



Robinair 34788-H

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Servicing hybrid vehicles with high voltage electric compressors

Hybrid vehicles are becoming more popular these days as the price of gasoline continues to rise. Back in 2001 there were a total of 4 hybrid models available, today in 2011 that number has increased to 41 models available and continues to grow. Looking at the numbers, in 2009, there were over 1.4 million hybrids in the U.S.A. with better than 1 million of them using high voltage electric compressors.

As the number of hybrid vehicles continues to increase, it present new challenges to service facilities providing A/C service work to both vehicles with traditional A/C systems, and the high voltage electric compressor systems used on many hybrids.

What changes were made to the SAEJ2788 standard?

To address the growing number of hybrid vehicles on the road, and differences in the A/C system on certain hybrids, in June 2010, the SAE published a revised version of the SAE J2788 standard that covers the operation of an A/C Recover, Recycle and Recharge (RRR) machine. The revised requirements state that a machine must:

1. Not have on board automatic/manual oil or dye injection.
2. Must be capable of charging refrigerant into a system with less than 0.1% by weight of any residual oil.

A machine must meet these new requirements to be suitable for servicing both vehicles with a high voltage electric compressor that uses POE oil and traditional PAG oil systems.

Which hybrid models use a high voltage electric compressor?

The table to the right lists hybrid vehicles up through 2009 (with a few 2010 models) that are currently using high voltage electric compressors. Some of the more popular hybrid vehicles are:

Chart for A/C Hybrid System Compressor © ACDC 2009

Make Model Years * Not for sale in US as of 3/06/09	Belt A/C Comp	High Volt Comp	High Volt Comp with belt drive
Honda Insight 2000-06	X		
Honda Civic HEV 2003 -05	X		
Honda Civic Gen II 08-09			X
Honda Accord HEV 05-07			X
Honda Insight 5d 2010 *	X		
Toyota Prius Gen I 01 - 03	X		
Toyota Prius Gen II 04-09		X	
Toyota Prius Gen III 2010 *		X	
Toyota Highlander HEV 06 - 07		X	
Toyota Highlander HEV 08 - 09		X	
Toyota Camry HEV 07 - 09		X	
Nissan Altima Hybrid 2007 - 2009		X	
Lexus RX400h 2006 - 2009		X	
Lexus RX450h 2010 *		X	
Lexus GS450h 2007 - 2009		X	
Lexus LS 600h L 2008 - 2009		X	
Lexus HS250h 2010 *		X	
Ford Escape Hybrid 2005 -2009	X		
Ford Fusion Hybrid 2010 *		X	
Mercury Mariner Hybrid 2006-2009	X		
Mercury Milan Hybrid 2010 *		X	
Mazda Tribute Hybrid 2008 - 2009	X		
Mercedes S400 Hybrid 2010 *	unknown	unknown	
Saturn Vue Green Line BAS Hybrid 2007 -2009	X		
Saturn Aura Green Line BAS Hybrid 2008 - 2009	X		
Chevy Malibu BAS Hybrid 2008 - 2009	X		
Chevy Silverado Hybrid PHT 2005 -2006	X		
Chevy Silverado Hybrid 2Mode 2010		X	
Chevy Tahoe 2 Mode Hybrid 2008 - 2009		X	
GMC Sierra Hybrid 2005 -2006	X		
Chevy Silverado Hybrid 2 Mode 2010		X	
GMC Yukon 2 Mode Hybrid 2008 - 2009		X	
Cadillac Escalade 2 Mode 2009		X	

Toyota Prius
Ford Fusion/Mercury Milan
Toyota Camry
Toyota Highlander

Lexus GS 450H
Hyundai Sonata
Chevrolet Silverado/Tahoe/
Suburban (and GMC equiva-

lents)
Cadillac Escalade

One additional note, Honda is using kind of a hybrid of their own with a high voltage electric compressor that is also belt driven.



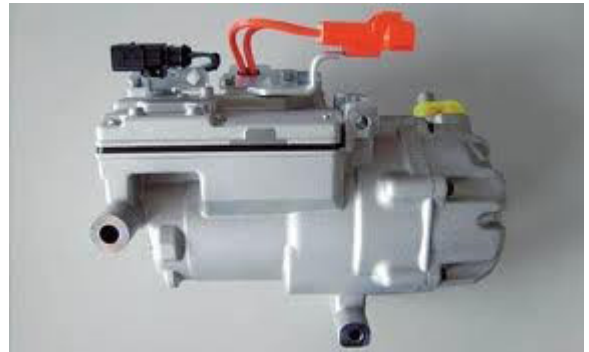
Chevy Tahoe 2 Mode Hybrid electric compressor

What's the difference between a standard compressor and a high voltage electric compressor?

The biggest difference (other than being powered by electricity versus the vehicle's engine) is the type of lubricating oil used by the compressor. High voltage electric compressors use a POE oil that has high dielectric properties. This oil helps to provide proper lubrication of the compressor and maintains the integrity of the compressor's electrical windings.

So what happens if the wrong type of oil is used? With just 1% of PAG oil in the system it can lower the insulation resistance of a compressor from over 10 Mega ohms to under 1 Mega ohm. If PAG oil is used to completely fill an electric compressor system the insulation resistance can essentially be reduced to zero.

The Hyundai Sonata hybrid is using yet another different type of oil for their high voltage electric compressor. They use a PVE (Polyvinylether) oil. With the different oils available, keeping it all straight can be a challenge for today's A/C technicians.



Porsche Cayenne S Hybrid electric compressor



2009 Toyota Camry Hybrid electric compressor

How can you tell if an A/C RRR machine is suitable for servicing hybrid vehicles?

Aside for the obvious—there should be no automatic oil injection anywhere on the A/C RRR machine as mentioned earlier, another way to tell if a machine is certified as suitable for servicing vehicles that use high voltage electric compressors is to look for the marking shown below:



**Certified for High Voltage
Compressor Service**

This certifying statement should appear somewhere on the machine either on a separate decal, or on the decal that indicates SAE J2788 certification. This will tell the user if they are using a machine suitable for servicing hybrid vehicles with electric compressors. And remember always follow the procedures outlined in the operators manual when using the machine.