New R-1234yf A/C Refrigerant Makes Its U.S. Debut

A new air conditioning refrigerant, R-1234yf, is being introduced in the new 2013 Cadillac XTS and ATS. R-1234yf is a new environmentally-friendly refrigerant that has a 99.7% lower Global Warming Potential (GWP) than R-134a. GWP is a value used to compare different greenhouse gases that trap heat in the atmosphere. The new refrigerant received final approval from the U.S. Environmental Protection Agency (EPA) last year.

The EPA and U.S. Department of Transportation have adopted new standards for reducing greenhouse gas emissions from light-duty motor vehicles. In addition, the European Union has adopted similar standards. European regulations ban the use of R-134a in all new vehicles by 2017.

The new refrigerant does not require significant changes to the design of automotive air conditioning systems. It also can be handled in service centers in much the same way as R-134a, although it does require dedicated service equipment.

R-1234yf stands for a specific compound: 1 – double bond, 2 – hydrogens, 3 – carbons, 4 – fluorines, yf – position of the fluoro atoms. It is a worldwide industry accepted solution for a low GWP refrigerant. The biggest benefit of the new refrigerant is that it breaks down faster in the atmosphere than R-134a. On average, R-134a has an atmospheric life of more than 13 years, giving it a GWP of over 1,400. R-1234yf stays in the atmosphere for only 11 days, for a GWP of 4.

R-1234yf refrigerant is considered mildly flammable and has thermodynamic properties similar to R-134a. R-1234yf standards require service equipment and evaporators with safety features that cover this concern. In addition, new SAE J2843-compliant Recovery/Recycle/Recharge machines must feature integrated refrigerant identifiers or a USB port for connection with a hand-held identifier. Current identifiers cannot identify R-1234yf refrigerant.

Service Procedures

Technicians repairing or servicing motor vehicle air conditioning (MVAC) systems in the U.S. must be trained and certified by an EPA approved organization. Certification is obtained by passing an EPA approved examination. Go to http://www.epa.gov/ozone/title6/609/technicians/609certs.html for more information.

Vehicles equipped with R-1234yf refrigerant systems have unique low and high side service fittings, internal heat continued on page 2
New R-1234yf A/C Refrigerant
– continued from page 1

exchangers (IHX), and SAE International standard J2842-compliant evaporator cores. The J2842 standard states that an evaporator from an A/C system shall not be repaired or removed with the intention of using it again in the same or a different vehicle.

There are new or revised service procedures for R-1234yf equipped vehicles (Refer to the appropriate Service Information for details):

- Refrigerant Recovery and Recharge
- Leak Test
- Evaporator Cores
- Internal Heat Exchanger

GM installs fluorescent dye in the A/C refrigerant system during manufacture. The dye mixes with the A/C compressor oil throughout the refrigerant system. Leaks in the A/C system will be indicated in a light green or yellow color when using a leak detection lamp. Adding fluorescent dye would only be required after flushing the A/C system. Verifying some passive leaks may require using an SAE J2913-certified electronic leak detector, even though the system contains fluorescent dye.

Retrofitting R-134a systems for R-1234yf refrigerant is not recommended nor endorsed by GM.

A/C Compressor Oils

R-1234yf systems require the use of specific A/C compressor oils. In the GM Service Information, refer to HVAC > Specifications > Adhesives, Fluids, Lubricants and Sealers for proper type and use. Only GM lubricant is approved. The XTS A/C system uses PAG-PSD1, P/N 19260643 (10-4084), and the ATS uses PAG-ND12, P/N 19299051 (10-4085).

New Tools and Equipment

New dedicated tools and equipment are required by EPA regulations to service vehicles equipped with R-1234yf refrigerant.

GM recommends the following equipment or equivalent.

GE-50300 Recovery/Recycle/Recharge Machine for R-1234yf A/C Systems — (certified to SAE J2843) Performs gas analysis before gas recovery or fills with recovery/fill lockout if gas is contaminated (less than 98% R-1234yf). VIN input is required. The VIN is retrieved via an integrated VCI cable connected to the vehicle’s OBD2 connector or may be manually entered. It records and prints VIN, pressures, temperature, recovered/charged amount, and gas analysis results.

