

VNL 670 vs. International® ProStar®+



COMPETITIVE ANALYSIS



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THE SUPERIOR CHOICE

THE VNL 670: A SUPERIOR CHOICE IN EVERY CATEGORY

Today's VNL 670 is an example of how Volvo continues to set industry standards. The Volvo VN is an evolution of product design, aerodynamics, fuel efficiency, product quality and safety. When the Volvo VN family was introduced in 1996 it changed the way the industry looked at aerodynamics. In 2002, the VN was redesigned to address the requirements of upcoming engine mandates. It quickly became the industry standard for how future over-the-road tractors would be designed and developed, with emphasis on low cost of ownership (including fuel efficiency and aerodynamics), friendly driver environment and safety.

THIS COMPETITIVE ANALYSIS CLEARLY OUTLINES VOLVO'S ADVANTAGES OVER THE INTERNATIONAL® PROSTAR®+. YOU'LL SEE HOW THE VNL 670 OFFERS:

SUPERIOR FUEL EFFICIENCY

The VNL 670 delivers up to 4% better fuel efficiency than the ProStar+ with a combination of advanced aerodynamics, No-Regen engine technology, and the Volvo I-Shift transmission.

SUPERIOR DRIVER PRODUCTIVITY

The VNL 670 combines top-of-the-line comfort behind the wheel and in the sleeper. It also offers an ease of operation that makes Volvo the top choice of professional drivers at the National Truck Driving Championships. Drivers are more satisfied in a VNL 670.

SUPERIOR SAFETY FEATURES

Volvo is the industry's clear leader in safety. We are the only manufacturer to combine a long list of standard safety features with comprehensive safety testing. The VNL 670 has a High Strength Steel cab with a standard driver side airbag and exceeds the standards of the Swedish Cab Impact Test. There are more Volvo trucks with enhanced stability in operation than any other manufacturer. The ProStar+ can't claim that.

SUPERIOR UPTIME

The VNL 670 has hundreds of design elements that save maintenance and repair costs. And every truck comes with a warranty that covers dozens more components than the ProStar+.

You can run more profitably in a VNL 670 because it's designed to address the key areas that affect your bottom line: drivers, fuel, safety and maintenance.



THE COMPETITOR

ABOUT INTERNATIONAL® AND THE PROSTAR®+

International has recently introduced the ProStar+ in an attempt to meet the standards set by Volvo and the VNL 670. As you can see from the chart on the opposite page, International's best efforts to reduce weight barely allow it to match the VNL 670.

Their MaxxForce® engines with massive EGR can only meet EPA 2010 certification with the use of credits because the engine does not meet the 0.2 g/bhp-hr of NOx requirement on its own.

Additional changes were also required on the ProStar+ to adapt to the larger cooling packages required for the MaxxForce. These included moving the cab rearward on the chassis and extending the engine compartment further into the cab, reducing space for the driver.



INTERNATIONAL PROSTAR+

CLASS 8 HEAVY DUTY WEIGHT COMPARISON GUIDE (EPA 2010)

	VOLVO D13	INTERNATIONAL MaxxForce® 11/13
2010 Emissions Technologies	SCR	MEGR
Displacement	12.8 L	10.5 / 12.4 L
Cylinder Configuration	Inline 6	Inline 6
Engine weight, dry	2676 lbs	2400 lbs
First Radiator Size	1380 in ²	1429 in ²
First Radiator weight, wet	166 lbs	181 lbs (est.)
Second Low Temperature Radiator Size (3 radiators)	n/a	1123 in ²
Second Low Temperature Radiator weight, wet	n/a	143 lbs (est.)
Charge Air Cooler, Front of Radiator	1007 in ²	764 in ²
Charge Air Cooler weight	50 lbs	38 lbs
Interstage Water to Air Cooler	n/a	120 in ² (est.)
Interstage Water to Air Cooler weight	n/a	15 lbs
Diesel Particulate Filter (DPF) weight	169 lbs	273 lbs (est.)
DEF Tank - 18.5 gal capacity	115 lbs	n/a
SCR Catalyst	219 lbs	n/a
Total Weights of Engine, Emission, and Cooling Pkg	3395 lbs	3050 lbs
I-Shift Transmission w/Clutch (12 spd)	712 lbs	n/a
UltraShift® PLUS w/Clutch (10 spd / 13&18 spd)	n/a	915 / 978 lbs
Average daily fuel pumped per truck as reported by two major truckstop chains	100 gal	100 gal
Additional fuel needed by ProStar+ (based on 5.5% better fuel economy in the VNL 670 as shown in SAE Type II tests)	n/a	27.5 gal
Fuel consumed in 5 day week	500 gal	527.5 gal
Weight of diesel fuel consumed per week at approximately 7.2 pounds per gallon	3600 lbs	3798 lbs
Difference in week's consumption of fuel	n/a	198 lbs
DEF Consumed for 5 day week (@2.3% of diesel)	11.5 gal	n/a
Weight of DEF (9.1 lbs x 11.5 gal)	105 lbs	n/a
System Weight Total	7812 lbs	7763 / 7826 lbs

BETTER FUEL EFFICIENCY

DELIVERING UP TO 4% BETTER FUEL EFFICIENCY THAN THE PROSTAR[®] +.



VOLVO VNL 670

The latest generation of Volvo SCR engines, along with aerodynamic improvements, can deliver up to 8% better fuel efficiency than our 2007 vehicles. Fuel is second only to driver expenses in terms of a fleet's operating costs. That's why the Volvo VNL 670 is engineered to help fleet managers get maximum fuel efficiency from every gallon of diesel.

In an extensive real-world test, the VNL 670 was compared head-to-head with the International[®] ProStar[®] +. In over 6,000 miles of identical operation, the Volvo D13 engine with SCR technology delivered 4% better fuel efficiency (including DEF consumption) than the MaxxForce[®] 13 using massive EGR.

Today, fuel efficiency is one of the most important decision points for a customer. In total, the Volvo engine can save \$3,000 or more every 125,000 miles. The savings for a fleet with 50 trucks using the Volvo D13 could equal \$150,000 or more per year compared to ProStar+.

\$3,000 IN SAVINGS		
	Volvo	ProStar+
Miles traveled	125,000	125,000
Fuel cost \$4.50/gal	\$93,750	\$97,656
Gallons of fuel used	20,833.33	21,701.39
DEF cost	\$906	\$0
Gallons of DEF used	520.83	0
Miles per gallon	6.00	5.76
Total fluid cost	\$94,656	\$97,656

AERODYNAMICS

Today more than ever, it's essential to understand how aerodynamic truck design can affect fuel efficiency. That's why Volvo trucks are optimized to control airflow and minimize wind resistance.

The VNL 670's sloping hood, sleek curves and graceful lines represent one of the most aerodynamic truck designs on the road today. Volvo has done more than any other manufacturer to successfully maximize vehicle aerodynamics and increase fuel economy.

Aerodynamic drag on a tractor-trailer combination is a key design component affecting fuel economy. Above 50 mph, it could take over half of the engine's power to move the tractor and trailer through the air.

With the introduction of the VN series in 1996, Volvo changed the way the industry thought about aerodynamic design. In 2002 we took aerodynamics to the next level by resculpting the front, accommodating the larger radiators needed for our upcoming 2007 and 2010 engines. Proof that we're not just thinking; we're always thinking ahead.

There are three simple rules for maximizing a truck's aerodynamics:

1. Attach the air (over, around and under the cab) as close to the front of the truck as possible.
2. Keep it attached.
3. Pass it to the trailer efficiently.

Volvo follows these rules to deliver an aerodynamic design that saves fuel.

The VNL 670 is designed with a wedge shape in the horizontal and vertical planes, with smooth sides and minimal surface protrusions. This assists in attaching air at the front of the truck, and keeping it attached.

In addition, the VNL can be equipped with A-pillar turning vanes. The turning vanes keep air attached and traveling around the windshield to the side window, maximizing fuel efficiency. The ProStar®+ does not use turning vanes.



VOLVO VNL 670



INTERNATIONAL® PROSTAR+

When hood-mounted mirrors are required by the customer's operating condition, the VNL 670 is available with one or two proprietary aerodynamic mirrors, in black or bright finish. The mirrors are mounted closer to the front of the vehicle and provide better visibility and aerodynamics compared to larger, round hood-mounted mirrors. The mirrors can be folded when the hood is tilted in the workshop.



VOLVO VNL 670

The VNL 670's front bumper is designed to direct air to the side, into the center below the truck, or over the top of the aerodynamic headlamp pod. There is an aero feature to reduce the air traveling into the wheel well. This avoids air hitting the tire, causing additional turbulence and increased drag.



VOLVO VNL 670



INTERNATIONAL PROSTAR+

Movement of air under the truck is controlled by an airflow deflector mounted below the front bumper. The design was optimized by extensive testing in a rolling-road wind tunnel, which simulates airflow under the vehicle as if the vehicle is moving down the road. International® makes no reference to rolling-road wind tunnel tests in any of their product information.



VOLVO VNL 670



INTERNATIONAL PROSTAR+

Chassis fairings go a long way toward increasing fuel efficiency and reducing fuel costs. The VNL 670's chassis fairings are available in three lengths: short partial, partial, and a full fairing design that covers the side from wheel to wheel. Volvo's additional short partial skirt reduces weight and cost, meeting the EPA SmartWay requirements. The International® ProStar®+ only offers two chassis skirts: cab length and full length.

