

Questions and Answers from DuPont Product Launch Webinar 5.6.09

Question	Answer
Will MO99 be able to be used in all R-22 applications?	NO. MO99™ has been developed for Direct Expansion (DX) systems designed for R-22. See retrofit guidelines for specific questions at <a href="http://www.isceon.com">www.isceon.com</a> click on the products section for the MO99 literature
What about residential AC?	Our field work to date has been focused on commercial a/c and refrigeration however we are doing development work in residential systems and we will publish results when available.
How sure are you that there will be an R-22 product shortage in 2010 and beyond?	This is a difficult question and there is a level of uncertainty around whether there will actually be a shortfall in 2010. Having said that, we have studied the EPA vintaging model and the data and assumptions appear to be sound; however, like any model, it is based on a number of assumptions that may or may not come true. With the significant decrease in R22 allocations starting in 2010 and the significance of the reclaim assumption vs. current practices, it is our opinion that there is a high likelihood of R-22 supply shortfall. What is uncertain is the timing and how extreme the shortfall will be. Despite the uncertainty, we feel the data is compelling enough to warrant deliberate action by contractors and end-users to reduce their dependence on R-22. We think its important for us to help you understand the potential supply situation so you can help your customers plan accordingly
What is the best replacement refrigerant for existing medium temp R-22 commercial refrigeration?	We believe ISCEON MO99 delivers the best value to your customers. MO99 was designed to be used in low, medium and high temperature applications.
Should we expect R-22 prices to increase or decrease in the next 6 months? R410?	Pricing is determined by supply and demand dynamics, and we expect R-22 price volatility to increase over the next 10 years. Pricing for R-410A will also be determined by supply and demand dynamics and by potential impacts of future climate change legislation.
Any discussion or information about M059. Isn't it a better fit for air conditioning applications?	ISCEON MO99 has a higher cooling capacity than MO59 and is a better choice for R-22 replacements than MO59.
What should the approach be by or to existing apartment complexes non-ending demand for R-22	We recommend developing a refrigerant management plan including, leak reduction and retrofitting to HFC replacements. Use the recovered or reclaimed R-22 to service your existing equipment to offset your R-22 costs.
Is this new refrigerant a direct replacement for R-22 and if not what upgrades to the system will be required?	Yes. ISCEON MO99 is a direct replacement for R-22 for most DX systems. As with all R-22 retrofit refrigerants (i.e. HFCs), critical seals must be changed. See retrofit guidelines at <a href="http://www.isceon.com">www.isceon.com</a> .
Has Copeland/Emerson tested this new refrigerant, and do they approve of it?	We are working with major component manufacturers to approve MO99 for a variety of applications.
Is 410A the answer?	R-410A is the replacement for R-22 in new equipment ONLY. R-410A should not be used as an R-22 retrofit refrigerant.
What about pricing once the 2010 mark hits?	Pricing is determined by supply and demand dynamics, and we expect R-22 price volatility to increase over the next 10 years.
Is ISCEON MO99 a direct replacement for R-22	Yes. ISCEON MO99 is a direct replacement for R-22 for most DX systems. As with all R-22 retrofit refrigerants (i.e. HFCs), critical seals must be changed. See retrofit guidelines at <a href="http://www.isceon.com">www.isceon.com</a> .
What will the effect of all the reclaim R22 gas have on the market?	While the rate of reclaim has continued to increase it still represents a very small percentage of the overall market demand.
Is MO99 NOT recommended for cap tube systems?	We have limited experience with cap tubes. This really depends on the system. If the cap tube can move 5 -10% higher refrigerant volume then it may be possible.
Is the MO99 volume equal to R-22 per system? In other words, if you take out 100 pounds of R-22, how much MO99 will you need?	Most systems are pound for pound; however, the range of charge size is 95% of R22 charge to 105% of R22 charge – this depends on the system design. Detailed retrofit guidelines are available at <a href="http://www.isceon.com">www.isceon.com</a>
Do you also see MO99 as a better alternative than R404A or R507 in new installations, due to its lower GWP?	GWP is a growing concern among many customers, and it is very possible MO99 will be preferred over R-404A/507 in new installations due to its 42% lower GWP. In fact, we have a published case history on <a href="http://www.isceon.com">www.isceon.com</a> for a new equipment installation using ISCEON MO99.
Is there a specific seal material that is not compatible?	No. Our testing has shown ISCEON MO99 is compatible with seal materials used with R-22. Seals used in R-22 service should be replaced as part of the retrofit see retrofit guidelines at <a href="http://www.isceon.com">www.isceon.com</a>
Can you top off a system that has existing R-22?	No. Mixing refrigerants can lead to high pressure formulations, unpredictable performance and is not recommended.