The GE-50300 Recovery/Recycle/Recharge Machine for R-1234yf A/C Systems requires product activation within 30 days of the machine’s initial startup. Refer to the Quick Start Guide and follow the on-screen instructions to complete the on-line registration and product activation process.

GE-50957 Contaminated Refrigerant Recovery Machine — (certified to SAE J2861) Required for recovery of contaminated refrigerant systems.

GE-50078 Electronic Refrigerant Leak Detection for R-1234yf and R-134a (certified to SAE J2913 for use on R-1234yf systems and certified to SAE J2971 for R-134a systems). The SAE J2843-certified equipment (GE-50300) requires a SAE J2913-certified leak detector to perform the mandated gross leak check.

GE-50744 R-1234yf PAG Oil Injection Hose — Used to replace PAG oil in R-1234yf systems with belt-driven A/C compressors. Use with GE-45037 and the oil specified in the appropriate Service Information.

GE-45268-130 R-1234yf Fitting Kit – Refrigerant Flush Kit — Required to adapt GE-45268 Flushing Kit to R-1234yf.

continued on page 3
### Need Programming?

**Check Control Module Calibrations for Free with CAL ID Website**

During vehicle diagnosis, it’s necessary to determine if a control module can be updated before replacing it. Manufacturers release a number of calibrations that can be used to program a module to address a variety of conditions.

To determine if programming is needed, GM offers a free online service through TIS2Web that can help determine if updated calibrations are available for a control module and programming should be performed.

To view available calibrations, go to [www.acdelcotechconnect.com](http://www.acdelcotechconnect.com) and click GM Service Information on the left side of the home page. Scroll down to the link “Look Up Vehicle Calibrations (No Charge),” or go to [tis2web.service.gm.com/tis2web](http://tis2web.service.gm.com/tis2web).

In addition, the Service Information uses a service programming symbol to identify modules that may be programmed or require a setup procedure.

Always verify a valid reason for reprogramming. A control module should not be reprogrammed simply because there are updated calibrations available. Programming a module requires a subscription to the GM Service Programming System (SPS).

**Get CAL ID**

To search for the latest electronic control module calibrations for a vehicle from the CAL ID website home page, enter the vehicle’s Vehicle Identification Number (VIN) and select Get CAL ID.

Select the desired control module from the menu and select Next. The systems controlled by the module will be displayed. Select the desired system and click Next.

The available calibrations for the control module system selected will be displayed, including the part number, Calibration Verification Number (CVN) and a description of the calibration. Click Next for a summary of calibrations for the module.

**Setup Procedures**

After programming or replacing a control module, it will require a setup procedure to relearn the values of vehicle systems and to operate correctly with other components. There are different setup procedures to follow based on the control module.

Check the appropriate Service Information for the necessary setup procedures. The Control Module References table in the Service Information includes links to all information related to the programming of a specific control module.

For some control modules, there may be only one opportunity to set up the module correctly. Be sure that all correct vehicle options are selected during module setup. Some options only appear during the initial module setup procedure. If the module is setup incorrectly, it may need to be replaced.

– Thanks to Bob Stewart
ACDelco is updating its service programming and diagnostics application subscriptions by adding a new annual GM Vehicle Communication Interface Package.

The new package includes a 1-year subscription to the Global Diagnostic System 2 (GDS 2) and Tech2Win for $750.

GDS 2 software is required for communicating and diagnosing new GM vehicles using the GM Global Architecture (includes the current generations of the Chevrolet Camaro, Equinox, Cruze, Volt, Sonic, Malibu and Captiva; Buick LaCrosse, Regal and Verano; GMC Terrain; Cadillac SRX, ATS and XTS). It replaces the Tech 2 scan tool.

GDS2 works with menu-driven commands using a standard Windows® interface on a Personal Computer (PC). It enables much more data to be viewed from many different perspectives and offers enhanced data features.

Tech2Win is a PC-based application version of the Tech 2 and CANdi (Control Area Network diagnostic interface) module.

