Adsorbent Products for Aviation Fuel Handling

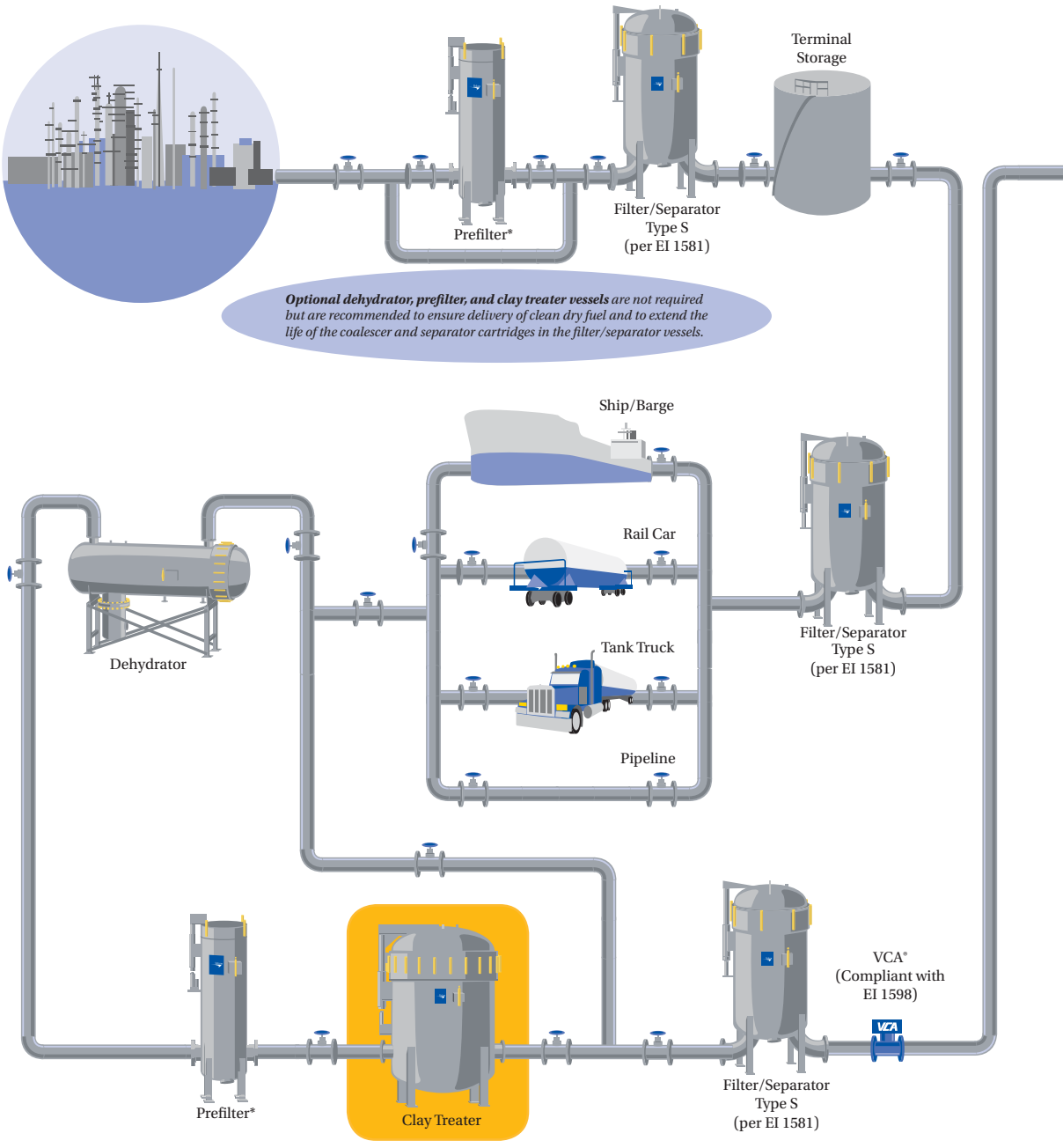
aerospace
climate control
electromechanical
filtration
fluid & gas handling
hydraulics
pneumatics
process control
sealing & shielding

Parker Velcon

ENGINEERING YOUR SUCCESS.