If you use MO99 and there is a leak on the system. Being that it is a blend, Do you have to dump the entire charge or can you top off the charge?	You can top off the charge. The issue with blend refrigerants or refrigerants with glide is that some of the components “boil off” more quickly than other components leaving behind a mixture with potentially lower capacity. We have performed a modeling simulation test for MO99 under worst case conditions (20% full vapor leak) and topped off for 8 years and the total capacity loss was calculated to be only 5% over that entire 8 year modeling period. Please note this was a worst case full vapor leak test.
Can you mix R-22 with MO99?	No. Mixing refrigerants can lead to high pressure formulations, unpredictable

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	performance and is not recommended.
Can you charge as a liquid or a gas?	MO99 should be charged as a liquid.
Have you had ball valve stem seal leaks?	Based on field experience with thousands of retrofits to HFCs from HCFCs, we recommend changing critical seals (including ball valve stem seals) to avoid the potential for leaks. As with any HFC refrigerant retrofit from R-22, there is always potential for leaks due to R-22 off gassing from the seals. See detailed retrofit guidelines at <a href="http://www.isceon.com">www.isceon.com</a>
Can you use this FREON® in new systems?	We have used ISCEON MO99 on new systems. See the Edison Chouest Offshore Case history at <a href="http://www.isceon.com">www.isceon.com</a>
When you say the critical seals [do you mean] (sight-glass)?	Critical seals are seals, including some sight glasses, that cannot be isolated when the system is operating. R-22 penetrates elastomeric seals and when it is removed from the system the R-22 off-gasses and the seals shrink leaving an opportunity for HFC leaks.
Chuck, you said R-22 can cause seals to swell and cause leaks, did you mean to say MO99?	NO. R-22 penetrates elastomeric seals and when it is removed from the system the R-22 off-gasses and the seals shrink leaving an opportunity for HFC leaks.
On open drive reciprocating compressors does this change effect crankshaft seals?	We have limited experience with this type of equipment. We recommend consulting the compressor manufacturer.
Can MO99 be mixed with R-22?	No. Mixing refrigerants can lead to high pressure formulations, unpredictable performance and is not recommended.
Can we get a copy of the slides and or the webinar?	Yes. Please contact your local DuPont distributor for a copy of the slides presented in the webinar.
What information / training can I give my techs for a successful changeout?	Please see our detailed retrofit guidelines, product bulletins, case histories, MSDS and technical support at <a href="http://www.isceon.com">www.isceon.com</a>
Does MO99 leak at the same rate? At what point do you need to remove the complete charge and recharge if the system has leak?	Leak rates are independent of refrigerant. You would remove the refrigerant, repair any leaks and replace the charge when the system no longer performs to the customer's satisfaction.
On low temp is liquid injection still required?	On low temperature refrigeration systems operating at extremely high ambient temperatures, MO99, R407C and R407A may need a small amount of injection cooling.
What is the expected impact on recovery machines and tanks demand?	There may be an increase in demand for both recovery machines and recovery tanks.
How do charge weights compare?	Most systems are pound for pound; however, the range of charge size is 95% of R22 charge to 105% of R22 charge – this depends on the system design. Detailed retrofit guidelines are available at <a href="http://www.isceon.com">www.isceon.com</a>
How's it work with the newer chillers?	ISCEON MO99 is a replacement for DX chillers using R-22. Some new chillers use R-134a and do not require a retrofit.
Is MO99 on the market today?	Yes. See your local DuPont distributor.
Can you mix R-22 and MO99 refrigerants?	No. Mixing refrigerants can lead to high pressure formulations, unpredictable performance and is not recommended.
In A/C, will there be any new equipment designed and sold with MO99 as an alternative to 410a?	Most OEM's have selected R-410A as the replacement in new equipment.
Has DuPont done any regional studies on this refrigerant?	Yes. Please see the case histories at <a href="http://www.isceon.com">www.isceon.com</a> under the products section.
Will this be used in new equipment?	MO99 has been designed as a retrofit refrigerant, but it could be considered for new equipment designed for R-22. We have a published case history on <a href="http://www.isceon.com">www.isceon.com</a> for a new equipment installation using ISCEON MO99.
Will liquid injection be required with low temperature applications?	On low temperature refrigeration systems operating at extremely high ambient temperatures, MO99, R407C and R407A may need a small amount of injection cooling.
Will metering pistons need to be replaced with thermal expansion valves?	Systems with metering pistons are likely critically charged and the charge will need to be optimized for MO99. See retrofit guidelines at <a href="http://www.isceon.com">www.isceon.com</a>
What about fixed orifice units rather than TXVs?	We have limited experience with fixed orifice TXVs. If the fixed orifice can move 5 -10% higher volume then it may be possible.
Has MO99 been tested on screw compressors?	We have limited tests on screw compressors and would appreciate a call if you have a specific project. Please contact us at <a href="http://www.isceon.com">www.isceon.com</a> sales & support.
