BluOne

ENVIRONMENT FRIENDLY REPLACEMENT FOR R22/R404a/R407c/R507a

TDX20 BENEFITS FOR THE END USER

TRUE STRAIGHT "DROP-IN" ALTERNATIVE

ARC™ AU39692

- TdX 20 IS AN OPEX RATHER THAN A CAPEX EXPENSE AND CAN PAY FOR ITSELF IN **12-36 MONTHS**, PROVIDING AN ROI OF 35-100%
- BEST ECONOMIC OUTCOME, TDX20 **REDUCES ENERGY** CONSUMPTION BY 5-25%
- ENVIRONMENTALLY FRIENDLY - HAS A NON-FLAMMABLE A1 RATING, LOW CARBON FOOTPRINT, LOW GWP AND IS NON-OZONE DEPLETING

ARCTICK RESELLER

EPA AUTHORISED

SNAP APPROVED

R#458A ASSIGNED

COMMERCIALLY AVAILABLE

TDX20 BENEFITS FOR THE INSTALLER

ADVANTAGES EXTEND BEYOND JUST THE END USER

- POWERFUL NEW **REVENUE STREAM** WHILE ENHANCING CUSTOMER LOYALTY WITH SAVINGS AND GREEN TECHNOLOGY
- PROVEN, PROACTIVE WAY TO **INCREASE SYSTEM EFFICIENCY.** TRUE STRAIGHT "DROP-IN" WITH NO ADDITIONAL EQUIPMENT CHANGES REQUIRED
- **REDUCES EQUIPMENT FAILURE** + MAXIMISING SLA PROFITS UTILISING INSTALLER TIME ON HIGH-MARGIN SERVICES

SIGN UP FOR A TEST TRIAL TODAY! 90 DAY PRODUCT WARRANTY INCLUDED

DON'T REPLACE YOUR R-22 SYSTEM

UPGRADE IT

TdX | 20

To learn more, please visit us at *www.bluone.com.au*

Like us below on Facebook
or contact us at
info@bluone.com.au

BluOne

ROI CALCUALTOR RESULTS

1542 KW ELEC HVAC UNIT

TOTAL COST OF BLUON TdX 20 UPGRADE: $226,530

84%
ROI

1.24
ROI
in years

15,350
CO2 REDUCTION
(kg.)

15.35
CO2 REDUCTION
IN METRIC TONS

368
TREES PLANTED
TO SAVE CO2

21,024
KWH PER TON
(2,250 ANNUAL AVERAGE)

$0.17
COST PER KWH
(.12 NATIONAL AVERAGE)

$183,320
ANNUAL ELECTRICITY
SAVING FOR HVAC

35%
ESTIMATED ANNUAL
ELECTRICITY REDUCTION

$146.90
BLUON TDX 20 UPGRADE
PER ELEC KW

FEATURES

- **Proprietary Blend** of 5 EPA approved and commercially used refrigerants
- **True "drop-in"** R-22 replacement. No oil change or metering device change
- **Lower pressures** means substantially less leaking into atmosphere
- **Global Warming Potential** = 1650 (GWP) Lowest of ALL drop-in R-22 replacements
- **Ozone Depletion Potential** = 0 (ODP)
- **Non flammable** - A1 rating

BENEFITS

- **Extends equipment life.** Lower operating pressures, lower compressor temps and stabilized amp draw
- **Creates equal or superior capacity**. No loss of system performance
- **Reduces energy consumption by 20%** (Avg.) Lower amp draw + reduced run time. Tenants enjoy notable energy savings
- **Inexpensive installation.** Approx. same $100 - 175 per ton of capacity
- **Significant decrease to carbon footprint**

CASE STUDY

ST KILDA RESTAURANT & BAR

TECUMSEH HERMETIC UNIT

Walk in Coolroom

DPV Services, an air-conditioning and refrigeration company in Melbourne ran a field test on a 1/2 Tonne walk in cool room with separate 3 door under bench refrigeration unit to calculate energy savings and unit run time. TdX 20, the true drop in refrigerant with no oil or metering device change required, delivered significant benefits including lower amp draw, drop in discharge pressure and run time reduction in comparison to R22, results below.

Performance Results

Use of TdX20 resulted in the following energy savings:

Compressor savings

20.6%

Reduction of amps

Discharge Pressure

18.4%

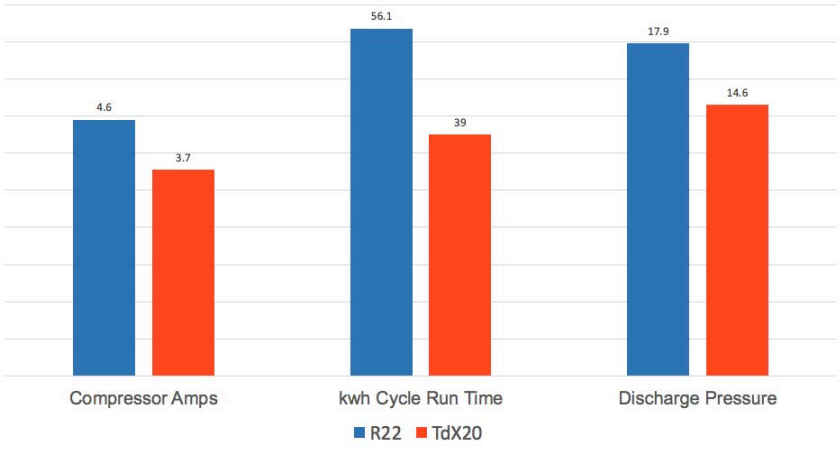
Less in a 24 hour day

Run Time Reduction

30.48%

Less per cycle

Results Comparison



Testing Comparison

R-22 to TdX 20

	R-22	TdX20
Compressor Amps	4.6	3.7
Discharge Pressure	17.9 BAR	14.6 BAR
60 Hour Cycle Run Time kwh	56.10 kwh	39 kwh

The recorded data was completed under similar conditions, including outside temperature, humidity and heat load.

Unit & Testing Information

DPV contractors tested TdX 20 against R-22 on the above 1/2 Tonne unit. They recovered the R-22 to an approved storage tank, replaced filter dryer and then evacuated the system to 500 microns. They then charged the unit to the factory charge recommendation with TdX 20. The optimum performance was achieved by adjusting the TX valve to the correct level of superheat as recommended by the manufacturer.