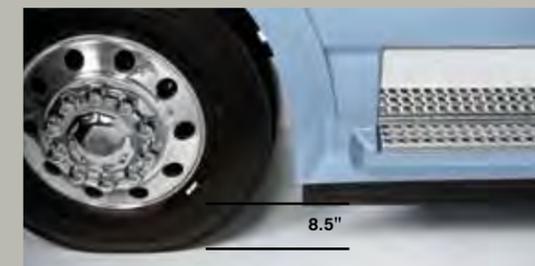


VOLVO VNL 670

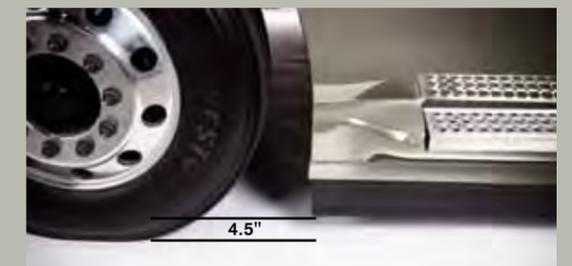


INTERNATIONAL PROSTAR+

The ground effects added to the VNL 670's chassis fairings feature an extrusion designed to have a controlled fold when the fairing is removed and leaned upright during service. Volvo provides approximately 8.5" of ground clearance to prevent damage and still provide an aerodynamic improvement. ProStar+ fairings use a straight rubber extrusion with no folding ability. There's also potential for misalignment when a removed fairing is returned to the chassis. The ground clearance is only 4.5".



VOLVO VNL 670



INTERNATIONAL PROSTAR+



VOLVO VNL 670



INTERNATIONAL® PROSTAR®+

The VNL 670 cab side fairings are compound angle structures—not flat panels. This design effectively transitions air from the curved side of the cab to the flat trailer side panels. The cab side fairing with extensions allows air to flow efficiently to the trailer at a trailer gap of 43" to 47". If the gap is too small, air is “thrown” past the front corners of the trailer onto the sides, causing turbulence and drag. If the trailer gap is too large, the air applies high forces to the trailer front and sides, again increasing turbulence and drag.

The VNL 670 features a shaped skirt, attached between the cab and chassis fairing, that reduces turbulence and drag by preventing air underneath the cab from mixing with the air on the outside of the cab.



VOLVO VNL 670

The VNL 670's cab roof fairing is at optimal performance when the trailer is 13' 6" from the ground and the trailer gap is 43". We understand that customers are not always able to operate at the optimum setting, so we've designed a patented roof trim tab that “pulls” the air down, attaching it to the trailer front corner when the trailer gap is longer than optimum or the trailer height is less than 13' 6".

Volvo tractors that may be certified by the EPA as SmartWay include a specific set of EPA required options and have a special designation sticker affixed to the dash, left of the steering column.

SELECTIVE CATALYTIC TECHNOLOGY (SCR) VS. MASSIVE EXHAUST GAS RECIRCULATION (MEGR)

Volvo accomplishes superior fuel efficiency compared to International® by reducing oxides of nitrogen (NOx) through an ultra-high efficient SCR catalyst versus MEGR.

Volvo engines use SCR: a highly effective aftertreatment technology that eliminates NOx and soot while improving fuel efficiency and engine performance. On the other hand, Navistar's MEGR engines use large amounts of recycled exhaust, which creates soot and requires more fuel for soot removal using active regenerations.

NO-REGEN ENGINE

Volvo No-Regen engines excel at passive regeneration, which saves fuel on a daily basis, eliminating the need for active regeneration and the use of additional fuel to clean the DPF.

The heat used for the DPF regeneration causes the unit to expand and contract through the process. More thermal cycling associated with MEGR technology means more stress on the DPF that may lead to failures.

The Volvo No-Regen engines are superior to International's MEGR engines. Their engines require a daily cycle of active regeneration, reducing uptime.



VOLVO SWEET SPOT INDICATOR

VOLVO I-SHIFT TRANSMISSION

The Volvo I-Shift is a proprietary automated manual transmission (AMT), designed for a single purpose: to optimize the performance of a Volvo truck. The I-Shift is the only automated transmission exclusively designed to communicate with the Volvo engine platform, contributing to overall fuel efficiency.

International® does not offer a proprietary transmission, instead they offer the UltraShift® PLUS from Eaton. The drawback of non-proprietary automated transmissions is clear. Because it is a third-party transmission designed to interface with a variety of engine platforms, it is not optimized for any single engine family.

With a 2323 lb-ft (3150 Nm) torque rating, I-Shift has the highest torque capacity of any transmission sold in North America. It's a 12-speed AMT that is available in three models: direct and overdrive for Volvo D11/D13 engines, and overdrive for the Volvo D16 engine.

The Eaton UltraShift® PLUS is available in 10, 13 and 18 speeds and has a maximum capacity of only 2250 lb-ft torque.

When operating I-Shift with the Premium shifter and an upper level software package, the Economy and Performance modes are available through a pushbutton switch on the shifter. In Economy mode, the transmission operates to maximize fuel efficiency. In Performance mode, the transmission operates in a mode that maximizes engine power and gradeability. The transmission will automatically default back to Economy mode when maximum performance is no longer needed.

The automated transmissions used in the ProStar®+ have programmable settings that allow for either economy or performance operation characteristics, and can't go from one setting to the other without being modified by a service tool. These settings do not offer a "dual personality" as with I-Shift Economy and Performance Modes.

Another unique feature of the Volvo I-Shift is Eco-Roll, that returns the engine to idle when traveling down slight hills, adding fuel savings. The I-Shift delivers better fuel efficiency because of skip shifting (ability to shift through 12 gears in 5 steps). Integrated electronic controls and Eco-Roll add to the average driver's ability to improve overall fleet fuel economy.



VOLVO I-SHIFT TRANSMISSION

DRIVER PRODUCTIVITY

COMFORTABLE DRIVERS
ARE PRODUCTIVE DRIVERS.



VOLVO VNL 670

Volvo builds trucks that are comfortable to drive, comfortable to live in and easy to operate. The VNL 670 is roomy behind the wheel and in the sleeper area. It all comes together to make the driver's job a little easier, allowing them to be more productive every mile on the road.

THE VALUE OF A SATISFIED DRIVER

Not only can a VNL 670 make a driver productive on the road, Volvo's legendary comfort can help keep that driver satisfied in their job. That's important when the average large fleet faces an annual turnover rate of 69%¹ with training costs reaching \$7,000² for one new driver. If adding the Volvo VNL 670 to a fleet of 50 trucks just reduced those turnover numbers by half, it could yield a savings of over \$120,000 annually.

TURNOVER COST	
Fleet size	50
Reduced turnover ratio	34.5%
Number of drivers being trained, annually	17.25
Cost of training an employee	\$7,000
Total potential savings with Volvo	\$120,750

¹ ATA report April, 14, 2011 "Driver Turnover Rises"

² Analysis of Benefits and Costs of Roll Stability Control Systems for the Trucking Industry; US DOT, FMCSA, (2009)

COMFORT

The VNL 670 has 28" of space between the driver and passenger seats. Standing between the seats in line with the back of the seat, there is 7' 5" from the floor to the roof. At the front of the seat the dimension is 6' 8". This provides more than enough room for most to comfortably stand up and change clothes. The ProStar®+ limits interior roof height to just 4' 5" at the front of the seat, more than two feet less than the VNL 670.



VOLVO VNL 670

SOLAR-MANAGED WINDSHIELD

A solar-managed windshield provides expansive visibility with less glare. It also provides UV protection. The viewable area is 2,050 square inches, which is larger than the ProStar+ at 1,909 square inches.

ADVANCED CLIMATE SYSTEM

The VNL 670 driver environment features an available advanced climate control system that assures comfort regardless of the weather outside. The driver can set the control for a specific temperature and the system will maintain the temperature. Double-sealed doors keep out water and assist in maintaining the interior temperature without drafts. A filtered HVAC system circulates fresh air that's free of dust and other airborne particulates. The ProStar®+ is equipped with a blend-air system with blue-red system controls similar to economy cars without a temperature indicator.



VOLVO VNL 670



INTERNATIONAL® PROSTAR+

DOUBLE-SEALED DOORS

To keep things quiet in the driver's area, Volvo doors are double-sealed. The tight fit reduces wind and road noise at highway speeds. From frame to cab, the VNL 670's "durable comfort" design philosophy creates the best ride in the business.

INTERIOR SUNVISORS

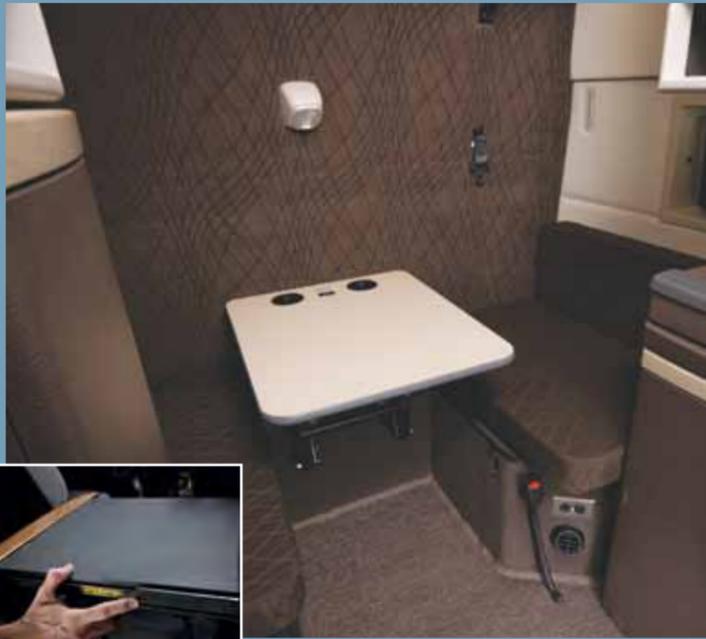
Volvo's sunvisor design completely covers the front of the windshield without gaps. The side sunvisor can slide into the position needed. The ProStar+ has a large gap in the center of the windshield when deployed. When moved to the side, it strikes the overhead compartment and does not include a simple clip to support the rear, allowing vibration and inadvertent movement.