To use either GDS 2 or Tech2Win, a Multiple Diagnostic Interface (MDI) tool is required.

Access to the GM Service Programming System, GM vehicle calibrations, Tech 2 scan tool diagnostic software updates and GDS 2 software updates are available online through a TIS2Web subscription.

Every subscription includes access to the ACDelco eBusiness and TIS2Web Helpdesk — the same assistance provided to dealerships — for issues with software and programming. For assistance, call 1-888-212-8959.

– Thanks to Bob Stewart

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<td><strong>Tech2Win</strong></td>
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<tr>
<td>Tech 2 software on a PC</td>
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<tr>
<td><strong>GM Vehicle Communication Interface Package</strong></td>
</tr>
<tr>
<td>GDS 2 and Tech2Win software</td>
</tr>
</tbody>
</table>

ACDelco Support for Tech2Win

Several diagnostic tool manufacturers have recently added ISO 22900 PDU API (International Organization for Standardization 22900 Protocol Data Unit Application Programming Interface) functions and software/hardware to their SAE J2534 diagnostic scan tools. These companies may state that the new software/hardware allows their J2534 devices to use Tech2Win, the PC-based application version of the Tech 2 and CANdi (Control Area Network diagnostic interface) module, which is built on the ISO 22900 PDU API standard.

Technicians requiring technical support for these non-GM tools should direct inquiries to the tool manufacturers. ACDelco offers support for the Tech 2 scan tool and Multiple Diagnostic Interface (MDI) tool, but does not provide support for non-GM tools.

ISO 22900 specifies the common software interface for diagnostic software applications. The purpose of the standard is to ensure that an application can operate on a common interface to communicate with a manufacturer's network protocol and vehicle bus systems.

Tech2Win can be loaded onto a service center's Personal Computer (PC) or notebook computer through a TIS2Web subscription. A MDI tool also is required. Using Tech2Win enables technicians to take advantage of the computer power of the PC or notebook computer and the speed of the MDI, providing faster operation than a Tech 2.

Go to www.acdelcotechconnect.com and click the GM Service Information link on the left side of the home page for more information.

For Tech 2 and MDI technical support, contact the ACDelco eBusiness and TIS2Web Helpdesk at 1-888-212-8959.

– Thanks to Bob Stewart
Welcome to the WIP Community

If you’ve ever been searching through the ACDelco catalog and had a question on a part, an idea, or a challenge with a repair you would like to share, take a few minutes to visit the new WIP Community.

The WIP Community, a new forum and social community available only to WIP catalog users, offers you an opportunity to share your insight on repairs, ask questions, or spread the word on just about any topic. The input provided by other catalog users in the private WIP community provides useful peer-to-peer feedback on new parts, tough repairs, business best practices and much more.

To sign in, click the ACDelco Community link on your WIP catalog home page. Once registered, bookmark the site to log-in from any public computer or mobile device. Every technician and parts person will have unique log-in credentials and an individual profile.

The community operates on gaming dynamics, so the more you engage in the community, the more you can move up in rank to earn additional permissions and privileges.

The WIP Community features a variety of topics and discussions organized by part categories. The WaterCooler is where users can discuss just about anything. Community topics include:

- Air, Fuel, Emissions & Exhaust
- Batteries, Electrical & Wiring
- Brakes, Steering & Suspension
- Chemicals, Waxes & Lube
- Cooling & Heating
- Electronics & Navigation
- Engine & Ignition
- Transmission & Drivetrain
- WIP Catalog Discussions

Community members also can search for topics to quickly find the latest information, such as by part (e.g. fuel filter) or vehicle (e.g. Chevy Avalanche).

In addition, users can share their knowledge about a topic — for example, part- or repair-related tips and information — or to help spread the word about an upcoming event, including training seminars, business open houses, or other activities. Users also can include pictures, videos or document attachments with their posts.

For more information about WIP and the ACDelco catalogs, go to acdelcotechconnect.com and click the eBusiness tab.