BluOne

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CASE STUDY EA5

SHOPPING CENTRE

APAC PACKAGE UNIT

HVAC UNIT

AMBIENT TEMP 19.1˚C

A large air-conditioning and refrigeration company in Melbourne ran a field test on a 14 year old, 20 Tonne roof mounted packaged unit. TdX 20, the true drop in refrigerant with no oil or metering device change required, delivers significant benefits including lower suction pressure and reduced cycle time in comparison to R438A, results below.

Performance Results

Use of TdX20 resulted in the following energy savings:

Package Unit kwh

17.5%

Reduction of kwh

Liquid Line Temperature reduction

10%

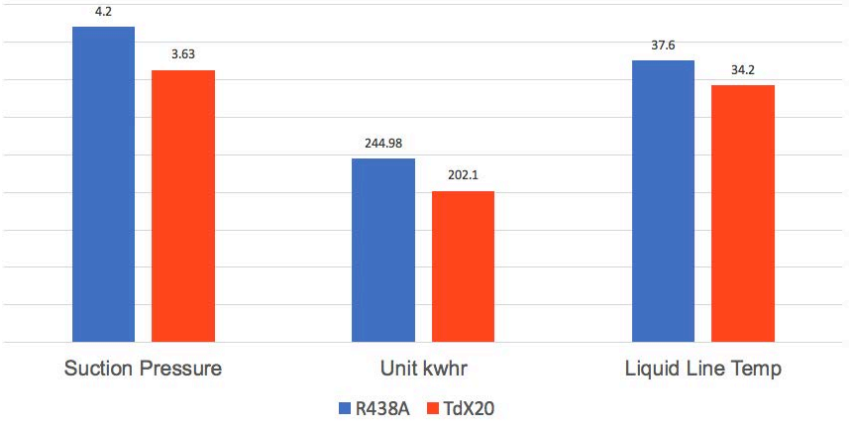
Less per cycle

Suction Pressure Reduction

25%

Less per cycle

Results Comparison



Testing Comparison

R-438a to TdX 20

	R-438a	TdX20
Unit Run Time (kwhr)	244.98	202.1
Liquid Line Temp	37.6	34.2
Suction Pressure	4.2 BAR	3.63 BAR

The recorded data was completed under similar conditions, including outside temperature, humidity and heat load.

Unit & Testing Information

The contractor tested TdX 20 against R-438a on the above 20 Tonne unit. They recovered the R-438a to an approved storage tank then evacuated the system to 500 microns. They then charged the unit to the factory charge recommendation with TdX 20. The optimum performance was achieved through the electronic TX valve to the correct level of superheat as recommended by the manufacturer.

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CASE STUDY

MEDPAC OFFICE

DAIKEN SPLIT UNIT

Heat Pump

DPV Services, an air-conditioning and refrigeration company in Melbourne ran a field test on a 7 year old 2 Tonne wall hung heat pump to calculate energy savings and unit run time in cooling mode. TdX20, the true drop in refrigerant with no oil or metering device change required, delivered significant benefits including lower amp draw reduced discharge and suction pressure in comparison to R22, results below.

Performance Results

Use of TdX20 resulted in the following energy savings:

Compressor savings

21%

Reduction of amps

Discharge Pressure reduction

6.4%

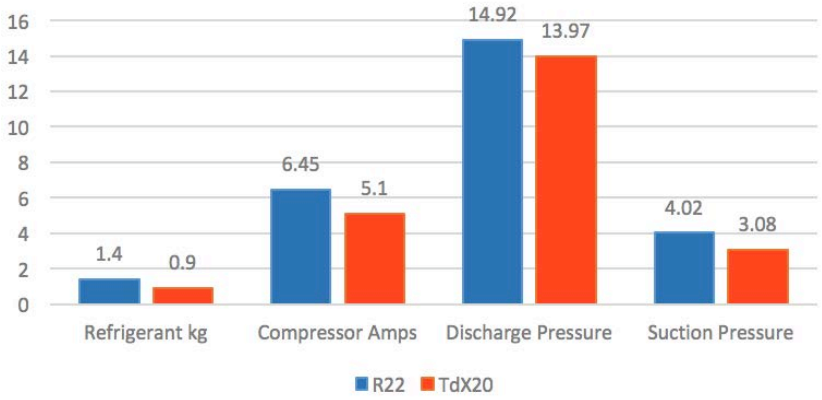
Less in a 24 hour day

Suction Pressure Reduction

23.4%

Less per cycle

Results Comparison



Testing Comparison

R-22 to TdX 20

	R-22	TdX20
Compressor Amps	6.45	5.1
Discharge Pressure	14.92 BAR	13.97 BAR
Suction Pressure	4.02 BAR	3.08 BAR

The recorded data was completed under similar conditions, including outside temperature, humidity and heat load.

Unit & Testing Information

DPV contractors tested TdX 20 against R-22 on the above 2 Tonne unit. They recovered the R-22 to an approved storage tank then evacuated the system to 500 microns. They then charged the unit to the factory charge recommendation with TdX 20. The optimum performance was achieved through the electronic TX valve to the correct level of superheat as recommended by the manufacturer.

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CASE STUDY EA7

SHOPPING CENTRE

APAC PACKAGE UNIT

HVAC UNIT

AMBIENT TEMP 27˚C

A large air-conditioning and refrigeration company in Melbourne ran a field test on a 14 year old, 4 stage, 40 Tonne roof mounted packaged unit. Three compressors were charged with R22 and one with R438a. TdX20, the true drop in refrigerant with no oil or metering device change required, delivers significant benefits including lower suction pressure and reductions in kWh's and Amp's in comparison to R22 & R438a, results below.

Performance Results

Use of TdX20 resulted in the following energy savings:

Package Unit kWh

38%

Reduction in kWh

Suction Pressure Reduction

31%

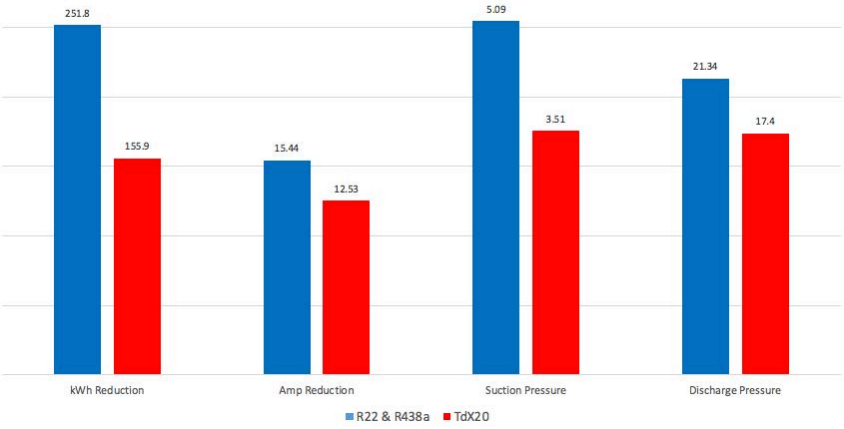
Less per cycle

Discharge Pressure Reduction

18.4%

Less per cycle

Results Comparison



Testing Comparison

R22 & R438a to TdX20

	R22 & R438a	TdX20
kWh Reduction	251.8 kWh	155.9 kWh
Amp Reduction	15.44A	12.53A
Suction Pressure	5.09 BAR	3.51 BAR
Discharge Pressure	21.34 BAR	17.4 BAR

The recorded data was completed under similar conditions, including outside temperature, humidity and heat load.