VOLVO VNL 670



INTERNATIONAL® PROSTAR+



WORKSTATION

Sitting down to dinner and getting down to business are easy in the VNL 670. An oversized workstation provides a large functional surface that's ideal for paperwork, meals or relaxation. Recessed cup holders in the workstation keep drinks in place, even if the vehicle is in motion. The workstation lowers and the seat cushions form a lower bunk, if needed. The table locks in two locations to the back wall for security and stability. In addition, a small pull-out work surface is located in the driver side lower cabinet, similar to a small pull-out offered in the ProStar®+. The ProStar+ is not available with an oversized workstation. It is only available with the small pull-out surface. Releasing the ProStar+ pull-out table and sliding back in the store position creates a finger-pinch hazard.



VOLVO VNL 670

INTERNATIONAL® PROSTAR+

REFRIGERATOR

The Volvo VNL 670 offers an optional 1.6 cu.ft refrigerator/freezer with heavy-duty shelves that provide space for a gallon jug, plus door storage for a 2 liter bottle and more. The separate freezer section is large enough to hold several frozen dinners in addition to the included ice tray. The refrigerator/freezer is custom-designed to fit seamlessly into the VNL 670's cab, with doors that match the interior cabinets. The refrigerator/freezer is put through the same rigorous safety testing all interior options must complete.

The ProStar+ offers either a 1.6 cu.ft pullout-drawer-style refrigerator mounted under the bunk, or a 1.7 cu.ft model that mounts in a cabinet. Both are "off the shelf" models that were not specifically designed for the cab interior. This type of option can become a projectile during a crash.



VOLVO VNL 670

ROOF WINDOW AND TWO SIDE WINDOWS

The VNL 670 has upper roof skylight windows, as well as vented upper side windows to keep the sleeper bright and airy. Each is equipped with covers to block out light when needed. The ProStar®+ only has lower side windows that open to vent the sleeper compartment.



VOLVO VNL 670



VOLVO VNL 670



INTERNATIONAL® PROSTAR+

CAB INSULATION

Volvo offers premium insulation packages that lower noise levels throughout the cab, and improve thermal values for the sleeper compartment. The luggage compartment doors in the sleeper are also insulated for noise reduction. The ProStar+ does not insulate the luggage compartment doors.

STEERING COLUMN

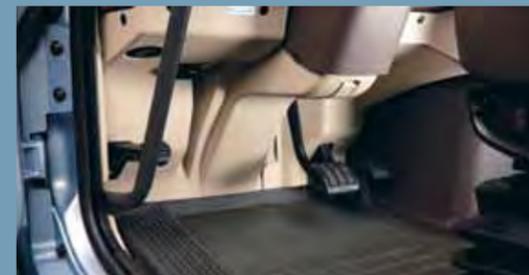
It's true that the VNL 670 fits a wide range of applications. It also fits a wide range of drivers. Once seated in the spacious cab, the driver can adjust the steering wheel position using a foot pedal while in a driving position. The wheel telescopes 4.5" and tilts 32 degrees, so there's always an optimum position for every driver. The steering wheel can be equipped with handy controls for radio, phone and lights, allowing the driver to perform these operations without taking their hands off the wheel or eyes off the road.



VOLVO VNL 670

PEDALS

The wide floor space of the VNL 670 provides generous room for the driver's feet. The cab has 25.5" wide foot space with a 9" x 5.5" foot rest for the driver's left foot. The pedals are suspended from a plate mounted on the cab's bulkhead. The operating angles and sweeps of the pedals have been tailored to provide the best feel and driver comfort. And since the pedals are suspended, there's no chance that dirt from the floor will get into the hinge point and cause them to bind or stick.



VOLVO VNL 670

In the ProStar[®]+, the accelerator pedal is positioned low and close to the firewall and doghouse. The International[®] foot space is only 23" wide, 10% less, with a 32% smaller (7.5" x 4.5") foot rest.

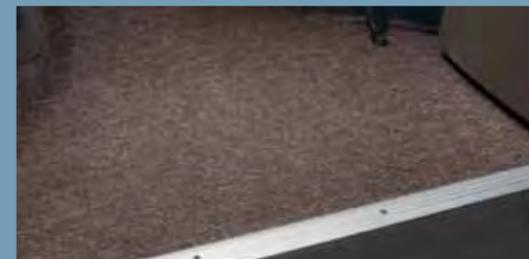
The VNL 670 is designed with valance panels below the dash that cover the steering column and provide a finishing touch to the bottom of the instrument panel.



INTERNATIONAL PROSTAR+

FLOOR COVERINGS

Volvo's VNL 670 cab comes standard with a thick, rubberized floor mat that provides excellent insulation and sound absorption properties. The sleeper area has a standard, insulated rubber rear floor covering as well as an optional, permanently attached carpet. These coverings provide additional insulation that keeps cab and sleeper temperature consistent, while keeping road noise out of the cab.



VOLVO VNL 670

The ProStar+ comes with a rubber front floor mat and rubber sleeper mat, and a carpet insert is available. The insert is not secured to the sleeper mat and does not stay in place. It has a "cheap" appearance and can become a trip hazard.



INTERNATIONAL PROSTAR+

EXTERNAL STORAGE

The VNL 670's spacious luggage compartment is 92% larger, almost twice the interior volume of the ProStar®+ compartment. It is designed for easy access from outside the vehicle, using a pull cord in the lower B-pillar location. The exterior door to the luggage area opens upward and can be positioned to provide a weather guard when accessing the compartment. The door opening on the VNL 670 is 25" wide x 16.5" high, with a driver side compartment that measures 36" wide x 16" high x 28" deep. The VNL 670 also offers an unobstructed, 9" wide x 16" high pass-through to allow storage of load locks inside the vehicle.



VOLVO VNL 670 DRIVER SIDE

The passenger side compartment on the VNL 670 houses the bunk climate unit, but still provides additional usable storage space. On the ProStar+, the passenger side compartment contains the bunk climate unit, leaving little room for storage.



VOLVO VNL 670 PASSENGER SIDE

The ProStar+ offers luggage storage similar to the VNL 670, but the space is smaller and accessing the storage compartment when standing outside the cab requires the use of a key. That means the driver has two inconvenient options: turn the truck off to access the compartment or carry a second key. The compartment opening on the ProStar+ is 25" wide x 15" high (9% smaller opening), with a driver side compartment that's 25" wide x 12" high x 28" deep, 48% smaller storage area. The opening is cluttered with an electric switch and lock latch, both of which can cause a problem if articles drag across them.



INTERNATIONAL PROSTAR+ DRIVER SIDE

The ProStar+ has a 14.5" wide x 12" high pass-through for load locks. But as you can see, the space is obstructed on the passenger side opening by the bunk lift support gas shock and bunk air supply tubing.



INTERNATIONAL PROSTAR+ PASSENGER SIDE



VOLVO VNL 670

EFFICIENCY

MANEUVERABILITY

The VNL 670's remarkable maneuverability is made possible by a combination of many factors. First, the vehicle has a 50-degree wheel cut - the tightest in the industry. It features a 52.2-inch set back axle position. Drivers are able to steer wheel stop to wheel stop in only two and a half rotations. Finally the wide, single-piece windshield offers optimum visibility while maneuvering.

Maneuverability is one reason Volvo is the choice of professional drivers. Year after year, more drivers choose Volvo trucks for the National Truck Drivers Championship than any other brand. During this challenging annual event, more 1st place prizes are awarded to Volvo drivers. It's proof Volvo delivers a competitive edge that drivers recognize and appreciate.

DRIVER DISPLAY

The Volvo instrument panel is equipped with a large, 2 1/4" x 3 3/4" driver information display that's quick and easy to read. Compare this to the ProStar®+ display at 1 1/8" x 3 1/8", which is less than half the size of the Volvo display.



VOLVO VNL 670



INTERNATIONAL® PROSTAR+



VOLVO VNL 670

MIRROR CONTROLS

Directional and heater mirror controls on the VNL 670 are mounted together in a single switch plate on the driver's door panel. The ProStar+ mounts the mirror directional switch on the door, but puts the mirror heat switch on the dash. This design requires drivers to take their eyes off the road when reaching for the switch. Common sense and convenience would suggest all mirror controls should be in one easy-to-reach location.



VOLVO VNL 670

HEATED WINDSHIELD AND DEFROSTER

The 670's windshield defroster uses four strategically placed outlets, plus two door outlets, to clear the windshield and side glass.

The VNL 670 is also available with a heated windshield option that quickly reduces snow and ice buildup on the bottom and sides.



VOLVO VNL 670



VOLVO VNL 670

International® ProStar®+ uses only two defroster outlets for the windshield and a very small dash mounted outlet to defrost the door glass.



INTERNATIONAL PROSTAR+



INTERNATIONAL PROSTAR+

INTERIOR DOOR HANDLES

The VNL 670's door handle is mounted on the top of the door panel next to the window, making access very easy regardless of seat position. The ProStar®+ interior door handle is positioned lower on the door, requiring the driver to reach down between the door and seat and blindly feel for the handle.