– Thanks to Angela Cox and Kelli Abbott
Control Circuits and Test Lamps

A control circuit (output) from an electronic control module provides a logically controlled (by operator or software) voltage potential to a component or another electronic control unit. This controlled voltage potential can be anything from vehicle ground to vehicle system voltage or a manipulated (pulsed/amplitude/frequency) voltage output.

The tool of choice to test a control circuit is a test lamp. When the control circuit is activated, the test lamp will load the circuit. If there is any resistance in the circuit the test lamp will not light.

Do Not Use a Digital Multimeter

Why a Digital Multimeter (DMM) voltage reading is not used to test control circuits:

• The DMM does not load the circuit being tested

• The DMM’s high input impedance (typically 10M ohms) would mask any resistive circuit condition up to 1M ohm.

There are also times when the DMM voltage reading will not toggle or change states when commanding the control circuit on and off. This is caused by internal filtering in the control module, holding a charge (voltage) on the control circuit.

Test Lamps

There have been two essential test lamps used over the years:

• Original – Low impedance (20 Ω) test lamp J-34142-B

• Newer – High impedance (200 Ω) test lamp J-35616–210

Either test lamp works fine when testing a B+ (Battery Positive Voltage) or an ignition circuit. And up until the 2005 model year both test lamps work fine testing any control circuit.

However, when testing a 2006 model year and newer control module control circuit, the newer high impedance test lamp (J-35616–210) must be used in place of the original low impedance test lamp (J-34142-B).

The issue is not with the test lamp but with the newer control modules. The original low impedance test lamp (J-34142-B) requires a high inrush current to fire off the bulb. When this happens, the control module shuts down the output driver. It’s not because the output driver can’t handle the temporary current spike (up to half an amp), but because the control module’s software is calibrated to turn off the output driver at a very low current threshold and in a very short amount of time (typically, only a few milliseconds).

Because the on-vehicle diagnostic validation is done using the newer test lamp (J-35616–210), it’s important for technicians to also use it when testing control circuits.

There are some control module outputs that will not work even with the newer test lamp (J-35616–210). In these cases, the control circuit test steps in the Service Information call out alternative diagnostic testing methods.

– Thanks to Dave Nowak

ACDelco dexos1 5W20 Engine Oil

Some 2013 GM models now being sold specify the use of dexos1™ 5W20 engine oil. Coming in early October, ACDelco will offer dexos1 5W20 engine oil in drums, and soon after, in quarts. 2013 models that specify dexos1 5W20 include the new Cadillac ATS and Chevrolet Malibu equipped with the 2.5L 4-cylinder engine and the Chevrolet Spark equipped with the 1.2L 4-cylinder engine.

Currently, dexos1 is available as a 5W30 engine oil. Refer to the vehicle’s owner manual to determine which viscosity of dexos1 is specified. The use of a viscosity of engine oil not specified may affect engine performance.

If dexos1 5W20 engine oil is not available, use a SAE 5W20 viscosity oil that is certified by the American Petroleum Institute (API) and displays the API “Starburst” symbol, which indicates that the oil meets the current engine protection standards and fuel economy requirements of the International Lubricant Standardization and Approval Committee, a joint effort of U.S. and Japanese automobile manufacturers.

GM has required dexos1 as the factory fill and service fill in spark ignited engines worldwide since the 2011 model year.

The dexos specification was designed to meet the exacting requirements of GM’s advanced engine technology, including direction injection, cam phasing, turbo charging and Active Fuel Management. The specification has gone through an extensive development and testing process that requires a number of proprietary tests not included in current industry standards and sets performance criteria at a level that exceeds many current standards. The result is a high performance fluid that:

• Has improved viscometric properties, creating less friction in the engine, contributing to improved fuel economy

• Resists aeration, which enables fuel-saving devices, such as variable valve timing, to work optimally

• Offers improved oxidation and deposit-forming tendencies allowing emission systems to operate longer and optimally

For more information about the stringent quality standards of the dexos specification, visit the GM dexos website at www.gmdexos.com.

ACDelco dexos1 engine oil is available through the GM Oil Program in bulk, 55-gallon drums and quart-size packaged containers. Orders may be placed through your local ACDelco oil distributor.