Unit & Testing Information

The contractor tested TdX20 against R22 & R438a on the above 40 Tonne unit. They recovered the R22 & R438a to an approved storage tank then evacuated the system to 500 microns. They then charged the unit to the factory charge recommendation with TdX20. The optimum performance was achieved through the setting the electronic TX valve to the correct level of superheat as recommended by the manufacturer.

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CASE STUDY EA7

SHOPPING CENTRE

APAC PACKAGE UNIT

HVAC UNIT

AMBIENT TEMP 27˚C

A large air-conditioning and refrigeration company in Melbourne ran a field test on a 14 year old, 4 stage, 40 Tonne roof mounted packaged unit. Three compressors were charged with R22 and one with R438a. TdX20, the true drop in refrigerant with no oil or metering device change required, delivers significant benefits including lower suction pressure and reductions in kWh's and Amp's in comparison to R22 & R438a, results below.

Performance Results Comparison

Use of TdX20 resulted in the following energy savings:

March 7th 2016 Average Temperature 27.4˚C (R22)
April 5th 2016 Average Temperature 27.5˚C (TdX20)

Compressor 1	R22	TdX20
Amp	15.86 A	13.28A
kWh	83.7 kWh	67.4 kWh

Difference	Reduction
2.58A	16.2%
16.3 kWh	19.4%

Compressor 2	R22	TdX20
Amp	15.69 A	12.02A
kWh	72.4 kWh	50.9 kWh

Difference	Reduction
3.67A	23.3%
21.5 kWh	29.7%

Compressor 3	R22	TdX20
Amp	15.36 A	13.13A
kWh	50.9 kWh	25.5 kWh

Difference	Reduction
2.23A	14.5%
25.4 kWh	49.9%

Compressor 4	R438a	TdX20
Amp	14.86 A	11.69A
kWh	44.8 kWh	12.1 kWh

Difference	Reduction
3.17A	21.3%
32.7 kWh	73%

Total Unit	R22	TdX20
Discharge Temp	102.01C	91.96C
Suction Pressure	5.09BAR	3.51BAR
Discharge Pressure	21.34BAR	17.4BAR

Difference	% Saving	RTR
95.9 kWh	38%	19%
Discharge Temp	**Suction Pressure**	**Discharge Pressure**
9.8%	31%	18.4%

The recorded data was completed under similar conditions, including outside temperature, humidity and heat load.

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CASE STUDY EA9

BLUECARE RETIREMENT VILLAGE

FUJITSU SPLIT UNIT

SPLIT UNIT

AMBIENT TEMP 30˚C

A refrigeration company, in conjunction with All Seasons Bayside Heating and Cooling, located in Cairns ran a field test on a Fujitsu 7 Kw roof mounted split unit. This unit was charged with R22. TdX20, the true drop in refrigerant with no oil or metering device change required, delivered significant benefits including lower suction pressure and reductions in kWh's and Amp's in comparison to R22, results below.

Performance Results

Use of TdX20 resulted in the following energy savings on a average 30C Day:

Split Unit kWh

48%

Reduction in kWh

Suction Pressure Reduction

16.1%

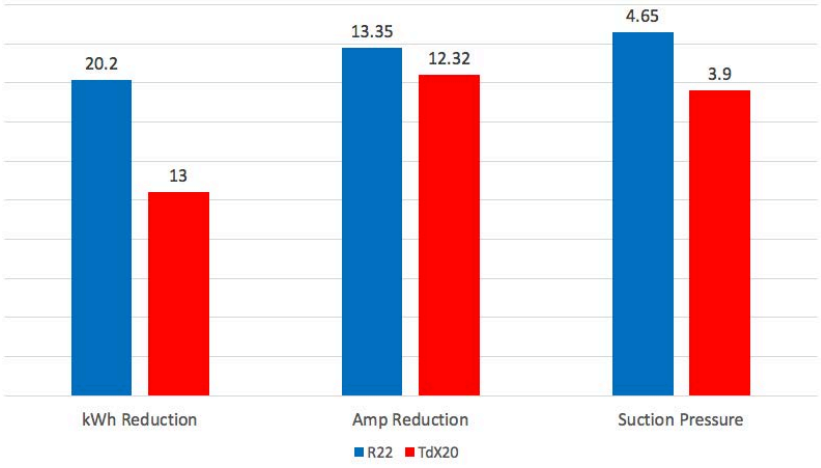
Less per cycle

Amp Draw Reduction

10.1%

Less per cycle

Results Comparison



Testing Comparison

R22 to TdX20

	R22	TdX20
kWh Reduction	20.2 kWh	10.5 kWh
Amp Reduction	13.39A	12.03A
Suction Pressure	4.65 BAR	3.9 BAR

The recorded data was completed under similar conditions, including outside temperature, humidity and heat load.

Unit & Testing Information

The contractor tested TdX20 against R22 on the above split unit. They recovered the R22 to an approved storage tank then evacuated the system to 500 microns. They then charged the unit to the factory charge recommendation with TdX20. The optimum performance was achieved through the setting the unit to the correct level of superheat as recommended by the manufacturer.

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CASE STUDY EA9

BLUECARE RETIREMENT VILLAGE

FUJITSU SPLIT UNIT

SPLIT UNIT

AMBIENT TEMP 29˚C & 30˚C

A refrigeration company, in conjunction with All Seasons Bayside Heating and Cooling, located in Cairns ran a field test on a Fujitsu 7Kw roof mounted split unit. This unit was charged with R22. TdX20, the true drop in refrigerant with no oil or metering device change required, delivered significant benefits including lower suction pressure and reductions in kWh's and Amp's in comparison to R22, results below.