VOLVO VNL 670

CRUISE CONTROL AND ENGINE BRAKE STALK LOCATION

The cruise control stalk switch on the Volvo VNL 670 is conveniently located on the left side of the steering column while the engine brake controls and windshield wipers (as shown) are located on the right of the steering column. This design makes it easy for a driver to access either one without taking their eyes off the road, or hands off the steering wheel. The International® ProStar+ engine brake switch is located on the dash.



VOLVO VNL 670

CHASSIS FAIRING OPTIONS

Volvo was the first to introduce removable chassis fairings in 2002, making it easier to perform routine maintenance on the vehicle. Volvo is the only manufacturer offering removable chassis fairings so additional equipment can be mounted behind the fairing. The VNL 670's removable mid-mount fairings provide 25+ inches of frame space behind the fairing. Everything from the wheel

openings to the step pockets are designed to be as aerodynamic as possible. Maintaining a smooth surface for uninterrupted airflow around the chassis and providing accessibility is a crucial part of this fairing design. Removable sections make maintenance easier, without sacrificing aerodynamics. Encased steps make entering the cab safer.



VOLVO VNL 670



INTERNATIONAL® PROSTAR®+



VOLVO VNL 670

FUEL FILL LOCATION

Volvo positions the fuel tanks rearward, placing the fill neck in an unrestricted location behind the cab. This allows the driver to pull a fuel hose to the passenger side tank across the deck plate, eliminating turnarounds when fueling at single island stations. The fill neck is designed to be accessible without damaging or scratching the cab paint.

Volvo offers a range of fuel tank capacities, from a single 50-gallon tank to dual tanks holding up to 300 gallons of fuel. Rearward positioning also moves some of the fuel load to the rear axles and allows positioning of the fifth wheel to optimize trailer gap.



VOLVO VNL 670



INTERNATIONAL® PROSTAR®+

RIDE AND HANDLING

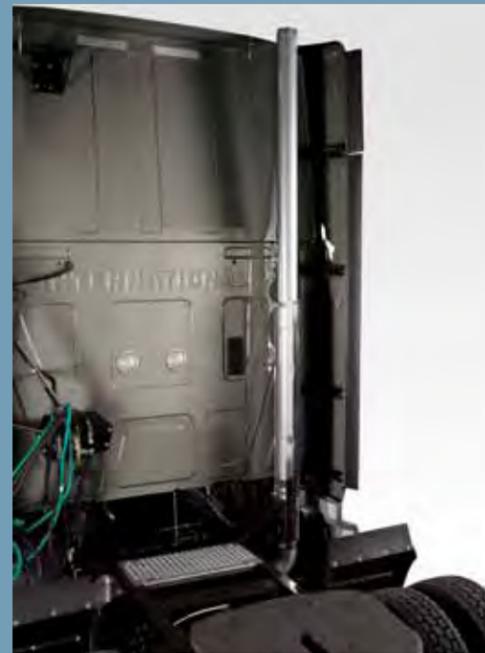
When you spec a truck, you won't find line items for "smooth ride" or "quiet cab", but those are qualities that today's top drivers want. Volvo leads the industry by designing and assembling quality vehicles that are legendary for delivering a comfortable and relaxing driver environment.

Drivers report that they don't feel as fatigued after a day behind the wheel of a VNL 670. Volvo's smooth, quiet ride begins with a frame that provides the rigidity needed for durability, but also responds to the motions of braking, steering and other maneuvers.

Volvo constructs its trucks to maintain optimum stiffness along major structural points such as frame crossmembers, rear suspension and front crossmembers. While some manufacturers stiffen specific areas like the front or the rear suspension support, Volvo employs a linear approach to frame stiffness that results in a better driving experience.



VOLVO VNL 670



INTERNATIONAL® PROSTAR+

VERTICAL EXHAUST

The VNL 670 vertical exhaust is attached to a frame-mounted vertical stanchion. Mounting is secured with a cross bar and rubber isolator, which helps keep engine and chassis vibrations from entering the cab.

The vertical exhaust on the ProStar®+ is hard-mounted to the chassis with a cast bracket. This bracket only supports the first 10 to 12 inches of the exhaust pipe. The rest of the pipe, as much as 12 to 13 feet, is subject to chassis vibrations and sway.

HOOD MOUNTING

The hood on the VNL 670 is held in place with two hood support brackets that are mounted to the chassis, not to the cab like other manufacturers. This way, the hood and cab can move independently without affecting each other, which



VOLVO VNL 670

helps eliminate interior noise and vibration. In addition, this mounting solution improves the life of the hood and cab by eliminating friction and hard contacts between these components. ProStar®+ mounts the hood directly to the cab.



INTERNATIONAL® PROSTAR+

CAB MOUNTING

Cab mounting on the VNL 670 is accomplished with large rubber bushings at the front to support the weight of the cab. This reduces noise and



VOLVO VNL 670

maintains correct cab alignment. The bushings are independent of the rear cab suspension, which provides lateral support for the cab.



INTERNATIONAL PROSTAR+

CAB SUSPENSION

Airbags, lateral dampeners and a panhard rod provide comfort inside the cab. The dual airbags are mounted outside the frame for a firm foundation. Lateral stability is maintained using the panhard rod and the angled dampeners. All the suspension components are rubber bushed to eliminate noise and high level vibrations from entering the cab.



VOLVO VNL 670

The ProStar+ uses a McPherson Strut that's outboard mounted to the frame rail. The components of Volvo's cab suspension system can be replaced individually at a lower cost than the all-in-one ProStar+ McPherson Strut design.



INTERNATIONAL PROSTAR+

I-SHIFT VS. ULTRASHIFT® PLUS

FULL OEM INTEGRATION

The Volvo I-Shift transmission has been fully designed and engineered by the same team that designed Volvo engines. They are uniquely configured to work together, using the same protocols and sharing engineering concepts. As a result, under various conditions, the I-Shift transmission maximizes performance and fuel efficiency by controlling the engine.

The I-Shift transmission also makes sure the transmission is in neutral, regardless of the shifter position, before allowing the engine to shut down. This ensures the transmission will never get stuck in gear. To protect the clutch release bearing, the I-Shift will automatically shift to neutral if left in gear with the parking brake applied for four minutes.

I-SHIFT LOAD AND GRADE SENSOR

The Volvo I-Shift has always featured a grade sensor and load sensor. The grade sensor allows the transmission to detect the vehicle's current incline and road pitch, altering gearshifts accordingly. The load sensor allows the transmission to calculate the vehicle GCW and adapt gearshifts based on actual weights. Utilizing the grade and load sensors, the transmission is also able to calculate when to skip shift gears. UltraShift PLUS, featured in the ProStar®+ has only recently added these sensors.

Only I-Shift, with 12 speeds, can reach top gear in Economy mode with just five upshifts. It achieves this with smaller steps (28% average) between gears compared to an average of 37% steps between the UltraShift PLUS 10-speed gears.

LOW SPEED OPERATION - IDLE DRIVING MODE

Volvo I-Shift utilizes an Idle Driving mode that is engaged when the driver takes his foot off the accelerator and allows the vehicle to idle along. The transmission automatically selects the gear that best suits the speed, letting the driver pay more attention to their surroundings. This feature also works great in reverse.

UltraShift PLUS uses a creep mode to allow the vehicle to operate at low speeds. The transmission will not shift to a higher gear.

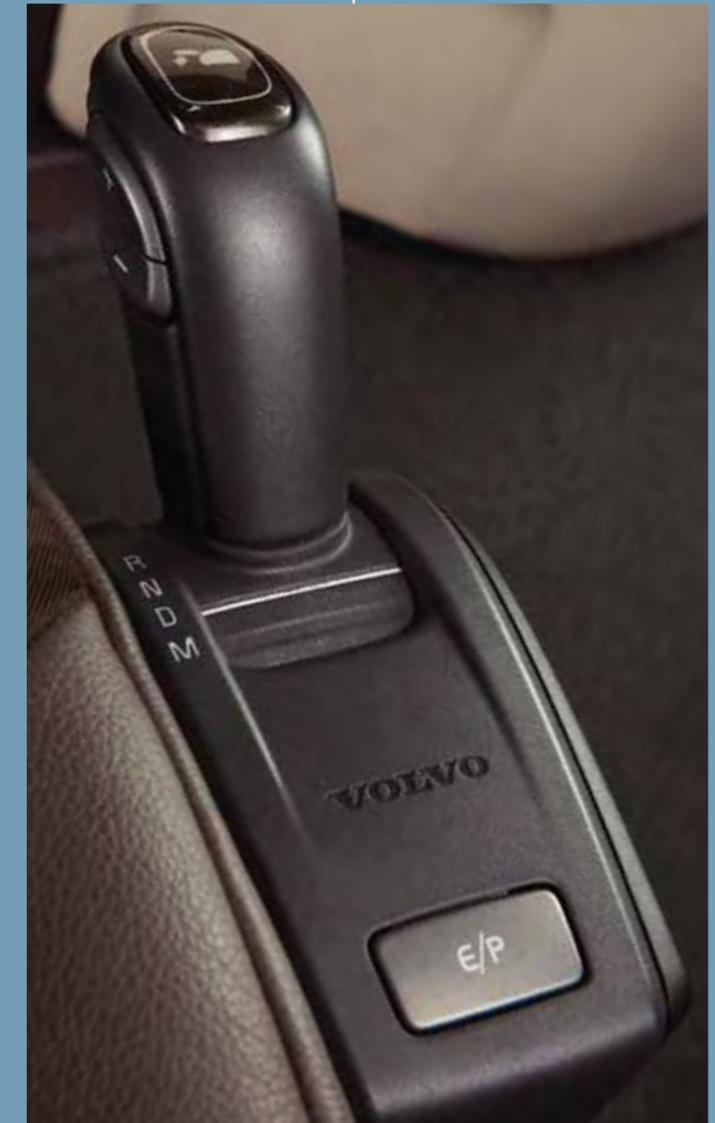
HILL STARTING ASSISTANCE

The Volvo I-Shift has featured Hill Start Assist since its introduction. Hill Start Assist holds the vehicle on a hill by applying the service brakes (in forward or reverse), allowing the driver three seconds to move his foot from the brake to the accelerator. This is a safety feature that keeps the vehicle from rolling backwards or forwards, and also saves wear on the drivetrain. UltraShift® PLUS only recently added Hill Start Aid to offer similar functionality.

