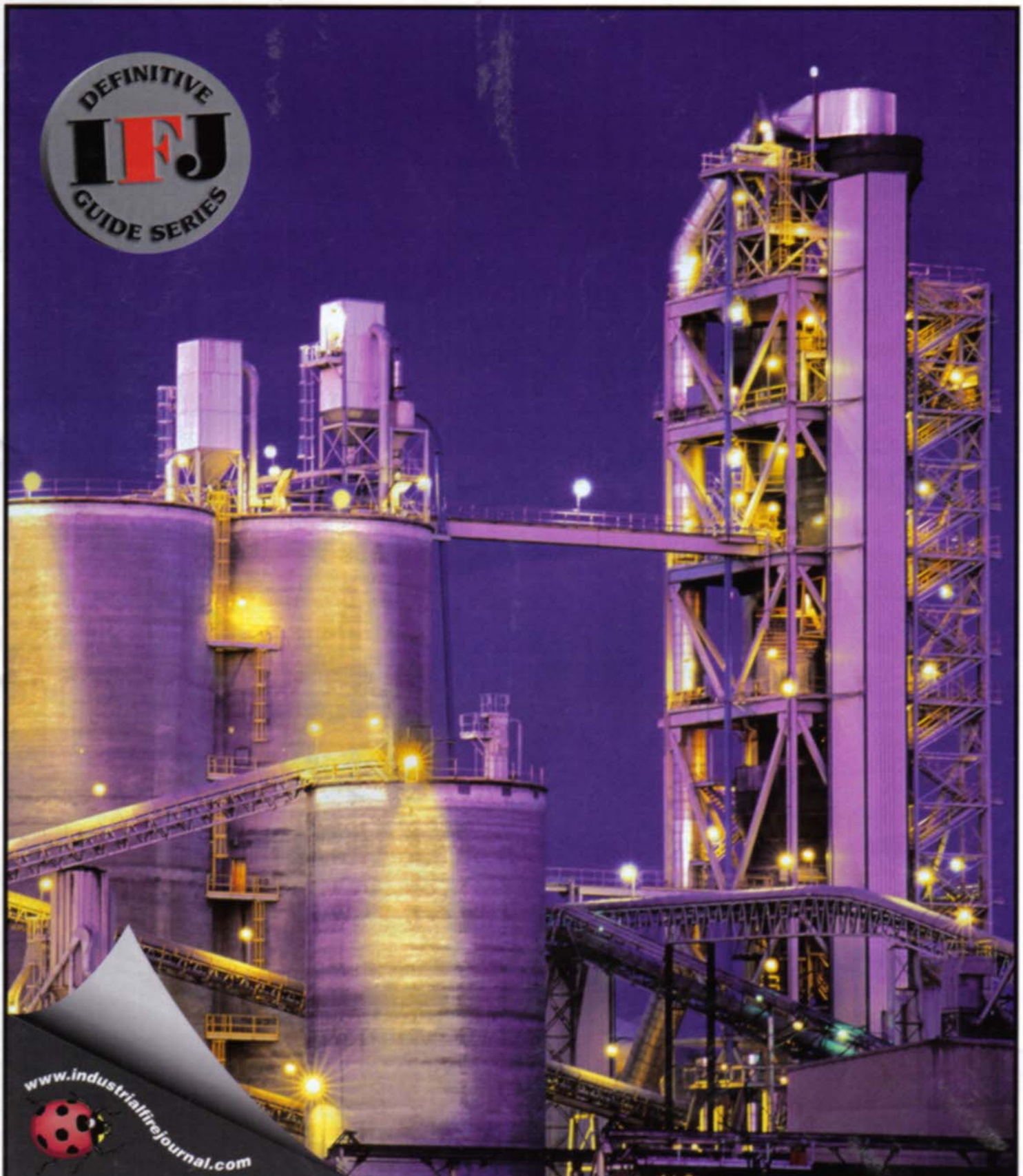
# INDUSTRIAL© FIRE JOURNAL

REPORTING WORLD WIDE TO THE OIL, GAS, CHEMICAL, POWER & OTHER HIGH RISK INDUSTRIES



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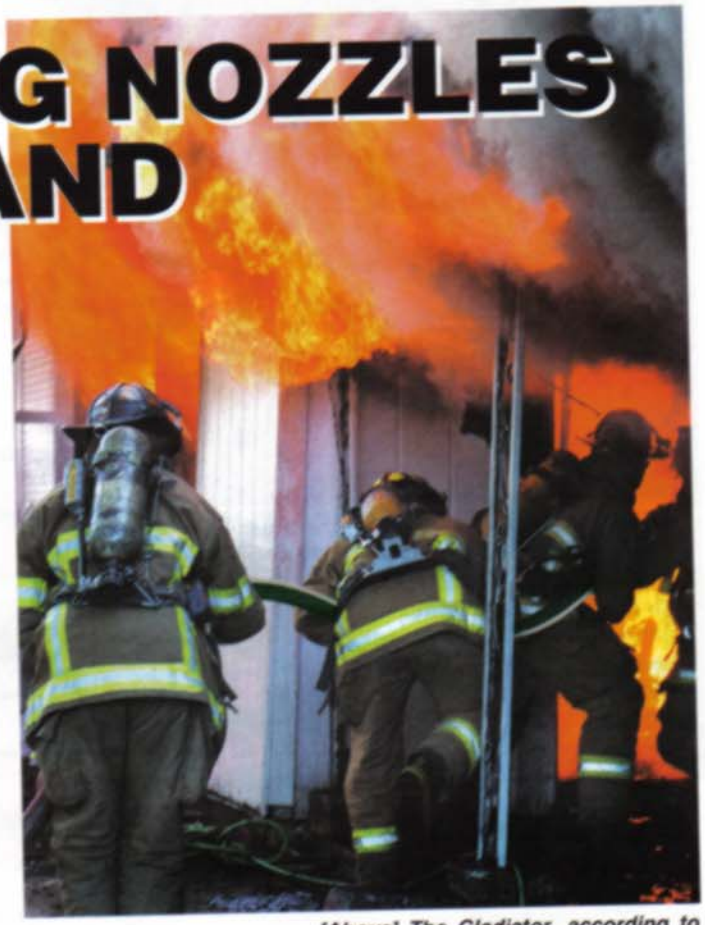
***There is perhaps no other tool in the firefighter's armoury that is quite so important as the hand-controlled branch, or firefighting nozzle as it is often now referred to, argues Paul Grimwood.***

# FIREFIGHTING NOZZLES HOSELINES AND COUPLINGS



***The advances in nozzle technology over the past twenty years have provided us with a wide variety of options although there is no single nozzle that will suit every application on the fireground. It is generally becoming accepted throughout Europe that the standard requirements for main-line nozzles should incorporate both 'jet' and 'spray' features based upon nominal flow outputs measured at 6 bars nozzle inlet pressure (NIP). However, the UK currently has no standard for firefighting nozzles and recent research would suggest actual main-line operating pressures may be closer to 4 bars NIP. This is a cultural tradition that has evolved from the days when flows from 'smooth-bore' class 'A' type nozzles were optimised at the lower pressures. There is now no logical reason why modern nozzles should be 'under-pumped' at the lower settings and firefighters should grasp the opportunity to maximise the combined effects of flow (lpm) and 'impact' force to their advantage.***

## Hose Standards

Hose should be seen to conform to the requirements of local standards - the UK BS 6391 (for example) and it's trademark the 'kitemark' informs us that such equipment has been tested for burst pressure, abrasion, oil, ozone and heat resistance, jacket adhesion, coupling connection and moisture absorption. In house tests also ensure both chemical and kink resistance, along with freeze protection which, provides additional qualities that combine to make Duraline from Angus Fire, a respected market leader. Another manufacturer also able to offer a wide range of firefighting hose are Richards Fire who also

*The Akron 753 high-pressure trigger shut-off nozzle has an ergonomically designed flow control system that is becoming increasingly popular with firefighters. When used on a high-pressure hosereel/ booster-line the quality of the fog pattern and its ability to 'pulse' fine droplets matchs other top industry nozzles. Circle No. 125.*

*[Left] With everything from fixed, remote controlled or portable monitor models to the spray-jet range of Optrapons nozzles, R.Pons provide a solution to tactical firefighting needs. More information? Circle No. 126.*