Performance Results Comparison

Use of TdX20 resulted in the following energy savings:

Temperature 29C	R22	TdX20
Amp	13.38 A	11.77A
kWh	19.2 kWh	11.2 kWh

Difference	Reduction
1.61A	12%
8 kWh	41.67%

Temperature 30C	R22	TdX20
Amp	13.39 A	12.03A
kWh	20.2 kWh	10.5 kWh

Difference	Reduction
1.36A	10.21%
9.7 kWh	48.02%

kWh Results Temperature Comparison

Use of TdX20 resulted in the following kWh energy savings:

Temperature	29C	30C
R22	19.2 kWh	20.2 kWh
TdX20	11.2 kWh	10.5 kWh
Savings	41.67%	48.02%

Temperature Dates
29C 09/04/2016 - 29.6C - R22 28/04/2016 - 29.4C -TdX20
30C 13/04/2016 - 30.2C - R22 18/04/2016 - 30.0C - TdX20

The recorded data was completed under similar conditions, including outside temperature, humidity and heat load.

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CASE STUDY

CITY COUNCIL

75kW APAC PACKAGE UNIT

HVAC UNIT

AMBIENT TEMP 6.5˚C

A large air-conditioning and refrigeration company in Melbourne ran a field test on a 9 year old, 2 stage, 75kW roof mounted APAC packaged unit under heating mode. These compressors were charged with R407c. TdX20, the true drop in refrigerant with no oil or metering device change required, delivers significant benefits including reductions in kWh's and Amp's in comparison to R407c, results below.

Performance Results

Use of TdX20 resulted in the following energy savings under heating mode:

Package Unit kWh Reduction

18.86%

Reduction in kWh

Suction Pressure Reduction

6.98%

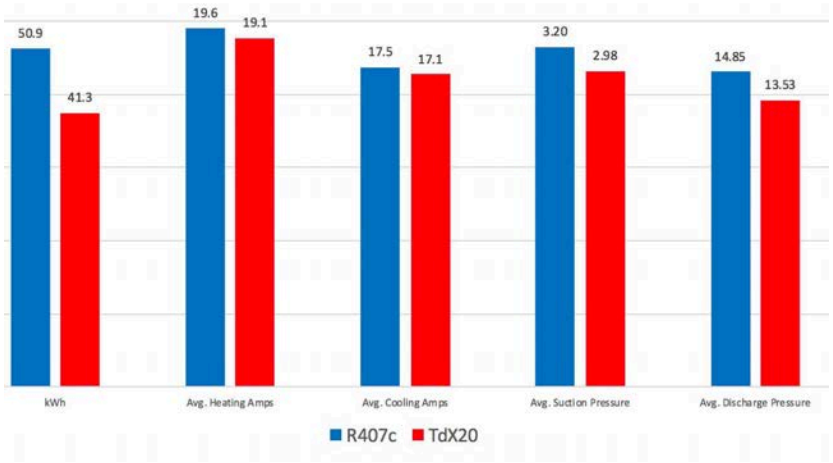
Less per cycle

Discharge Pressure Reduction

8.9%

Less per cycle

Results Comparison



Testing Comparison*

R407c to TdX20

	R407c	TdX20
kWh	50.9 kWh	41.3 kWh
Avg. Heating Amps	19.6 A	19.1 A
Avg. Cooling Amps	17.5 A	17.1 A
Avg. Suction Pressure	3.20 BAR	2.98 BAR
Avg. Discharge Pressure	14.85 BAR	13.53 BAR

The recorded data was completed under similar conditions, including outside temperature, humidity and heat load.

Unit & Testing Information

The contractor tested TdX20 against R407c on the above 75kW unit. They recovered the R407c to an approved storage tank then evacuated the system to 500 microns. They then charged the unit to the factory charge recommendation with TdX20. The optimum performance was achieved through the setting the bi-flow TX valve to the correct level of superheat as recommended by the manufacturer.

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CASE STUDY

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A large air-conditioning and refrigeration company in Melbourne ran a field test on a 9 year old, 2 stage, 75kW roof mounted APAC packaged unit under heating mode. These compressors were charged with R407c. TdX20, the true drop in refrigerant with no oil or metering device change required, delivers significant benefits including reductions in kWh's and Amp's in comparison to R407c, results below.

Performance Comparison

Use of TdX20 resulted in the following energy savings:

System 1 Heat	R407c	TdX20
Amp	19.6 A	19.1 A
kWh	25.4 kWh	21.3 kWh

Difference	Reduction
0.5 A	2.55%
4.1 kWh	16.1%

System 2 Heat	R407c	TdX20
Amp	19.8 A	18.6 A
kWh	25.5 kWh	20 kWh

Difference	Reduction
1.2 A	6%
5.5 kWh	21.56%

Performance of Capacity

Use of TdX20 resulted in the following proof of no capacity losses:

COP	R407c	TdX20
System Heat 1	3.81	5.07
System Heat 2	4.44	4.51
System Cool 1	4.21	4.28
System Cool 2	4.64	4.66

TdX20	Difference	Saving
4 Hour Reading	9.6 kWh	18.86%
10.25 Hour Reading	25.2kWh	18.86%

The recorded data was completed under similar conditions, including outside temperature, humidity and heat load.

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R22 REPLACEMENT ALTERNATIVES

There are multiple alternative refrigerants in the Australian market that have been created to counteract the phase out of R22. Some of these alternatives cause reductions in capacity, higher pressures/leakages and require retrofitting of equipment. There are currently no alternatives in the market that provide energy savings to the customer until now.

TdX20 provides a solution for companies to continue using their current equipment. In addition to the average potential energy savings of 20%, this refrigerant also provides the same/better capacity (vs R22) and increases the equipment longevity.