ELECTRONIC CLUTCH ACTUATION

The VNL 670 I-Shift transmission features a lightweight and maintenance-free clutch actuator. This pneumatic device is controlled electronically by the I-Shift and combines the functions of clutch actuator, release fork, clutch bearing, transmission quill and various bushings/pivot points into one integrated unit. This helps eliminate wear points as well as resulting inaccuracies of operation. No hydraulics are involved, and the concentric in-bell housing design eliminates the undercarriage ground clearance restrictions of "catapult fork-type" setups.

The UltraShift PLUS transmission has a high amperage electronic clutch actuator (ECA), which replaces the standard clutch pedal, requiring a 50 amp direct to battery power connection. The ECA mounts to the bottom of the clutch housing and opens the clutch when shifting. UltraShift PLUS uses a creep mode to allow the vehicle to operate at low speeds.



VOLVO VNL 670

SAFETY

SETTING STANDARDS FOR THE INDUSTRY.



VOLVO VNL 670

VOLVO SAFETY FEATURES CAN SAVE MORE THAN \$100,000 A YEAR BY MITIGATING JUST 20% OF CRASH POTENTIALS.

Safety is difficult to equate until you talk with fleets that have experienced even a minor crash. Industry statistics indicate a customer will experience 2.2 crashes per million miles traveled at an average cost of \$172,292² per crash.

Fifty trucks traveling 125,000 miles per year would travel 6,250,000 miles a year. The average number of crashes for the same time frame could cost more than \$2,300,000 a year based on those statistics.

If this fleet can mitigate 20% of non injury, 5% injury, and 2% fatality crashes, it could save a total of \$100,419.46 or \$2,008 per truck, per year.

	Crashes ¹ per 6.25 Million Miles	Cost per Crash ²	Total Cost	Mitigation Percent	Mitigated Cost
Non-injury Crashes	10.66	\$12,248	\$130,563.68	20 %	\$26,112.74
Injury Crashes	3.07	\$334,892	\$1,028,118.44	5 %	\$51,405.92
Fatality Crashes	0.15	\$7,633,600	\$1,145,040.00	2 %	\$22,900.80
TOTALS			\$2,303,722.12		\$100,419.46

¹ FMCSA – Large Truck and Bus Crash Facts 2009: Early Release (Oct. 2010)

² Current FMCSA Crash Cost Figures (Dec. 2008)

ACTIVE SAFETY

A core priority at Volvo is to provide designs that not only address ACTIVE safety – those safety features that help AVOID a crash – but also PASSIVE safety, those features that PROTECT the occupants in a crash.

VOLVO ENHANCED STABILITY TECHNOLOGY

One of the most visible examples of Volvo's leadership in active safety is VEST, or Volvo Enhanced Stability Technology. This system mitigates many jackknifes and rollovers through advanced sensing of multiple vehicle parameters and conditions, and automatically selectively applies tractor and trailer brakes to control the vehicle before an incident occurs. Volvo leads the industry in stability technology development for class 8 trucks and is the only manufacturer in North America to make it standard. Volvo has delivered more than 50,000 trucks with the technology, which accounts for more than half of all of the class 8 trucks equipped with stability technology.

VOLVO ENHANCED CRUISE

The VNL 670 features the proprietary Volvo Enhanced Cruise (VEC), a system that works with the truck's cruise control to maintain a safe following distance between vehicles. VEC also has the capability to automatically slow the truck with the engine and foundation brakes to maintain a set following distance, while at the same time alerting the driver to potential danger. Using a radar sensor mounted in the front bumper, VEC monitors vehicles moving in the same direction as the truck. It can detect up to 32 objects within approximately 500 feet in front of the truck.

Proactive braking means the truck will slow down without driver intervention when necessary. If the vehicle in front slows down below the truck's cruise control set speed, VEC will sequentially reduce throttle to the engine, apply the engine brake and apply the foundation brakes to try to maintain the set following distance. The system applies about one-third of the foundation brake's capacity, meaning the driver always has full braking capability if needed.

If the vehicle in front speeds up and moves away, VEC will automatically increase vehicle speed to the cruise control set speed. VEC automatically intervenes only if the cruise control is on and the speed is set by the driver. VEC also warns drivers if the truck is too close to vehicles ahead. A beeping alert warns drivers if they are closing the distance. An uninterrupted modulating tone warns drivers to immediately apply the brakes or take evasive action if the distance is too short and closing speed is too high for VEC to maintain safe following distance, for example when another vehicle cuts in front of the truck or slows too sharply.



VOLVO ENHANCED CRUISE RADAR SENSOR

FEWER DISTRACTIONS

Another important active safety feature is Volvo's I-Shift automated transmission. With automated shifting, drivers can keep their eyes on the road and both hands on the steering wheel. There's no distraction of trying to find the right gear. Drivers are less fatigued and more alert, which helps reduce accident rates and lower operating costs. And thanks to the two-pedal system, I-Shift makes it easier to train new drivers and retain older, more experienced drivers.



VOLVO VNL 670

CAB INGRESS AND EGRESS

Volvo believes that safety should start even before you're seated behind the wheel. That's why the 670's door is 36.5" wide 51.5" high, and opens with two distinct detent positions. The door opening includes full-length left and right-hand grab handles mounted inside the cab and out of the weather.

The door on the VNL 670 opens 70° vs. 55° on the ProStar®+. That provides a 49" door opening, while the ProStar+ has only a 39.5" door opening, restricting entrance to the cab.

The VNL 670's self-cleaning, anti-slip steps are designed for safety, too. The first step is approximately 18" from the ground; the second is 18" from the first, and the final step into the cab is another 14". The steps are arranged in a staircase that moves progressively closer to the cab, assuring that each step is fully visible. This configuration, in combination with the full-length grab handles, ensures three contact points when entering and leaving the cab.

The ProStar+ has just a single cab-mounted handle on the B-pillar. A single B-pillar handle requires the driver to enter the truck by grabbing the door with the left hand before stepping up, and then relocating the left hand from the door to the steering wheel. This can be a long reach and the door can move, making it difficult to maintain a safe, three-point contact when entering, and especially leaving the truck.



VOLVO VNL 670



INTERNATIONAL® PROSTAR+

INTERIOR SUNVISORS

The VNL 670 provides superior sun and glare control when compared to the ProStar®+. Volvo uses a patented off-set sunvisor system that completely covers the top of the windshield. The driver's side is protected by an independent sliding visor; the combination gives complete coverage in the front and driver's side. On the VNL 670, all ends are secured. The ProStar+ sunvisors allow a center windshield gap. While pivoting the side visor from the front, the visor strikes the storage area above the driver and has no anchor clip on the driver side for support.



VOLVO VNL 670



INTERNATIONAL® PROSTAR+

HOOD-MOUNTED MIRROR

The VNL 670's redesigned, hood-mounted mirrors are rectangular in shape and mounted forward on the hood. The position and design provides the driver with a much better left-to-right image than the industry's typical 10" round mirror.



VOLVO VNL 670

BACK-OF-CAB ACCESS

On many trucks, accessing the back-of-cab can be a tricky path and a tight squeeze, especially with chassis fairings in place. Not on a Volvo. With a VNL 670, you'll have safe and easy back-of-cab access, even with full chassis fairings. There's plenty of room to maneuver, and self-cleaning, anti-slip steps and continuous deck plates provide safe footing.



VOLVO VNL 670

STEPS

The VNL 670 with full chassis fairings has conveniently placed steps and grab handles on both sides of the vehicle to allow safe, easy, back-of-cab access. The International® ProStar®+ offers back-of-cab access via a ladder attached to the frame. This is the case with or without full chassis fairings. If a full chassis fairing is optioned on the ProStar+, a hinge-mounted fairing opens and closes to allow access to the steps.

Depending on the ProStar's wheelbase, there is little room for the driver to fit between the fairing and wheel to reach the access steps. The steps are assembled with bolt heads on the top of the step, creating a trip hazard.



VOLVO VNL 670



INTERNATIONAL PROSTAR+

IN-SET WHEEL

The front wheels on a Volvo truck are set inside the fender edge to contain road splash. Because the wheels are located inside the fender, a Volvo truck typically has far less road splash at the front axle than competitors' trucks.



VOLVO VNL 670



INTERNATIONAL PROSTAR+

SPLASH SHIELDS

Road splash on a Volvo truck is further contained through splash shields. They cover the interior of the wheel openings. Their design also helps improve aerodynamics by limiting drag from air coming from the engine compartment.