– Thanks to Chris Crosby
The following technical tips provide repair information about specific conditions on a variety of vehicles. If you have a tough or unusual service repair, the TSS Diagnostic Hotline can help. Call 1-800-825-5886, prompt #2, from 8 a.m. to 8 p.m. ET Monday–Friday, to speak with a technical expert with the latest OEM information.

**Power Window Service Tips**

2008-2013 GM passenger cars and light-duty trucks

The following service tips may be helpful if a front or rear side door window is inoperative, rattles or squeaks, binds, operates slowly, fits poorly or is misaligned.

Always check the appropriate Service Information for additional information on specific window operation and window regulator concerns.

**Window Intermittent Operation**

- For 2-pin motors, first disconnect the motor connector and then apply a 12-volt power supply to the regulator motor to verify motor functions/activates. (This is not possible on 6 or 7-pin motors.)
- Check the wire harness for pinched/shorted wires. Check the switch for correct function and check the switch bezel for sticking switches. (If the motor activates and stops, check for window/regulator binding/alignment.)
- Check for proper glass alignment/attachment. Position the window to access the side door window regulator window attachment bolts. Loosen the two bolts that attach the window to the window regulator or disengage the glass from the snap fit attachment. Slide the window up and down in the run channel. If it does not bind, properly adjust – do not replace the regulator. If it does bind, check for defective seal and/or proper seal installation, debris in the glass run channel and the glass run channel position.

**Regulator/Glass Rattles**

- Check for any loose fasteners and re-torque to specification as required.
- Check that the glass is in the channel and reinstall if not positioned correctly.

**Noisy Operation**

- Check for other components in the glass path, such as wire harness, impact foam, lock rods or cables.

- Check for proper glass alignment/attachment and door seal installation.

**False Glass Reversal/Glass Lowers Unexpectedly**

- Check for debris in the glass run channel.
- Lubricate the window regulator, if required, with GM Synthetic Multi-Purpose Lubricant w/PTF or equivalent.

**Glass Does Not Index**

- Check seals, re-initialize the window regulator and/or realign the glass.
- Check the switch for correct function and check the switch bezel for sticking switches.

**Front Timing Cover Modification**

2003-2007 Honda Accord, Odyssey, Pilot and Ridgeline equipped with the 3.0L V-6 or 3.5L V-6 engines

Particular V-6 engine applications may require a small modification to the front timing cover during replacement of the accessory drive belt tensioner (ACDelco part number 38332).

The OES now provides an updated tensioner assembly that may cause interference with the front timing cover of some applications. ACDelco also offers the same, updated design as the OES. To allow proper clearance, remove approximately 3mm of plastic material from the front cover.

Improper installation may result in a damaged front timing belt cover and improper accessory belt tracking, eventually leading to belt failure.

**Replacing a Power Steering Cooler**


It is critical when replacing a leaking or damaged power steering cooler to replace the cooler without introducing a lot of air into the system.

When replacing a power steering cooler, first block off the hoses near the cooler connection with the appropriate clamps. Next, disconnect the cooler from the lines and remove the cooler.

Pre-fill the new cooler on the bench and cap off the pre-filled cooler ends for installation.

Install the new pre-filled cooler on the vehicle and remove the clamps on the hoses.

Once installation is complete, be sure to follow the Power Steering System Bleed Procedure in the appropriate Service Information.

**Product Information**

For free technical assistance and product information regarding specific ACDelco products, contact these toll-free information hotlines staffed by ASE-certified technicians:

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<thead>
<tr>
<th>Category</th>
<th>Hotline Number</th>
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</thead>
<tbody>
<tr>
<td>Brakes</td>
<td>1-888-701-6169 (prompt #1)</td>
</tr>
<tr>
<td>Chassis</td>
<td>1-888-701-6169 (prompt #2)</td>
</tr>
<tr>
<td>Clutches</td>
<td>1-888-725-8625</td>
</tr>
<tr>
<td>Lift Supports</td>
<td>1-800-790-5438</td>
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<tr>
<td>Shocks</td>
<td>1-877-466-7752</td>
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<td>Starters and Alternators</td>
<td>1-800-228-9672</td>
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<tr>
<td>Steering (Pumps, Rack and Pinion, Gears)</td>
<td>1-866-833-5567</td>
</tr>
<tr>
<td>Wiper Blades</td>
<td>1-800-810-7096</td>
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Training Update

How to Take ACDelco Training

Go to www.acdelcotechconnect.com and click the Training tab to log in to the ACDelco Learning Management System (LMS).