MANUFACTURER		bluon ENERGY	SEVERAL - OFF PATENT	DUPONT	ICOR INTERNATIONAL	Dynatemp
PRODUCT	R-22	TdX 20	R-407C	MO99	NU22	R-421A
ENERGY EFFICIENCY INCREASE/DECREASE	Baseline	+5 to +25%	-5% to -10%	-10% to -20%	-10% to -20%	-15% to -25%
CAPACITY	Baseline	Equal (can be slightly more or less)	Slight Decrease	Slight Decrease	Notable Decrease	Notable Decrease
VAPOR PRESSURE AT 100°F (psig)	195.9	164.7	196.1	187.3	182.9	181.0
LATENT HEAT OF VAPORIZATION (kJ/kg)	234	239	244	211	192	188
MOLECULAR WEIGHT (g/mol)	86.5	89.9	86.2	99.1	108.5	111.7
MASS FLOW RATE (%)	Baseline	-1	-2	+12	+20	+21
GWP	1810	1650	1774	2265	2526	2631
OZONE DEPLETING POTENTIAL (ODP)	Yes	None	None	None	None	None
ASHRAE SAFETY RATING	A1	A1	A1	A1	A1	A1
EQUIPMENT MODIFICATION	Baseline	None	Oil change required	None	None	None
OIL COMPATIBILITY	MO, AB	MO, POE, AB	POE	MO, POE, AB	MO, POE AB	MO, POE AB
WARRANTY	No	**Yes**	No	No	No	No

For more information visit www.bluone.com.au or contact us at info@bluone.com.au

TdX 20 IS A TRUE DROP-IN WITH NO OIL OR METERING DEVICE CHANGE REQUIRED

TdX 20 CAN PAY FOR ITSELF IN 12-36 MONTHS AND PROVIDES AN ROI OF 35-100%

BluOne

R22 REPLACEMENT

Frequently Asked Questions

What is TdX 20?
TdX 20 is a non-ozone depleting, drop-in refrigerant replacement for R-22 HVAC equipment, delivering equal to or superior capacity performance, energy savings and extended equipment life. TdX 20 is a blend of five commercially-used refrigerants.

What is the patent status of TdX 20?
Bluon TdX 20 is a patented formula. There are several utility patents currently filed surrounding TdX 20's unique blend, chemistry and multi-phase characteristics. The first of these patents are now searchable as of December 2015. It should be noted, that an older patent affiliated with Bluon's early work appears in some search results, this patent and the related product was completely abandoned by Bluon Energy in favor of a new direction that led to our current product, TdX 20.

How does TdX 20 perform from a capacity standpoint?
TdX 20 creates equal to or better capacity than R-22 as demonstrated in extensive field testing and third-party independent testing. Other R-22 replacement refrigerants make claims of "comparable capacity," however extensive tests and HVAC market feedback indicate they simply don't perform at R-22 levels. TdX 20 is the first R-22 updgrade that truly performs equal to R-22 and creates equal to or superior capacity.

How does TdX 20 produce energy savings benefits?
TdX 20 works with your existing equipment and compressor to reduce energy consumption by an average of 20% versus R-22. TdX 20 creates this energy savings via reduced amp draw to the compressor combined with a reduction in the compressor cycle time.

What is the estimated payback or ROI related to installing TdX 20?
While energy savings and electricity costs can vary, the payback for installing TdX 20 is typically between 18 - 36 months with an ROI of 35% - 75%.

How does TdX 20 stack up against other Energy Efficiency Measures (EEMs)?
TdX 20 represents one of the most cost effective EEM available today. TdX ranks in the top 5% of EEMs as measured by the EPA's cost per kWh saved.

What applications are not recommended for TdX 20?
TdX 20, as with all blended refrigerants, should not be used in flooded evaporators, centrifugal compressors or certain receivers in build-up refrigeration systems without consulting your HVAC service provider.

In what applications can TdX 20 be used?
TdX 20 can be used as a drop-in replacement for R-22 in commercial and residential air conditioning and heat pump equipment. TdX 20 is compatible with Liebert, Data Aire, Carrier, Lennox, Trane, BPD, APAC, Climate Master, Bryant, York, American Standard Liberty and Payne type systems.

How does TdX 20 compare to other R-22 replacement options on the market?
TdX 20 performs substantially better from an efficiency and capacity standpoint based on extensive field testing and third-party comparative testing.

In what applications can TdX 20 be used?
TdX 20 can be used as a drop-in replacement for R-22 in commercial and residential air conditioning and heat pump equipment.

How do I try TdX 20 today?
Manufacture and sale of TdX 20 for commercial and residential air conditioning and heat pumps is now approved by the EPA and is available for purchase online at www.bluone.com.au

Does TdX 20 meet AHRI standards?
Yes, TdX 20 refrigerant meets the AHRI 700 Standard for refrigerants. AHRI certification programs only test and certify HVAC&R equipment performance.

What is the ASHRAE flammability rating for TdX 20?
TdX 20 has an ASHRAE safety group classification of A1, non-flammable and lower toxicity.

What are the Global Warming Potential ("GWP") and ozone depletion characteristics of TdX 20?
TdX is 100% non-ozone depleting and has the lowest GWP rating of all drop-in R-22 refrigerant alternatives at 1,650. Additionally, through the energy savings created by using TdX 20, a substantial decrease in CO_2 emissions from electricity generation is realised. By using TdX 20, you significantly reduce your carbon footprint.

What is the installation process?
TdX 20 is easy to install. After the current refrigerant is evacuated from the system, charge the unit with TdX 20 using BluOne's installation procedure. No modifications to the infrastructure or the system are required.

Will I need to make any changes to my equipment or infrastructure to use TdX 20?
No. TdX 20 is a true drop-in replacement for R-22 systems.

Is a change to the oil or metering device (i.e. orifice or expansion device) required?
No. There is no oil change needed and no expansion device/TXV replacement required. TdX 20 works with standard oils including MO, PAG, POE and AB.

Will changing the metering device (i.e. orifice or expansion device) have an effect with TdX 20?
While replacing a metering device is not required, replacing a fixed metering device with a TXV can optimize equipment performance.

How much system charge is required with TdX 20?
Optimum unit performance is expected to be achieved with 80% - 100% of the factory charge or R-22 recovered, per circuit, depending on equipment manufacturer and age.

Does a mixture of oil types (e.g Mineral and POE) in a system have any effect on the miscibility / return of the oil?
No. TdX20 utilises a proprietary lubricant which enables the product to be used in both Mineral and POE oil.

Assuming that this refrigerant is a Zeotrope blend, what are the recommendations regarding top-up / re-use of gas if a leak has been found in a large system?
We recommend that a system can be "topped off" with TdX20 in a system with a loss up to 20%. In large systems, the impact of fractionation will actually be reduced.

What effect does a leak found in area of a system where refrigerant is in mixed state i.e. liquid and vapor have on the remaining refrigerant within the system?

If a leak occurs in a mixed state, and assuming the system is running, the impact of fractionation will be minimised.

What effect does a leak found in area of a system where the refrigerant is in one state i.e liquid or vapour have on the remaining refrigerant within the system?

Leaks that occur in the vapour areas will increase the impact of fractionation, while leaks occouring in the liquid phase will have a insignificant impact on fractionation.

If you would like more information on TdX 20, please email us at info@bluone.com.au

For more information visit www.bluone.com.au or contact us at info@bluone.com.au

TdX 20
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R22 REPLACEMENT

TdX20 Temperature Glide

The temperature glide for TdX 20 in Fahrenheit and Celsius is provided below. Both were calculated based on a liquid saturation point of 68° F or 20°C.