VOLVO VNL 670



INTERNATIONAL® PROSTAR®+

DECK PLATE

The Volvo VNL 670 provides a continuous deck from fairing to fairing—mounted flush and level all the way across—for safe access to trailer connections.



VOLVO VNL 670



INTERNATIONAL PROSTAR+

PASSIVE SAFETY

At Volvo Trucks, safety isn't an option. It's standard. In fact, safety is one of our core values. We've been recognized as the industry's leading safety innovator for more than 85 years. And our competitors repeatedly benchmark our vehicles as the standard in commercial vehicle safety.

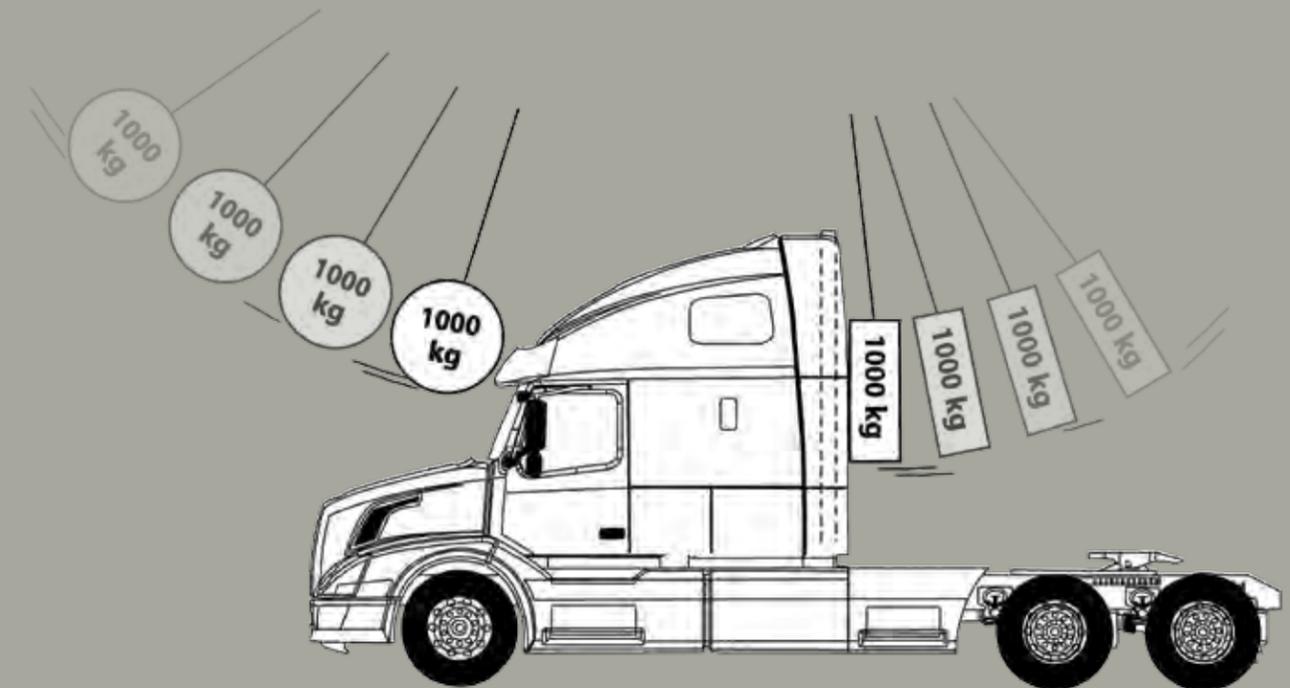
Maintaining a safe and risk-free fleet is essential to operating a successful transportation business. That's why Volvo uses High Strength Steel in our cabs. It's why we always meet and exceed the world's toughest impact tests. It's what makes the VNL 670 one of the safest trucks on the road.

IMPACT STANDARDS

The VNL 670's rugged design is a direct result of our extensive program of crash testing. In fact, the VNL 670 meets and exceeds the grueling standards of the Swedish Cab Impact Test—the toughest test in the world that simulates a collision. This tests the cab's front corner to simulate a rollover, the rear of the cab to simulate the payload impact, and the roof of the cab to simulate the vehicle coming to rest on its roof. Doors should not open during the test, but must be able to be opened after the test.

Our crash test standards also include Volvo's 30-mph Offset Barrier Test, designed to replicate running into the back of a stopped trailer, with impact occurring above the frame rails. In this test, most of the energy is absorbed by the cooling package, engine, and cab. If the VNL 670 is in a frontal impact, the engine and transmission are designed to break free from their mounts and drop down below the cab floor—protecting the driver space along the cab floor and helping to prevent entrapment of the driver's feet.

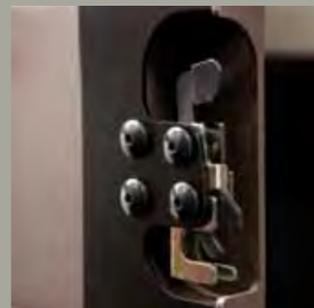
International® has never published statements indicating that the ProStar®+ has met the standards of the Swedish Cab Impact Test or used an Offset Barrier Test to protect the driver. In addition, while an effective SRS driver's airbag is standard on the Volvo, an airbag is not available on the ProStar+.



HIGH STRENGTH STEEL CAB

The VNL 670 is a truck that's built for protection. Volvo is the only truck manufacturer with an integral cab and sleeper constructed exclusively of High Strength Steel (HSS), including the sleeper compartment. High Strength Steel has the highest strength-to-weight ratio in the industry, which allows us to build a stronger cab while reducing weight. The VNL 670 also uses double-sided galvanized steel that's welded for greater durability and corrosion protection.

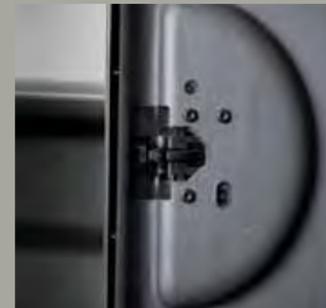
The VNL 670 offers a system of safety measures that work together to protect the driver in a collision. A driver-side airbag is standard in every Volvo truck. The engine mounts are designed to release during a frontal impact, pushing the engine and transmission down under the chassis rather than into the cab. And during an accident the energy-absorbing steering column collapses away from the driver.



VOLVO VNL 670



VOLVO VNL 670



INTERNATIONAL PROSTAR+

The VNL 670's cabinet doors are designed to remain closed during a crash, reducing the potential for flying objects in the cab. Although they can be pushed closed, they use a latching system that completely surrounds the closing pin and are only released when the handle is completely activated.



VOLVO'S HIGH STRENGTH STEEL CAB

DASH AND INSTRUMENT PANEL

The VNL 670 has a wrap-around instrument panel that's engineered for functionality and safety. Switches are rounded—rather than squared and sharp—and designed to release into the dash when impacted during a crash.

The VNL 670's ignition key is located on the steering column, away from potential impact locations that could cause knee injury. The ProStar[®]+ key is located at the bottom right side of the lower panel, with a steering column adjustment lever on the left side. Both locations may be hazardous during a crash.



VOLVO VNL 670



INTERNATIONAL[®] PROSTAR⁺

The lower instrument panel is built to catch the driver's knees and release energy slowly, reducing the likelihood of injury in a crash. Upon impact, the VNL 670's steering wheel absorbs energy regardless of the spoke rotation, and the steering column moves forward to reduce injury to the driver.



VOLVO VNL 670



INTERNATIONAL[®] PROSTAR⁺



INTERNATIONAL PROSTAR⁺

UPTIME

ENGINEERED FOR DEPENDABILITY.



VOLVO VNL 670

If a truck's not up and running, it's not making money. That's why Volvo designs its trucks to be dependable and easy to maintain. Volvo backs that up with industry leading service packages and warranties.

COST OF OPERATION

We want to keep customer costs to a minimum. That's why we're standard with a three-piece bumper, so you can replace just a section instead of the entire bumper. Removal is quick with the four bolt, self-aligning configuration that maintains the factory alignment during replacement or service access.

The complex ProStar[®]+ bumper provides a tilting bumper feature that consists of many subcomponents which are expensive to replace.

EASY MAINTENANCE

Access is everything, so the VNL 670 hood opens 60 degrees, allowing entry to service checkpoints, including easy radiator removal. The hood release is actually on the steering column, not the hood itself, ensuring only authorized personnel have access. Both the engine cover and the chassis fairings are easily removable, so you can quickly get to the areas you need. You can get to the windshield wiper motor, too.

The VNL 670 offers a number of time-saving features like an easily replaceable windshield. There's no need for a new windshield to spend hours "curing" before it's ready for the road. And break away mirror arms mean that you'll be replacing just a mirror and not an entire door.



VOLVO VNL 670



INTERNATIONAL® PROSTAR+

WINDSHIELD

The windshield on the VNL 670 has the advantage of being "roped-in." During the installation process the rubber seal is placed in the windshield opening, and the windshield glass is placed within the rubber seal. Once a special retaining cord ("rope") is removed, the rubber seals tightly to the windshield.

This design allows the windshield to "float" within the mounting and avoid stress from the cab. Other truck manufacturers glue the windshield in place, and the seal becomes vulnerable to cab flexing.

Roped-in installation assures that the windshield does not affect cab strength, which is an important point for cab safety. Just as important, the VNL 670's windshield can be kicked out and used as an escape route.

A roped-in windshield is ready to go back to work immediately, while glued windshields require a few hours to "set" during replacement. Even independent window replacement companies demand the vehicle set for an extended time or the warranty against leaks is void.