Typical Distribution System for Clean Dry Aviation Fuel - Adsorbent

EI 1581 Specification, 5th Edition



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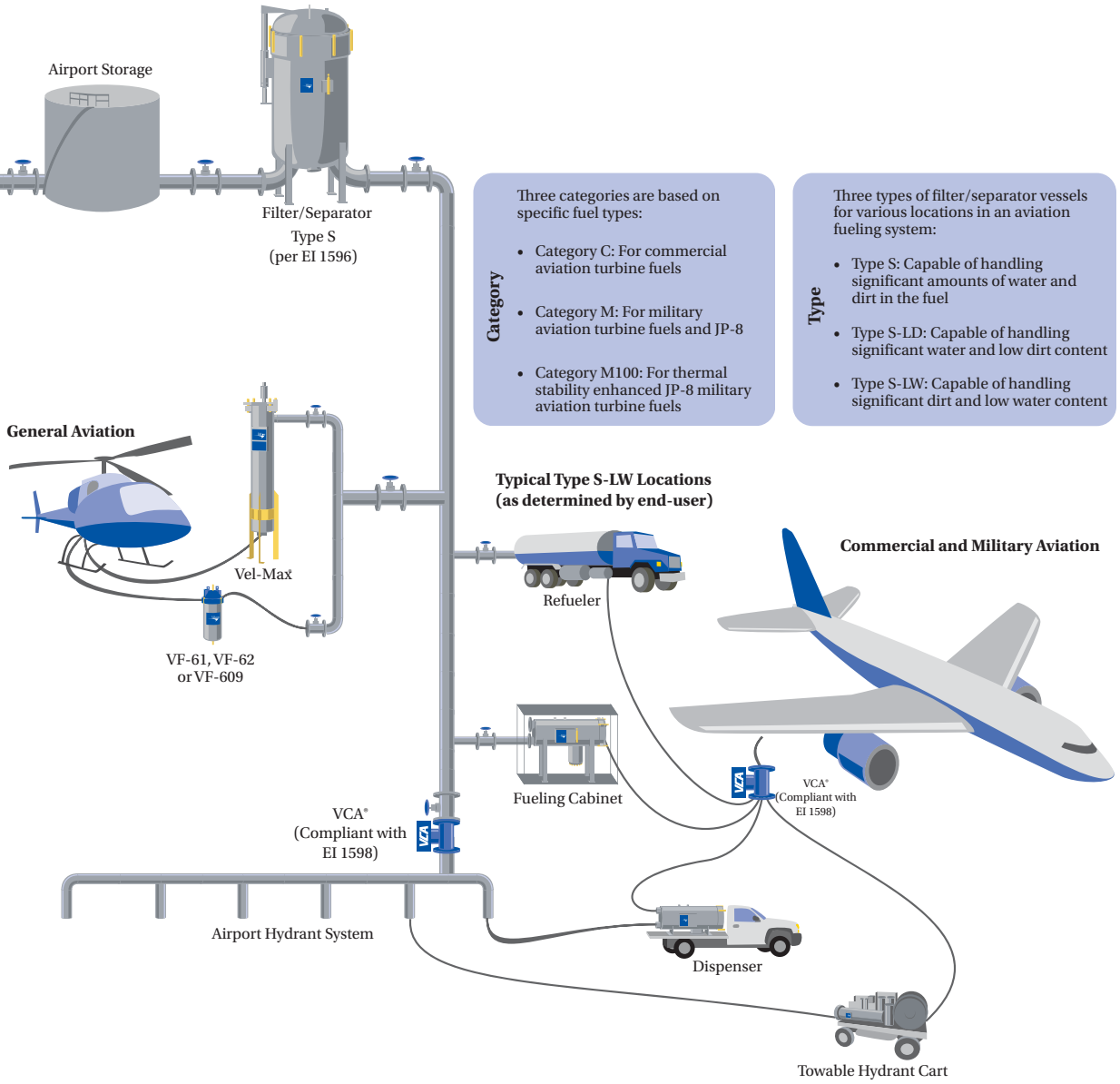