The temperature glide for TdX 20 in Fahrenheit is 11.05 F and is calculated as follows:

Saturated Liquid (Bubble Point) = 114.7 psig = 68.00° F
Saturated Vapor (Dew Point) = 114.7 psig = 79.05° F
79.05 – 68.00° F = 11.05° F Temperature Glide

The temperature glide for TdX 20 in Celsius is 6.1° C and is calculated as follows:

Saturated Liquid (Bubble Point) = 114.7 psig = 20.00° C
Saturated Vapor (Dew Point) = 114.7 psig = 26.14° C
26.14 – 20.00° C = 6.14° C Temperature Glide

Since the temperature glide is a differential between when the blend first starts boiling and when it reaches saturated vapor, a conversion of Fahrenheit to Celsius will not work. The differential needs to be determined separately for each temperature measure as indicated above.

BLUON TdX 20 CONVERSION PROCEDURE

TdX 20 is a drop-in R-22 replacement refrigerant that requires no equipment or compressor oil modification and is installed following industry standard installation practices. Some system adjustments may be needed, i.e. TXV adjustment and/or other control set points.

1. Record data. Check system operation and record baseline data.

2. Recovery. Recover 100% of the R-22 in accordance with EPA guidelines. Weigh and record the amount of R-22 removed from each circuit. This information will be used for the TdX 20 charge.

+ When possible choose a cool time of day to perform recovery to increase speed.
+ Evacuation equipment and process can significantly impact recovery time.
- *See Bluon Energy Recovery Best Practices Guide.*

3. Replace the filter drier with manufacturer's recommended filter optimized for use with HFC refrigerants. Check and replace any seals, if necessary.

4. Place system under vacuum. Evacuate to 500 microns. Check for leaks using normal service practices.

5. Charge system. Invert the TdX 20 cylinder a couple of times and charge with the cylinder inverted as indicated by the arrows on the cylinder box and charge liquid only. *(Do not attempt to charge the system to match R-22 operating pressures)*

+ Adjustable metering devices/TXV equipped systems

-**Initially charge to 80%** of either the R-22 recovered, per circuit, or 80% of the nameplate charge, whichever is less.
-Slowly increase charge using desired **Subcooling** as your guide.
- **Subcooling** (bubble temperature minus actual liquid line temperature).
  - Determine discharge pressure. Reference liquid (bubble point) column on TdX 20 PT chart to determine equivalent bubble temperature.
- Obtain actual liquid line temperature.

- Adjust TXV to desired **Superheat** (actual suction line temperature minus dew temperature). **The TXV will likely need to be closed by 1-4 or more full turns.**
  - Obtain the actual suction line temperature.
  - Determine vapor pressure from suction line. Reference vapor (dew point) column on the TdX 20 PT chart to determine equivalent temperature.

+ Fixed metering device equipped systems

- **Initially charge to 80%** of either the R-22 recovered, per circuit, or 80% of the nameplate charge, whichever is less.
- Slowly increase charge using desired **Superheat** as your guide. The system should respond quickly with each increase in charge.
  - **Superheat** (actual suction line temperature minus dew temperature)
    - Obtain the actual suction line temperature.
    - Determine vapor pressure from the suction line. Reference vapor (dew point) column on TdX 20 PT chart to determine equivalent temperature.

6. Fine tune for maximum performance. Performance will be enhanced when **Superheat** is correct. Note: In larger systems, check your superheat multiple times for the first hour after installation as it may shift while reaching its equailibrium pressure and temperature.

7. Label compressor and outside unit to designate it has been charged with TdX 20.

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R22 REPLACEMENT

Temperature / Pressure Comparison PT Chart

Temp (C)	Temp (F)	Liquid (Bubble) (psig)	Vapor (Dew) (psig)
-17.78°C	0	22.6	13.5
-17.22°C	1	23.4	14.1
-16.67°C	2	24.2	14.8
-16.11°C	3	25.1	15.5
-15.56°C	4	25.9	16.1
-15.00°C	5	26.8	16.9
-14.44°C	6	27.6	17.6
-13.89°C	7	28.5	18.3
-13.33°C	8	29.4	19.0
-12.78°C	9	30.3	19.8
-12.22°C	10	31.2	20.6
-11.67°C	11	32.2	21.3
-11.11°C	12	33.1	22.1
-10.56°C	13	34.1	22.9
-10.00°C	14	35.1	23.8
-9.44°C	15	36.1	24.6
-8.89°C	16	37.1	25.5
-8.33°C	17	38.1	26.3
-7.78°C	18	39.2	27.2
-7.22°C	19	40.2	28.1
-6.67°C	20	41.3	29.0
-6.11°C	21	42.4	29.9
-5.56°C	22	43.5	30.9
-5.00°C	23	44.6	31.8
-4.44°C	24	45.8	32.8
-3.89°C	25	46.9	33.8
-3.33°C	26	48.1	34.8
-2.78°C	27	49.3	35.8
-2.22°C	28	50.5	36.8
-1.67°C	29	51.7	37.8
-1.11°C	30	53.0	38.9
-0.56°C	31	54.2	40.0
0.00°C	32	55.5	41.1
0.56°C	33	56.8	42.2
1.11°C	34	58.1	43.3
1.67°C	35	59.5	44.5
2.22°C	36	60.8	45.6
2.78°C	37	62.2	46.8
3.33°C	38	63.6	48.0
3.89°C	39	65.0	49.2
4.44°C	40	66.4	50.5
5.00°C	41	67.8	51.7
5.56°C	42	69.3	53.0
6.11°C	43	70.8	54.3
6.67°C	44	72.3	55.6
7.22°C	45	73.8	56.9
7.78°C	46	75.4	58.3
8.33°C	47	76.9	59.6
8.89°C	48	78.5	61.0
9.44°C	49	80.1	62.4
10.00°C	50	81.7	63.8