The ProStar®+ uses a glued-in windshield with encapsulated glass (trim bonded onto the glass) and a higher replacement cost.



VOLVO VNL 670



INTERNATIONAL PROSTAR+

COWL AIR INTAKE

The VNL 670's hood has two vertical side air inlets, with patented air/water separators and an integral air plenum that feeds the cowl-mounted air cleaner. The air cleaner is mounted under-hood and out of the air stream. The vertical air intakes prevent dirt or other debris from building up and entering the air cleaner or engine.

ProStar®+ uses a cowl air intake that's positioned at the base of the windshield where snow and debris build up.



VOLVO VNL 670



INTERNATIONAL® PROSTAR+

BUMPER TOOLING

The VNL 670 is designed with a tooled lip at the gap between the bumper and the hood front. This improves airflow control and provides a finished look. ProStar+ uses a compressed rubber piece that may wear and split with time.



VOLVO VNL 670



INTERNATIONAL PROSTAR+

CORROSION PROTECTION

Volvo takes extra steps to assure chassis and cab durability. Volvo VN trucks feature the industry's only pre-treatment process for frame rail surfaces. This powder coating process improves frame rail paint durability and resists peeling and rusting. The cab is built using two-sided galvanized high strength steel. The bolts on Volvo trucks have a special coating to inhibit rust. This pre-treatment coating process is added to all hardware and is environmentally safe.

FRAME RAIL HANDLING PROCESS

The enhanced process reduces the number of imperfections caused by material handling. At Volvo's manufacturing facility, the conveyor system uses belts instead of chains to move the rails through the process. Once the rails are processed, they're bundled by plastic straps—not metal—for transport to Volvo's chassis assembly facility. Volvo's careful attention to handling also eliminates possible stress points that could result in weakness over time.



VOLVO VNL 670

FRAME RAIL PRE-TREATMENT PROCESS

The entire pre-treatment process was reviewed and revised with the goal of delivering the highest quality corrosion protection frame rails. As a result, Volvo implemented a six-step process that takes place before the frame rails are ever painted.

ENVIRONMENTAL IMPACT

Volvo's powder coating surface treatment is better for the environment because it reduces the need to repaint the frame rails over the vehicle's lifetime. In addition, the powder is 100% recyclable, and the coating process yields zero emissions. All of the powder is contained in the process and is applied to the rails.



VOLVO VNL 670

FRAME FASTENERS AND BRACKETS

Brackets, fasteners and components mounted to the frame have a protective primer coating, inhibiting rust and extending the component service life. The fasteners and brackets are pre-treated, prior to chassis paint.



VOLVO VNL 670

CAB CORROSION PROTECTION

Panels are two-sided, galvanized and robotic welded for consistency and improved integrity. Before each coat goes on, Volvo takes each cab through an extensive nine-step surface preparation, including seven cleaning immersion stations. Then, the entire cab is immersed in chrome-free/lead-free e-coat primer, providing a micro-smooth surface for the robotically applied water-borne primer. Next, a Dupont Imron® Elite basecoat/clearcoat, known for its glamour and durability, is applied.

CORROSION WARRANTY

The standard frame rail and cross member warranty is six years, 750,000 miles or 15,000 operating hours. The standard cab structure and corrosion is five year, 500,000 miles or 12,500 operating hours. These are included with the purchase of a Volvo truck, not an extended warranty.

International® offers five years of coverage for frame side rails, cab structure and cab perforation/corrosion.

ENGINE INSTALLATION

Navistar is the only manufacturer to use the Massive EGR solution. Because of their design, International MaxxForce® engines are more difficult to cool than Volvo engines. That's why the International® ProStar®+ has a cooling package that's big, more complex, and requires more maintenance.

ProStar+ has moved the engine 9" farther back in the chassis. This is done to accommodate the additional radiators, coolers and air flow needed to address the heat rejection from the Massive EGR engine.

ACCESSIBILITY

Since the MaxxForce engine has been pushed back under the cab to solve cooling issues, the ProStar+ cab has also been moved back approximately 4". The majority of the International engine is beneath the cab while the majority of the Volvo engine is accessible under the hood.

The MaxxForce engine has been pushed so far back that a rear sump oil pan is required, instead of a front sump oil pan. The sump of the MaxxForce engine is behind the front axle even though the ProStar+ features a setback axle, while the sump on the Volvo is ahead of the VNL front axle, and therefore the engine is much easier to service. Most work on a ProStar+ engine must be done from the inside the cab, requiring the engine access cover to be removed frequently. That adds time and labor costs, and could result in poor quality work due to tight quarters.



VOLVO VNL 670



INTERNATIONAL PROSTAR+

UPGRADEABILITY ALLOWED

I-Shift transmissions work with each Volvo engine inside a displacement family. For example, a D13 engine can be ordered with a 405 hp, 1450 lb-ft torque rating. Upon resale, the engine can be safely upgraded all the way to a 500 hp, 1750 lb-ft rating for higher residual values, without the need to upgrade the clutch or transmission.

The UltraShift® PLUS transmission does not have this upgradeability feature.

CLUTCH

I-Shift uses a 17" single plate, push-type organic faced clutch. The spring-cushioned organic friction facings ensure the smoothest possible clutch engagement. The combination of non-aggressive facings and I-Shift's ability to minimize heat during clutch engagement results in excellent clutch life, and helps reduce flywheel wear.

UltraShift® PLUS utilizes an Eaton 15.5" twin plate, pull-type, ceramic faced self-adjusting clutch.

DURABILITY COMPARISON

Note that the MaxxForce® crankshaft is 15% shorter than the Volvo crankshaft. The MaxxForce 13 is a 12.4-liter engine developed from the MaxxForce 11, a 10.5-liter engine. The Volvo D13 is a 12.8-liter engine developed from the D12, a 12.1-liter engine.

This means the MaxxForce 13 is a much smaller engine than the Volvo D13. Lighter yes, but smaller and less robust, with 37% less connecting rod bearing area. Is a crankshaft designed for a 10.5-liter engine sufficient for a 470 hp engine? Time will tell.

Since the MaxxForce 13 (12.4 L) shares the same engine block and design as the MaxxForce 11 (10.5 L) it has a slight weight advantage over the more robust Volvo D13 (12.8 L). However, ProStar®+ has an additional three low temperature radiators in an attempt to cool the advanced EGR solution that must be considered. There is also an interstage water-to-air cooler between the two turbos, and a larger DPF to accommodate the additional soot produced by the engine. This additional cooling and emission equipment adds weight to the chassis that International® does not mention in their brochures.



EXHAUST MOUNTING

Volvo mounts the DPF and SCR outside of the frame using u-bolt clamps on all the exhaust pipe routing. This allows for easy replacement of the pipe if damaged and replacement is required.

International® mounts their DPF under the frame within three to four inches of the driveline expansion joint, prop shaft plastic extension boot and u-joint. The transient heat from the DPF could possibly reduce the useful life of the driveline. Plus, grease from the driveline can burn and smoke on the DPF. In addition, the International DPF is supported by two bolts that are cantilevered to support its entire weight. These bolts could cause premature stresses in the frame.

Exhaust piping on the International is supported by metal hangers welded to the pipe. In the event the pipe or the hanger fails, the entire pipe will need to be replaced. And if the weld creates a leak in the exhaust prior to the DPF, those exhaust emissions count against the total emissions of the vehicle.



WARRANTY AND PURCHASED COVERAGES

At Volvo, we know our customers' business depends on maximum uptime and productivity. In addition, today's customers want to understand the total operating costs of their equipment, particularly in the first few years of a new vehicle purchase. Warranty coverage is an important factor in purchasing a new vehicle. Customers that purchase new vehicles want to avoid out-of-pocket expenses for repairs in this operating period. That's why Volvo offers a wide variety of warranty options for end users, covering more components than International®.

Volvo offers six different engine extended coverage plans with a palette of time intervals and mileage accumulations. The Volvo Blue provides limited coverage, the Platinum Plus package offers full coverage with a deductible base coverage in the third year, and the Gold package offers full coverage. In addition, Volvo offers three Value Plus Plans to provide coverage similar to our competitor's offerings.

Warranty coverage begins with a basic vehicle warranty that is 1 year or 100,000 miles for both Volvo and International. The basic engine coverage is 2 years. However, extended engine coverage is based on individual components and Volvo covers more. Volvo covers more individual base engine components as depicted in the graph to the right.

Volvo also offers more coverage options for the Waterpump, Turbocharger and Fuel Injectors. Platinum Plus, Gold and Value Plus cover all three components. Value Plus 2 covers both the Waterpump and the Turbocharger. International offers only two options with coverage for these components.

ENGINE COMPONENT WARRANTY									
Component(s)	Volvo Engine Offerings						International		
	Blue*	Platinum Plus**	Gold**	Value Plus 1**	Value Plus 2***	Value Plus 3	MF 11/13 Comprehensive**	MF 11/13 Limited	MF 11/13 Combination**
Electronic unit injector									
o-rings, retainer and retainer screws, sleeve									
Engine heat shields									
Block heater and exhaust manifold, gaskets, rings, studs and wraps, flexplate									
Fuel filter housing									
Power steering pump									
Fuel pressure regulator valve									
PTO drive housing /REPTO									
Hoses, tubes and lines - supplied with engine, oil fill tube and cap, oil pressure valve relief assembly, engine breather tube, oil pump pickup tubes and distribution tubes, nozzle holder inserts, belt tensioners and idler and oil pan gasket and plug									
EGR Piping and EGR system wire harness									
Air compressor sprocket and mounting bolts									
Air compressor									
Injector sleeves									
Water filter base, thermostat, thermostat side cover, coolant duct cover									
Vibration damper									
Brake housing, bushings, rocker levers, roller pin, roller, crosshead pin, crosshead, including mounting hardware and gaskets									
Gear cover									
Lube pump assembly									
Connecting rod assembly									
Oil pan									
Lube oil cooler assembly									
Piston, rings and liners									
ECM									
Rocker lever assembly									
EGR cooler, EGR valve, EGR mixer									

*Waterpump included in warranty coverage. | **Waterpump, turbo and fuel Injectors included in warranty coverage. | ***Waterpump and turbo included in warranty coverage.