Category

Three categories are based on specific fuel types:

- Category C: For commercial aviation turbine fuels
- Category M: For military aviation turbine fuels and JP-8
- Category M100: For thermal stability enhanced JP-8 military aviation turbine fuels

Type

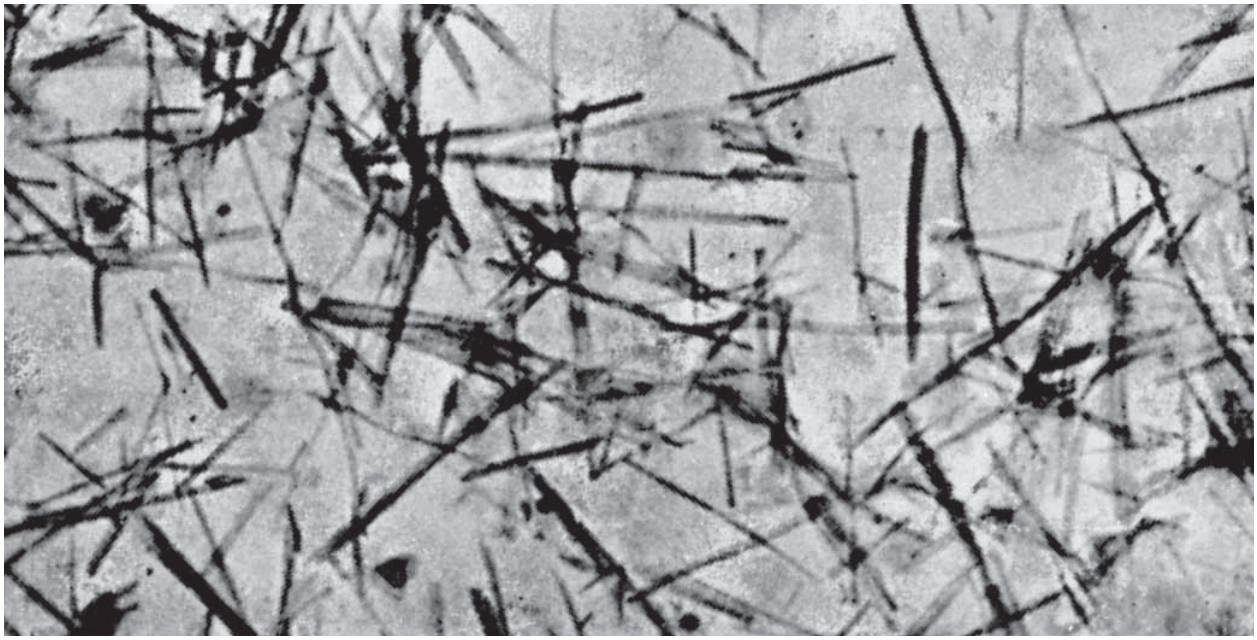
Three types of filter/separator vessels for various locations in an aviation fueling system:

- Type S: Capable of handling significant amounts of water and dirt in the fuel
- Type S-LD: Capable of handling significant water and low dirt content
- Type S-LW: Capable of handling significant dirt and low water content

* Prefilter elements compliance with EI 1590 and vessel compliance with EI 1596 is customer dependent.
Optional EI 1583 Qualified Vessels/Absorbent Type Cartridges for jet fuel without anti-icing additive.

Clay Element Information

Clay Treatment of Turbine Fuel



This photograph was taken at 35000X and was reproduced from technical literature of Minerals and Chemicals Philipp Corporation.