*[Above] The Gladiator, according to National Foam (Kidde Firefighting), represents the latest advance in foam firefighting nozzle technology delivering the most effective fire attack flexibility and performance available. The Gladiator is a self educting nozzle with the ability to be changed from non aspirating to aspirating mode without interrupting the foam stream. The Gladiator will operate with any foam concentrate and is available in 500, 750, 1000, 1500, 2000 & 3000GPM versions. The Gladiator is also available with an integrated metering valve for varying foam concentrate percentages. Circle No. 124.*

(BS 6391) hose equal to Duraline in their Brigadier version. With these higher pressures in mind the wide range of modern firefighting main-line jet/spray hand controlled nozzles may be generally categorised into the following three groups-

1. Fixed Flow Nozzles
2. Selectable Flow Nozzles
3. Automatic Nozzles

## Fixed Flow Nozzles

Nozzles within this category are generally compact and rugged with few moving parts, offering a fixed rate of flow at a pre-determined nozzle inlet pressure (NIP). They are manufactured inline with the customer's specifications - an example would be the Task Force Tips Metro series which offers a

*The Task Force Tips Ultimatic range includes the fire industry's first ever 'flashover' dedicated nozzle the Ultimatic FO7.*

and pressure combinations. The TFT organisation have carried out important research into the relationship of flow versus pressure and observed that although lower reaction force is achieved at the nozzle by reducing pre-set working pressures (making the nozzle easier to handle) the effect on 'impact force' is predominately relevant. With a flow of 600 lpm the impact forces (penetration capabilities) of three nozzles pre-set in the factory at 3.5; 5 and 7 bars NIP were measured where it was demonstrated that (in straight stream) the 7 bar version increased impact force over the 5 bar version by about 22 percent and the 5 bar version was better by about 11 percent over the 3.5 bar nozzle. When tested in a wide fog pattern against a flaming petroleum gas 'christmas tree', using thermal images to record data, there was a marked difference in the protection offered from radiated heat by the 5 bar nozzle when compared to the 7 bar version - at the same flows!

The Akron Brass company in USA offer a similar nozzle to the TFT Metro in their Assault version although the choice of flow options are not as wide ranging as with the TFT Metro series. Both Akron and TFT offer their nozzles with a choice of spinning teeth rings (stainless steel in the case of TFT) or fixed moulded teeth - each option providing differing fog patterns. It is generally acknowledged that spinning teeth rings are ideally suited to interior compartment firefighting operations and 'flashover' control applications whilst fixed moulded teeth are the preferred choice for industrial use and exterior firefighting operations. This is because spinning rings tend to break the droplets up into finer particles which are ideal for gas-phase cooling applications in structure fires. However, spinning rings are also known to 'pull' fire into the vortex created by the peripheral spray and the 'power-fog' effect common to nozzles with fixed moulded teeth is more likely to offer firefighters greater protection when advancing towards gas-flange fires or similar 'high-energy' situations. Another nozzle of the fixed flow design that has proven performance capability is the Elkhart Chief.

*The Task Force Tips Ultimatic 125 or FO7 will flow up to 470 lpm as a mainline (45mm hose) nozzle and 200 lpm in a hosereel version. Circle No. 127.*

## Selectable Flow Nozzles

There is a wide range of selectable flow nozzles which appear similar in design to the fixed flow versions but also offer the added feature of a 'selector ring' or facility to vary the flows at the nozzle itself without affecting the stream's quality, as may happen if the flow control handle were used for this purpose. The Akron Turbojet, with its spinning teeth ring, is a renowned firefighting tool that is popular with firefighters, offering a wide range of nozzle choices and selector rings with 4-5 options whilst flowing from 50-950 lpm. The Task Force Tips range of Quadrafog and Thunderfog nozzles have become equally as popular on the firegrounds of USA and throughout Europe and can deliver their rated quantities between 100-950 lpm at NIPs of 5 and 7 bars. For example, the increasingly sought after Quadrafog 500 nozzle enables the user to select one of four flows (110-230-360 and 470 lpm) at 7 bars NIP. The stainless steel spinning teeth are designed to optimise the fog pattern at the lower ends of the flow scale by finely dividing the droplets down to around 0.3mm in diameter - which are ideally suited to gas cooling applications. With the additional feature of a unique 'click-stop' setting at the 35 degree cone pattern the firefighter is now able to select spatial angles in darkness and 'pulse' droplets into the overhead with great effect. If the window to a compartment should break during the firefighting operation and an external wind 'push' the flames and heat