- To enroll in courses in your training path, open the home page to view your Training Progress Status Report, select Click Here to Show Detail, and then click the course number and title to view details on a specific course and to launch or enroll in the course.

- To enroll in an Instructor-Led Training (ILT) course (ILTs are full-day hands-on classroom courses), click Take Training > Instructor-Led Training to view the catalog and select a specific course.

- To enroll in a Virtual Classroom Training (VCT) course (VCTs are 1-2 hour live online courses), click Take Training > Virtual Classroom Training to view the catalog and select a specific course.

- To launch a Web-Based Training (WBT) course (WBTs are 1-4 hour self-guided online courses), click Take Training > Web-Based Training to view the catalog and select a specific course.

- To launch a TechAssist (TAS) course (TAS courses are 15-20 minute online presentations on a specific topic), click Take Training > TechAssist to view the catalog and select a specific course.

- To launch a Simulation (SIM) (SIMs require users to complete all repairs for a condition), click Take Training > Simulations to view the catalog and select a diagnostic challenge simulation.

Training Schedule

To search for currently scheduled courses in your area, view the Training in Your Area section on the Home page. Select search terms from the dropdown menus and click the Submit button.

- Thanks to Greg St. Aubin

Current Instructor-Led Training Courses

The following ILT courses are currently being scheduled:

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<th>Course Name</th>
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<td>HVAC Control System Operation and Diagnostics</td>
</tr>
<tr>
<td>S-BK05-01.01ILT</td>
<td>Braking Systems</td>
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<td>S-BK05-02.01ILT</td>
<td>ABS Operation and Diagnosis</td>
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<td>S-EL06-04.02ILT</td>
<td>Network Communication Diagnosis</td>
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<td>S-EL06-10.02ILT</td>
<td>Electrical Power Management</td>
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<td>S-EL06-11.02ILT</td>
<td>Enhanced Automotive Circuit Diagnosis</td>
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<td>S-EL06-12.01ILT</td>
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<tr>
<td>S-EL06-14.01ILT</td>
<td>Advanced Body Control System Electrical Diagnostics</td>
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<tr>
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<tr>
<td>S-EP08-03.01ILT</td>
<td>Engine Performance Air Induction and Fuel System Diagnostics</td>
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<td>Engine Performance Fault Monitoring and Emission System Diagnostics</td>
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<td>Engine Performance Advanced Drivability Diagnostics</td>
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<td>S-EP08-06.01ILT</td>
<td>After Combustion Sensors</td>
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<td>S-EP08-09.01ILT</td>
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<td>S-ST10-01.01ILT</td>
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Current Virtual Classroom Training Courses

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<td>HVAC System Operation and Service Hints</td>
</tr>
<tr>
<td>S-AC07-04.01VCT</td>
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<td>S-EL06-01.01VCT</td>
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<td>S-EL06-02.01VCT</td>
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<td>S-EL06-04.01VCT</td>
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<td>S-EL06-06.01VCT</td>
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<td>6.6L Duramax LMM Diesel Engine</td>
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<td>S-EP08-03.01VCT</td>
<td>6.6L Duramax LGH and LML Diesel Engines</td>
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Take the TechConnect Reader Survey Today

TechConnect provides technicians with the latest technical news and information from ACDelco and the automotive industry. We cover a wide range of topics, including technical information and programs from ACDelco, GM, Professional Service Center Program partners, tool suppliers and more.

To help in developing future issues of TechConnect, we’d like to hear from you. Go to the link below to take a short survey about what automotive-related service news and information you want most in TechConnect.

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- Thanks to Rick Balaban