SOURCES OF SURFACTANT

Surfactant contamination in turbine fuels has been attributed to the following sources:

1. **Refinery –** Naphthenic and sulfonic acids; also sodium naphthenates and sulfonates formed during acid and caustic treating.

2. **Pipelines and transport trucks –** Residuals from motor gasolines and heating oils adsorbed on pipe walls – then desorbed into turbine fuel. Also, pipeline additives are surfactants.

3. **Ships and barges –** Same methods as in (2) above. Also, sea water and acids in the fuel can combine to form sodium naphthenates and sulfonates.

4. **Maintenance materials –** Soaps, detergents, and steam cleaning residues. Rust preventives and descaling chemicals usually are surfactants or combine to form surfactants.

The problems that are attributed to surfactants are principally related to their tendency to prevent the filter/separator from performing its functions, i.e., removing dirt and water from the fuel. The mechanics of this are a subject for a separate discussion but the results of such a failure are extensive. Water and dirt in an aircraft fuel system have well recognized dangers, but secondary effects are of equal importance. Bacteria can grow in the aircraft fuel system if water is present and the result can be corrosion of structural members and errors in the signals from fuel quantity gauging probes.

Treatment of fuel to remove surfactants is usually done with attapulgus clay. In the refinery, large towers are built to contain many tons of bulk clay in a percolation column. However, complications of handling bulk clay outside of a refinery have led the industry to use cartridge-type clay vessels when it is necessary to treat the fuel in field installations.

The key to good results in clay treatment is to keep the fuel in contact with the clay for as long a time as possible. We call this "residence" time. If you look at a clay particle, you see what seems to be a grain of fine (60 to 90 mesh) sand. But if you look within the grain with a microscope, you find

it is made up of smaller particles that cling together to form a porous mass. If we now examine these smaller particles with an electron microscope, we see that they contain thousands of tiny needle-like attapulgite crystals.

Scientists have calculated that one pound of attapulgite has about 13 acres of surface area.

It is clear that residence time, mentioned above, is required because the fuel must have enough time to penetrate the clay particle where the surfactant can be adsorbed onto the surfaces of the crystals. Extremely small dirt particles in the sub-micronic range are also adsorbed. This is why the oil industry and most filter manufacturers keep the flow rate per standard cartridge very low – from 5 to 6 gpm, but never higher than 7 gpm. The industry is well standardized on 18" long cartridges, 7" diameter.

Referring once again to the construction of a clay particle, it was mentioned that the individual grains are made up of very small particles that cling together. The grains will not break down under normal conditions, but water can cause this to happen. To deter breakdown in the presence of water Parker Velcon uses an oven-treated grade of clay, known as Low Volatile Materials (LVM).

The improvement in operating life of coalescer cartridges when clay is installed is dramatic. At one location, 50,000 gallons were clogging Parker Velcon filters "9" series cartridges.

Life jumped to 4 million gallons after clay was installed and the clay cartridges lasted 8 million gallons. In another installation, regular "6" series cartridges were lasting only 200,000 gallons.

After clay was installed, life went up to 16 million gallons. The improvement in filter membrane color ratings is just as dramatic as the improvement in coalescer life.

Two types of cartridges are available for clay vessels. One is a bag cartridge which contains a given quantity of clay inside a cloth bag. The second cartridge is a rigid canister, which contains the same clay. Parker Velcon only produces the canister type cartridges because they provide a more effective sealing mechanism between cartridges when they are stacked on top of one another in the clay vessels. This cuts down on by-passing caused by folds of the cloth of the bag cartridge. Since the flow rates on clay cartridges are quite low, it is possible to have a significant amount of by-passing from relatively small apertures between the bag cartridges. Also, some competitors' bag cartridges and canisters contain less efficient 30–60 mesh clay. We encourage customers to use Parker Velcon's canister type cartridge (with 60–90 mesh) for the best performance and highest efficiency of clay treatment vessels.