Volvo covers all major engine components while International® offers no coverage options for the Ladder Frame, Flywheel Housing, Thermostat Housing, Oil Pump Drive, Timing Gear and Mounting Plate, Rocker Lever and Exhaust Manifold Casting.

WHEN YOU STOP, WE START.

WE BELIEVE CUSTOMERS COME FIRST. IT'S OUR OPERATING PHILOSOPHY. THAT'S WHY WE DO EVERYTHING WE CAN TO GET YOU BACK ON THE ROAD AS QUICKLY AS POSSIBLE.

Volvo Action Service is ready for your call, 24 hours a day, 365 days a year, in English, Spanish or French. Volvo Action Service provides support for all class 8 tractors and trailers. We have an established vendor network for towing, road service and tires, so you'll always receive fair market rates in all areas of the country.

Volvo's 10-Point Service Commitment was developed using our Customer Council telling us exactly what they want and expect when it comes to a service experience. All Volvo dealer locations are measured on how they perform relative to the Commitment as follows:

1. Customers must have service available to them on a 24/7 basis.
2. Customers must be able to schedule a service appointment.
3. Customers must find knowledgeable service advisors/managers at all Volvo dealers.
4. Customers must have their problem diagnosed within 2 hours.
5. Customers must find that parts are available when and where they need them.
6. Customers must be updated/communicated with during the repair process.
7. Customers must be notified promptly of completed repairs.
8. Customer repairs must be finished when promised.
9. Customer problems must be resolved correctly the first time.
10. Customers must have assistance in understanding warranty coverage and resolving warranty questions.

VOLVO ACTION SERVICE

Volvo Action Service is 24/7/365 road assistance! Volvo Action Service is always available to assist drivers anywhere in Canada and the United States. Volvo Action Service's well-trained staff has access to engineering and service specialists because of their proximity in the headquarters. They will manage the incident from the first call through truck return for expedited service. The quicker the truck is back on the road, the lower the out-of-service cost.

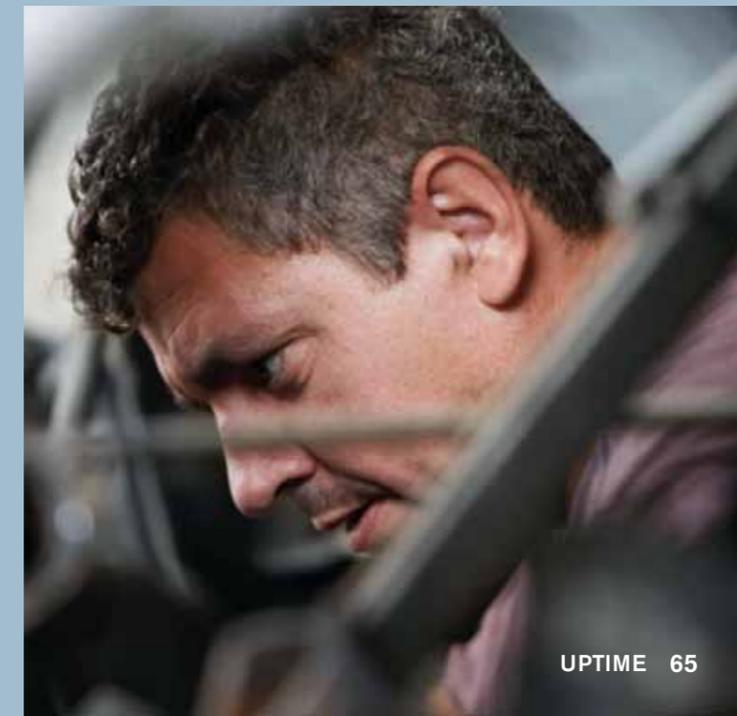
Volvo Action Service coordinates with reliable service providers to ensure customer trucks are serviced quickly and correctly. Service providers within the network are graded, and only the best are used. Warranty is handled directly, independent of the provider, and is transparent to the customer. No re-filing with a home dealer is needed.

Advantages

- Warranty administrator in-house
- Full time trainer in-house
- Invoice auditing and vendor disputes
- Large vendor network across North America (13,000+)
- 1,500+ preferred vendors with contracts on file
- Ability to track cases with MVASIST
- Ability to manage repairs for all Class 8 equipment

MVASIST

MVASIST is a web-based communication tool that allows the customer to schedule and track service quotes, repairs, parts orders, and just about any other product support activity with their local dealer. The communications, instructions, and requests can be handled efficiently without dialing a phone, waiting for a call, or waiting on hold. MVASIST connects the customer, dealer, and Volvo support personnel when needed to save time and expense. Volvo Action Service is also connected to MVASIST. MVASIST includes a tracking system by VIN to assist in fleet management.



MORE OPTIONS, BETTER SOLUTIONS

Model	VNL 670	International® ProStar®+
BBC	122.4" daycab	122" daycab
Front Axle Position	52.2"; set-back axle	50.2"; set-back axle
Cab Version	61" High-roof Sleeper; Long hood	73" SkyRise sleeper cab
EPA SmartWay	Certifiable	Certifiable
Engines	Volvo D13; 375 to 500 HP; 1450 to 1750 lb-ft of torque Volvo D16; 500 to 550 HP; 1850 lb-ft of torque Cummins ISX15; 400 to 550 HP; 1450 to 1850 lb-ft of torque	MaxxForce 13; 410 to 475 HP; 1450 to 1700 lb-ft of torque
Transmissions	Volvo AT and ATO I-Shift; 12 Speed Eaton® Fuller® FR, FRO, RTO, RTLO 9, 10, 11, 13, 15 and 18 speed; Manual, AutoShift®, UltraShift® and UltraShift® PLUS	Eaton® Fuller® FR, FRO, RTO, RTLO 9, 10, 13, 15 and 18 speed; Manual, UltraShift® and UltraShift® PLUS
Front Axles	Volvo VF12 and VF14 Dana Spicer E-12021 and E-13221 Meritor® FF941, FF943, FF944, FF945, FF961, FF965, and FF967 Easy Steer™ Hendrickson STEERTEK®	Hendrickson STEERTEK® Dana Spicer; E-12021I, E1202W, E1462I Meritor
Front Suspensions	Parabolic leaf spring; 12,500, 13,200 and 14,600 lb Hendrickson AIRTEK®; 12,500, 13,200 and 14,600 lb	MaxxPower air suspension Parabolic leaf spring; 12,000, 12,350, 13,200 and 14,000 lb Hendrickson SOFTEK®; 12,000 12,350, 13,200 and 14,000 lb
Rear Axles	Meritor RS21 and 23 Meritor RT40, RT46 and MT40; hypoid-generoid and amboid gearing; interaxle and full diff lock Dana Spicer S23 Dana Spicer DS404, DS405, DST40 and DST41	Meritor RS23 Meritor RT40, RT46 and MT40; hypoid-generoid and amboid gearing; interaxle and full diff lock Dana Spicer S23 Dana Spicer DS/RS404, DS/RS405, DST/RST40, DST/RST41, D46
Rear Suspensions	Volvo air suspension; 20,000, 34,000, 38,000, 40,000 and 46,000 lb Multi-leaf spring and with helper spring; 22,500 lb Volvo T-Ride; 40,000 and 46,000 lb; 2, 3 and 5 leaf Volvo PRIMAAX EX; 40,000 and 46,000 lb Hendrickson HAS air suspension; 40,000 and 46,000 lb	International® optimized suspension; 20,000 and 40,000 lb Hendrickson HAS air suspension; 40,000 and 46,000 lb Hendrickson HTB 40,000 lb
Frame Rail Packages	6 combinations of frames and frame liners 10.47" and 11.81" frame heights 120,000 PSI Yield 1,591,200 to 2,460,000 in-lb RBM	2 combinations of frames 10.125" and 10.25" frame heights 120,000 PSI Yield
Interior Trim Packages	Three interior trim levels: Choice Touring Limited Seat upholstery: Vinyl, Fabric and Leather	Two interior trim levels: ProStar+ ProStar+ Eagle



This competitive analysis has clearly outlined the hundreds of ways the Volvo VNL 670 outshines the International® ProStar®+. The VNL 670 does it by addressing all of a fleet's most important needs: fuel efficiency, driver performance, safety and uptime. And because every fleet's applications are slightly different, Volvo offers a much wider selection of available specifications than International. Fleet managers benefit from these additional options when they can spec a truck that custom fits their requirements.

Meeting a fleet's needs also means offering options from multiple engine manufacturers and sizes. The VNL 670 is available with the Volvo Power D13 and D16 engines, as well as the Cummins ISX15. International only offers the MaxxForce engine for the ProStar+. In addition to supplier designed components, Volvo offers proprietary parts and components which are designed specifically for Volvo Trucks, including the Volvo I-Shift fully automated transmission. Superior options, superior performance. When all the facts are reviewed, the VNL 670 is the superior choice.



VOLVO

Driving Success.

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