Temp (C)	Temp (F)	Liquid (Bubble) (psig)	Vapor (Dew) (psig)
10.56°C	51	83.4	65.3
11.11°C	52	85.0	66.7
11.67°C	53	86.7	68.2
12.22°C	54	88.4	69.7
12.78°C	55	90.2	71.3
13.33°C	56	91.9	72.8
13.89°C	57	93.7	74.4
14.44°C	58	95.5	76.0
15.00°C	59	97.3	77.6
15.56°C	60	99.2	79.2
16.11°C	61	101.0	80.9
16.67°C	62	102.9	82.5
17.22°C	63	104.8	84.2
17.78°C	64	106.8	86.0
18.33°C	65	108.7	87.7
18.89°C	66	110.7	89.5
19.44°C	67	112.7	91.3
20.00°C	68	114.7	93.1
20.56°C	69	116.8	94.9
21.11°C	70	118.8	96.8
21.67°C	71	120.9	98.6
22.22°C	72	123.1	100.6
22.78°C	73	125.2	102.5
23.33°C	74	127.4	104.4
23.89°C	75	129.6	106.4
24.44°C	76	131.8	108.4
25.00°C	77	134.1	110.5
25.56°C	78	136.3	112.5
26.11°C	79	138.6	114.6
26.67°C	80	141.0	116.7
27.22°C	81	143.3	118.9
27.78°C	82	145.7	121.0
28.33°C	83	148.1	123.2
28.89°C	84	150.5	125.4
29.44°C	85	153.0	127.7
30.00°C	86	155.5	129.9
30.56°C	87	158.0	132.2
31.11°C	88	160.5	134.5
31.67°C	89	163.1	136.9
32.22°C	90	165.7	139.3
32.78°C	91	168.3	141.7
33.33°C	92	170.9	144.1
33.89°C	93	173.6	146.6
34.44°C	94	176.3	149.1
35.00°C	95	179.1	151.6
35.56°C	96	181.8	154.1
36.11°C	97	184.6	156.7
36.67°C	98	187.5	159.3
37.22°C	99	190.3	162.0
37.78°C	100	193.2	164.7

Temp (C)	Temp (F)	Liquid (Bubble) (psig)	Vapor (Dew) (psig)
38.33°C	101	196.1	167.4
38.89°C	102	199.0	170.1
39.44°C	103	202.0	172.9
40.00°C	104	205.0	175.6
40.56°C	105	208.1	178.5
41.11°C	106	211.1	181.3
41.67°C	107	214.2	184.2
42.22°C	108	217.3	187.2
42.78°C	109	220.5	190.1
43.33°C	110	223.7	193.1
43.89°C	111	226.9	196.1
44.44°C	112	230.2	199.2
45.00°C	113	233.4	202.3
45.56°C	114	236.8	205.4
46.11°C	115	240.1	208.6
46.67°C	116	243.5	211.7
47.22°C	117	246.9	215.0
47.78°C	118	250.4	218.2
48.33°C	119	253.8	221.5
48.89°C	120	257.4	224.9
49.44°C	121	260.9	228.2
50.00°C	122	264.5	231.7
50.56°C	123	268.1	235.1
51.11°C	124	271.8	238.6
51.67°C	125	275.5	242.1
52.22°C	126	279.2	245.7
52.78°C	127	282.9	249.2
53.33°C	128	286.7	252.9
53.89°C	129	290.6	256.6
54.44°C	130	294.4	260.3
55.00°C	131	298.3	264.0
55.56°C	132	302.3	267.8
56.11°C	133	306.2	271.6
56.67°C	134	310.3	275.5
57.22°C	135	314.3	279.4
57.78°C	136	318.4	283.4
58.33°C	137	322.5	287.4
58.89°C	138	326.7	291.4
59.44°C	139	330.9	295.5
60.00°C	140	335.1	299.6
60.56°C	141	339.4	303.8
61.11°C	142	343.7	308.0
61.67°C	143	348.0	312.2
62.22°C	144	352.4	316.5
62.78°C	145	356.9	320.8
63.33°C	146	361.3	325.2
63.89°C	147	365.8	329.7
64.44°C	148	370.4	334.1
65.00°C	149	375.0	338.7
65.56°C	150	379.6	343.2

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TdX20 Pressure - Enthalpy Diagram (SI Units)

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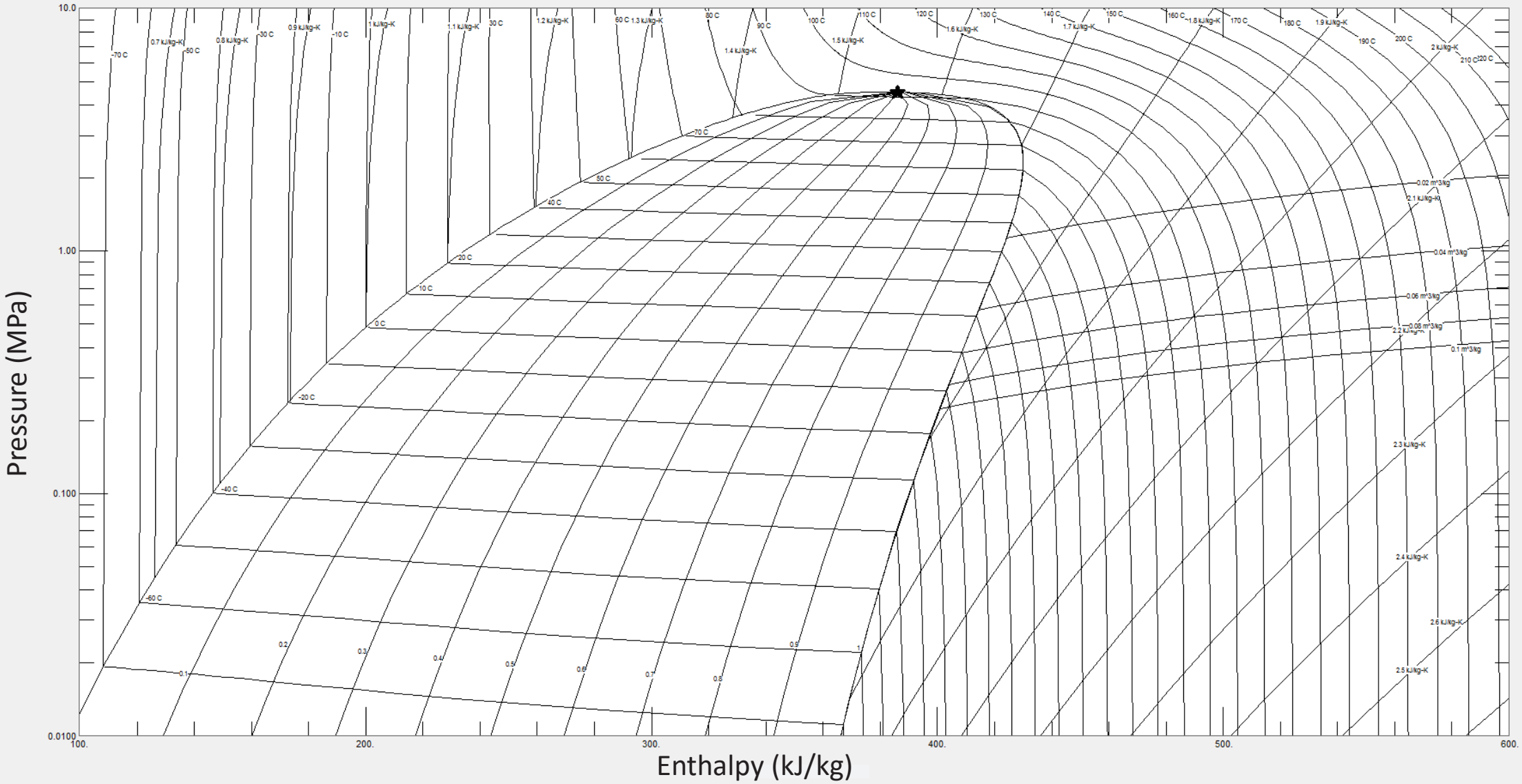