Clay Canister Cartridges

CO-718 Series Cartridges for Fuel and Oil Treatment

DESCRIPTION

The Parker Velcon CO-718 Series cartridges are intended for use in all clay treatment vessels designed for nominal 7" x 18" cartridges. The treatment/purification medium is a special blend of Low Volatile Materials (LVM) fuller's earth compounded to provide the optimum balance between adsorptive capacity and water resistance. With their ability to prevent channeling and their high particle structure stability, the cartridges assure reliable performance and long life in the most exacting process applications.

BENEFITS

- Length: 18"
- Outer Diameter: 7"
- Center Diameter: 2-¼"
- Collapse Strength: 100 psi
- Interchange:
  - Facet/Fram C-766-3
  - Keene-LE-718

APPLICATIONS

- Jet Fuels
- Diesel Fuel
- Biodiesel Fuel
- Lubricating Oils
- Quench Oils
- Vacuum Pump Oils
- Hydraulic Fluids
- Insulation Oils
- Aluminum and Stainless Steel Rolling Oils

JET FUEL TREATMENT

Jet Fuel Treatment – One of the most common uses for clay cartridges is to remove surfactants from jet fuels. Surfactants can carry over from the refinery process or be picked up when the jet fuel travels through multi-product pipelines (corrosion inhibitors, gasoline additives, etc.). Surfactants will eventually disarm filter/separators, which are primarily designed to remove water from the jet fuel. By removing surfactants from the fuel, the clay cartridges protect the downstream filter/separators. Since clay removes the surfactants by an adsorbent (adhering) action, the fuel residence time, or time in contact with the clay, is very important for proper fuel treatment. Normally, a flow rate of about 6.5 gpm per 7" x 18" cartridge is ideal for jet fuel.

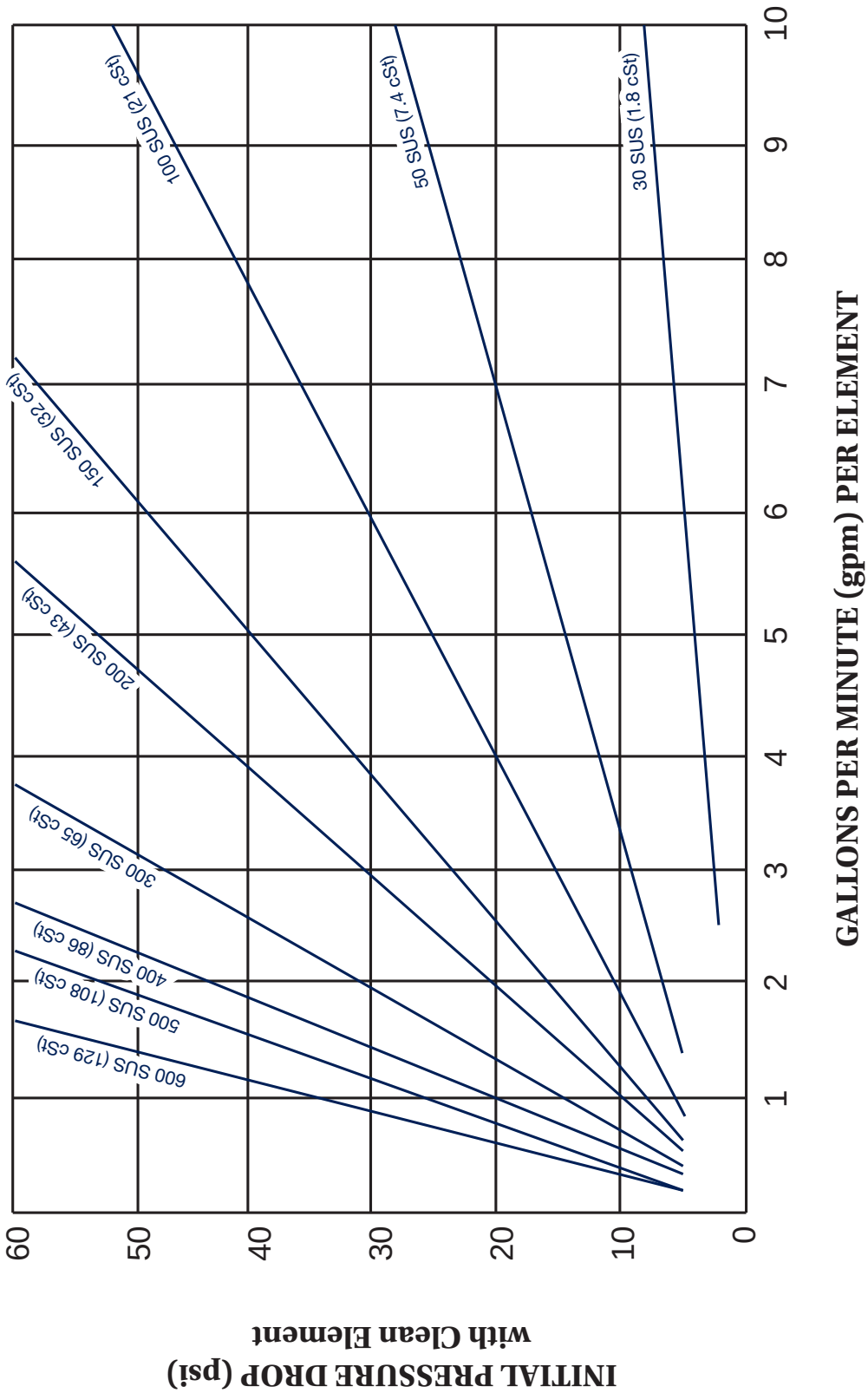
NOTE: See data sheet VEL1759, SWIFTKit®, for information on how to determine when the clay cartridges should be changed.

