

WALBRO MULTILAYER FUEL TANK AND **SYSTEMS PERMEATION PERFORMANCE** EPA Standard at 40 C° & E10 Fuel 2.5 20 Rate 1.5 Tank Body **Systems** Permeation 1.0 Entire Range Entire Range 0.5 Average erage Value 0 · Value 0.229 0.426

Proven Multilayer Technology

We provide our customers with a cost-effective, long-term evaporative emissions solution that meets end-of-life regulations and is positioned to meet near-term and future standards.

- **Excellent wear and** impact resistance
- Unaffected by slosh or abrasion
- **Excellent for high** alcohol-content fuels
- Light weight
- Meets end-of-life regulations
- **Exceeds US EPA and CARB** evaporative emissions standards
- **CARB** certified under **Executive Order**
- Walbro's annual certification with EPA can eliminate the need for customer testing.
- Positioned to meet tightened evaporative emissions standards in the future

- Capacities from 0.1 to 25 gallons
- **Exceptional design** flexibility:
 - Low emissions allow more design options
 - o Computer blowmolding simulation optimizes design
- **Complete systems** capability
- Advanced production methods:
 - 0 Lean production
 - Single piece flow
 - Stringent quality procedures
 - Continuous improvement
- **Extensive testing** and certification capabilities
- **Exceptional quality and** delivery record



Snowmobile



Riding Mower



Portable



ATV



Hand-Held

TWO DECADES OF FUEL TANK DESIGN AND MANUFACTURING EXPERTISE



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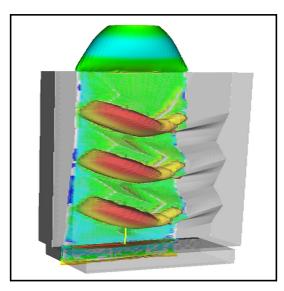
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Computer blow-molding simulation

Exceptional Design Flexibility

The highly experienced Walbro team practices design optimization to ensure maximum capacity and reduced product weight while meeting overall program targets.

- Wide range of tank capacities, from 0.1 to 25 gallons
- Ability to produce complex shapes maximizes fuel capacity
- Low evaporative emissions allow more design flexibility including:
 - Increased cap and gasket options
 - Lower cost attachments
 - More attachments
- Light weight

- Computer blow-molding simulation optimizes design:
 - Single or multiple cavity
 - Optimized wall thickness
- Additional computer tools include:
 - o 3D solid modeling
 - Finite Element Analysis
- Using molded-in process, insert molding and hot plate welding, Walbro can satisfy customer requirements for features such as:
 - o Fill necks
 - o Threads
 - o Bosses
 - Mounting tabs
 - Vents
 - o Handles



Wide range of capacities and shapes



Multi-cavity mold



Multi-cavity mold output

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Complete Systems Capability

Walbro is in a unique position to offer its customers fully assembled fuel tank systems ready for efficient installation at their factory. Walbro can provide customers with engineering, design and validation from concept to final production.

Walbro offers a full range of fuel system components as part of the tank system:

- Fuel pumps and assemblies
- Fuel pick-up and filtration systems
- Level sensors
- Low permeation seals and grommets
- Ethanol-resistant internal hoses
- Fuel fill caps, canisters and vapor management valves
- Rollover valves
- Return fittings

Walbro's single-piece flow manufacturing system is designed for the efficient production of complete tank systems:

- All components are attached sequentially during the production process
- Quality is monitored throughout production to confirm that assemblies meet requirements as they are produced
- 100 percent leak
 testing of completed
 systems is performed
 at the end of the line



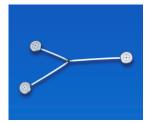
Fuel pump assemblies



Pump modules



Level sensors



Hose assemblies and multi--point pickups

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Thermal cycle testing

Prototype Testing and Certification

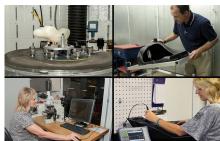
Thanks to decades of experience in fuel storage and delivery systems, Walbro can provide its customers with complete design qualification and is able to support vehicular-level customer certification.

- Fuel tank testing capabilities include:
 - o External leakage
 - Microtome: layers
 - o Microtome: pinch
 - o Pinch evaluation
 - Pressure cycle fatigue
 - o Permeation testing
 - Drop testing
 - Weld integrity
 - o Fill study
 - Burst testing
 - o Thermal cycle
 - Elevated temperature fluid resistance (ESCR)
 - Vibration
 - o Impact
 - o Tensile

- Walbro's annual certification with EPA can eliminate the need for customer testing:
 - o Family certification
 - Certified to 2.5 grams/sq. meter/day at 40 degrees C
- Customer may choose to certify in order to take advantage of averaging banking and trading
- CARB certified under Executive Order



Fuel system permeation testing







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Multi-layer blow-molding machines with flexible robotic insertion and removal



production lines

Flexible, Cost-Effective Manufacturing Technology

State-of-the art manufacturing equipment and Walbro's Single Piece Flow system ensure our customers competitive pricing, top quality and exceptional delivery.

Cost-effective manufacturing

- Flexible robotic machining and welding cells reduce tooling costs.
- Dual-clamp, multi-cavity capabilities result in reduced piece cost.
- Short lead times with worldclass development and timeto-market
- Quick changeover enables efficient, flexible scheduling and on-time delivery.
- Eliminates waste and provides immediate in-line quality feedback.
- Multiple machine sizes promote efficient manufacturing of tanks ranging from 0.1 to 25 gallons.
- Low cost tooling options available.

Complete systems capability

- Component assembly utilizing Single-Piece Flow allows full assemblies to be produced, tested and packed at full machine line speeds
- Fuel delivery systems manufactured and installed on site provide single-source, full system capabilities



Robotic machining center



Robotic machining and welding center



Assembly/testing center



Final system leak testing

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Customer awards



ISO 9001:2008 certification

Top Quality and Exceptional Delivery

Walbro's stringent quality control and best practice procedures result in 100 percent tested fuel tank assemblies and exceptional delivery performance.

Stringent quality control

- Single-piece flow allows verification of tanks and components through on-line inspection and testing.
- Tank layer and wall thickness are verified using state-of-theart microscopes.
- Tanks and full assemblies are 100 percent leak tested as produced to ensure conformance prior to being packed.
- Adherence of insert-molded and welded-on components is continually verified through the manufacturing process.
- Vision-guided weld cells ensure weld integrity.
- ISO 9001:2008 certification

Exceptional delivery

- Single-piece flow manufacturing enables efficient and flexible scheduling.
- Cross-functional team reviews customer demands daily.
- Exceptional delivery record with entire customer base.



Single piece flow flexible production lines



100% leak tested



Layer and component welding microtome testing



Tensile-strength testing



3D profile inspection scanner

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