***Idaho, USA, July 16: Fire glows in the night sky at Anderson Lumber as Pocatello firefighter Richard Nelson uses a large stationary hose to knock down the flames early Sunday morning. The fire destroyed most of the yard and was still burning some 7 hours later. [Pic: AP/ Doug Lindley]***

in the direction of the firefighters, the protective cone angle of the TFT Quadrafog is at its maximum with one half turn - instantly! The selector ring then allows an increase in flow to offer even greater protection - all achieved within 2-3 vital seconds! It is features such as these that suggest Quadrafog is the 'ideal' compartment firefighting tool!

## Automatic Nozzles

Quite simply, the 'automatic' nozzle is designed to counter reductions and fluctuations in fireground flows automatically without any intervening action from the pump or nozzle operators. If the supply in an attack hoseline suddenly falters the 'automatic' nozzle will reduce the size of its exit orifice to maintain a pre-determined nozzle pressure and an effective stream. This is achieved by a reaction to the force of water striking a pressure sensitive spring mechanism sited in the nozzle head. The true performance of automatic nozzles may only be fully appreciated at large incidents where water supplies fall short and several nozzles are in operation. The Task Force Tips organisation is still the only manufacturer to offer automatic nozzles across the complete flow-range for handline nozzles.

The TFT Ultimatic 125 or FO7 will flow up to 470 lpm as a mainline (45mm hose) nozzle and 200 lpm in a hosereel version. The TFT Midmatic and Midforce automatic nozzles offer higher flows in the practical range of 100-600 lpm and the TFT Jetmatic and Duojet 'autos' will flow 200-1000 lpm. All nozzles are fitted with traditionally popular features including the 'gasket grabber', 'detent flow control', TFT slide valve, pressure control unit pre-set at factory to customer specifications, flush without shutdown and rubber moulded 'power-fog' teeth - providing a fully-filled protective fog cone.

## Nozzle Innovations

The Akron 753 high-pressure trigger shut-off has an ergonomically designed flow control system that is becoming increasingly popular with firefighters. When used on a high-pressure hosereel/booster-line the quality of the fog pattern and its ability to 'pulse' fine droplets is seen to match the industry's first ever 'flashover' dedicated nozzle in the TFT Ultimatic FO7.

However, possibly the most innovating nozzle of the new millenium is the Vindicator from First Strike Technologies USA. When recently trialed by the Fire Experimental Unit and fire officers at the Fire Service College in Moreton, it was stated that nothing like this had 'ever been seen before'! The Vindicator is not a jet/spray nozzle and only provides its stream in an aspirated jet form. Having said that, its design is unique and its true ability is found in the quantity of water the nozzle is able to flow. Never before has a handline been capable of delivering such large quantities of water or foam! The Vindicator's cleverly designed waterway has almost done away with nozzle reaction and whilst no nozzle on earth can defy the laws of physics it is natural to wonder where this nozzle reaction can have gone! The fact is, for flows only manageable by monitors until now, the Vindicator can deliver high quantities of water or foam with extremely impressive stream reach - and easily handled by a single operator! In June 2000 a series of US military tests documented Vindicator with a 13.9 to 1 expansion ratio when used in conjunction with AFFF and noted the foam stream obtained a greater reach than plain water at the same pump pressure!

The Vindicator comes in three handline versions - The Light Attack flows 340-750 lpm; the Heavy Attack flows 660-1,600 lpm; and the Blitz Attack flows 950-1,900 lpm. A Master Attack monitor is also available. With a delivery range up to 60 metres the Vindicator is definitely worth a look! ❐

*Louisiana, USA, June 17, 2000: A Monroe firefighter battles a blaze at the Riverside Missionary Baptist Church. The fire completely destroyed the structure. [Pic: AP/ R.H. Becker]*


*Duraline hose from Angus Fire is offered in lengths of up to 100 metres at diameters from 25-102mm. With a burst pressure of 50 bars and a safe working pressure of 21 bars, Duraline is able to meet the demands of higher nozzle pressures. Circle No. 128.*