CONSTRUCTION

CO-718CE is a rugged canister cartridge featuring aluminized steel endcaps and center-tube, polyester felt outerwrap and both interior and exterior media migration barriers. A wire bail provides for easy installation and removal. Buna-N gaskets at each end assure tight sealing. The improved construction offers high resistance to transit or handling damage and to differential pressures up to 100 psi.

CO-718 Clay Canister Cartridges

FLOW RATE PER CARTRIDGE



Mission

Parker HFFD is committed to being the world's preferred source for the expert aviation filtration solutions we deliver to our customers.

Values

Superior customer service

Profitable growth

Meet or exceed customer expectations

Accountability

Integrity

U.S.A.

Michael Walls
Business Development Manager, Ground Fueling
michael.walls@parker.com
+1 719 5315855

CANADA

Rob Guglielmi
Regional Sales Manager
robert.gluglielmi@parker.com
+1 519 6227363

SOUTH AMERICA

Scott Thomas
Territory Sales Manager
scott.thomas@parker.com
+1 763 2283897

NORTH EUROPE

Richard Hooton
Market Development Manager
richard.hooton@parker.com
+44 (0)7785 521957

SOUTH EUROPE, AFRICA

David Cassagne
Market Developement Manager
david.cassagne@parker.com
+33 164 70 77 20

SOUTH AFRICA

Steven Finn
Global Market Development Manager
steven.finn@parker.com
+27 (0) 11 392 5633

EASTERN EUROPE, MIDDLE EAST

Mark Hoye
Market Development Manager
mark.hoye@parker.com
+971 50 3426142

ASIA PACIFIC

Dennis Hughes
Business Development Manager
dennis.hughes@parker.com
+ 61 (0)3 9589 0196

VEL2198 0216

Parker Hannifin Corporation
Hydraulic & Fuel Filtration Division
1210 Garden of the Gods Road
Colorado Springs, CO 80907
tel +1 719 531 5855 | +1 800 531 0180
www.velcon.com | www.parker.com