What are you doing to aid the industrial designs using re-circulated and flooded systems using 15,000 lbs of R-22?	The use of HFC blends in these types of systems will reduce the system performance. We have worked with customers on a case by case basis. If you have a specific project, please contact us at <a href="http://www.isceon.com">www.isceon.com</a> sales & support
What does discharge temps do on low temp compressors?	In low temperature refrigeration, the discharge temperature is about 22F lower than R-22.
Cost per jug?	Please see your local DuPont distributor.
Are all of the charts discussed here on the ISCEON MO99 website?	Not on the website. However, they are available from your local DuPont distributor.

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Is DuPont working on a flooded evap alternative refrigerant?	We have not yet found any refrigerant alternative that can provide good performance in R-22 flooded evaporator systems.
What determines whether you need an oil change?	MO99 is compatible with MO, POE & AB oils. MO99 provides adequate oil return with existing oil in most systems when converting from R-22. In systems where oil return is a challenge, addition of a small amount of POE usually resolves the oil return issue. Please see retrofit guidelines at <a href="http://www.isceon.com">www.isceon.com</a>
Is MO99 better or worse than R410A for new installations?	MO99 was designed to be the lowest cost retrofit refrigerant to replace R-22. R-410A operates at a much higher pressure, and has been the product selected for air conditioning OEM's for new equipment.
Is MO99 available now?	Yes. Please see your local DuPont distributor.
Is the slide show available online	Not on the website. However, they are available from your local DuPont distributor.
In R-12 retrofit to R-409 if changing to MO99 what factors come into play?	MO99 is a replacement refrigerant for R-22. We have an R-12 replacement MO49 plus. Information is available at <a href="http://www.isceon.com">www.isceon.com</a>
When did R-422D become less than a drop in replacement? We were told last year that it was a direct drop in with no changes required. We have done several conversions and have more scheduled.	R-422D is working well in thousands of refrigeration systems across the world. In fact, we have documented up to 14% energy savings for supermarkets using R-422D in low temperature applications. However, R-422D requires an engineering assessment before retrofitting. Because MO99 is a closer match to R-22, no engineering assessment is required for most systems. Also, MO99 gives customers an opportunity to retrofit a wider range of equipment including air conditioning systems.
What size container does MO99 come in?	25 lb and 110 lb cylinders
Great Job!!!	Thank you. We have worked with many customers to develop this product.
Will new equipment be coming out with the MO99?	MO99 has been designed as a retrofit refrigerant, but it could be considered for new equipment designed for R-22. We have a published case history on <a href="http://www.isceon.com">www.isceon.com</a> for a new equipment installation using ISCEON MO99.
What are the friction characteristics between R-22 and MO99?	Friction characteristics are a function of the boundary layer properties of the pipe such as diameter and roughness and therefore not related to refrigerant properties.  ISCEON® MO99™ combines R-22 pressure - enthalpy characteristics with mineral oil compatibility in a unique HFC refrigerant that can be used to replace R-22 over a wide range of evaporator temperatures. If you would like to speak with a technical person please contact us at <a href="http://www.isceon.com">www.isceon.com</a> sales & support tab
When can we see presentation again because we thought it was at central standard time thanks?	Please see your local DuPont distributor.
I can see the potential of a low temperature system running in a vacuum with MO99 which we have strived to stay away from.	MO99 will run 2-3 lower suction pressure than R-22. If you would like to speak with a technical person please contact them at <a href="http://www.isceon.com">www.isceon.com</a> sales & support
Do we have field data on rooftops we could share or will it be on the website?	Field data was presented in the webinar presentation. Please see your local DuPont distributor.
If cap tube is sized; what's the capacity impact as valve opens further?	We have limited experience with cap tubes. This really depends on the system. If the cap tube can move 5 -10% higher refrigerant volume then it may be possible.
Will you have a line size chart specific for MO99 – is it on the web?	This data will be posted this month.
Where can I get the PT chart for MO99?	<a href="http://www.isceon.com">www.isceon.com</a> products page
What is the pricing for MO99?	Please see your local DuPont distributor.
Is it ok for heat pumps?	We have tests for heat pump applications in progress; however, we have not field tested heat pump applications. If you would like to complete product use testing with us that would be a great next step. Please contact us.
Are leak detectors compatible?	Yes.
Do you recommend use for new installations?	MO99 has been designed as a retrofit refrigerant, but it could be considered for new equipment designed for R-22. We have a published case history on <a href="http://www.isceon.com">www.isceon.com</a> for a new equipment installation using ISCEON MO99.
What are the health hazards?	MO99 has been classified as an A1 low toxicity refrigerant by ASHRAE. Please see MSDS sheet at <a href="http://www.isceon.com">www.isceon.com</a>
How does lower discharge temperature effect size of condenser?	There should be no effect on the size of the condenser.
Has DuPont sold MO99 to OEM manufacturer's?	No. Not yet.