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TdX20 Pressure - Enthalpy Diagram (English Units)

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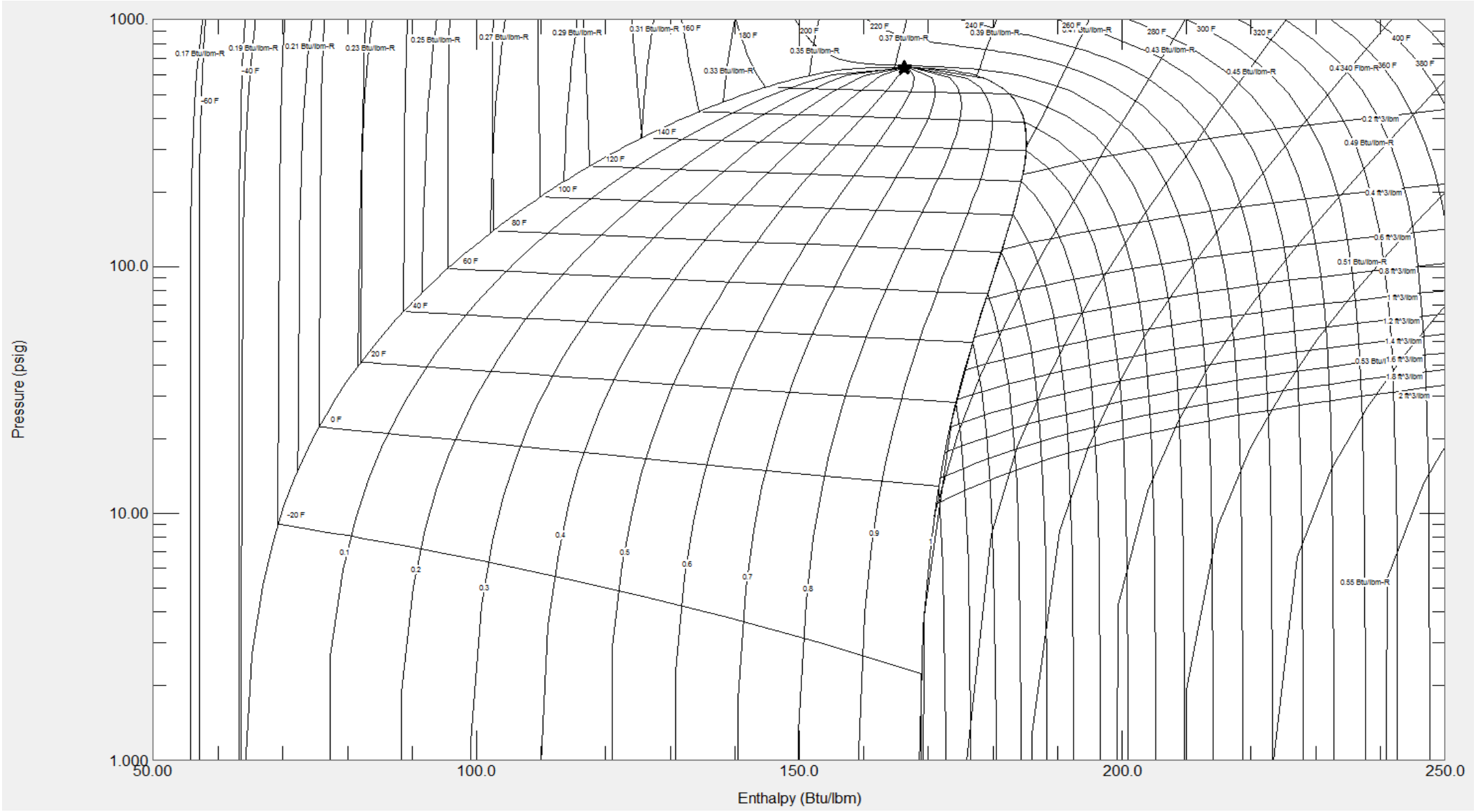

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R22 REPLACEMENT

Temperature / Pressure Comparison PSIG

Temperature (C)	TdX	R22	R410A	R407C	R134A	R404A
-51	9.4	12.4	0.4	16.0	--	--
-48	8.4	9.7	2.6	13.6	--	--
-46	7.4	6.6	5.1	11.0	--	--
-43	6.2	3.2	7.8	8.0	16.9	2.0
-40	4.9	0.6	10.9	4.6	14.8	4.3
-37	3.4	2.6	14.2	0.9	12.5	6.8
-34	1.7	4.9	17.9	1.6	9.8	9.6
-32	0.2	7.4	22.0	3.9	6.9	12.7
-29	2.3	10.2	26.4	6.5	3.7	16.0
-26	4.5	13.2	31.3	9.2	0.1	19.7
-23	7.1	16.5	36.5	12.3	1.9	23.6
-21	9.9	20.1	42.2	15.9	4.1	27.9
-18	12.9	24.0	48.4	19.6	6.5	32.6
-15	16.3	28.3	55.1	23.6	9.1	37.7
-12	19.9	32.8	62.4	28.0	11.9	43.1
-9	23.9	37.8	70.2	32.8	15.0	49.0
-7	28.3	43.1	78.5	38.0	18.4	55.3
-4	33.0	48.8	87.5	43.6	22.1	62.1
-1	38.0	55.0	97.2	49.6	26.1	69.3
2	43.5	61.5	107.5	56.1	30.4	77.1
4	49.5	68.6	118.5	63.1	35.0	85.4
7	55.8	76.1	130.2	70.6	40.1	94.2
10	62.7	84.1	142.7	78.7	45.4	103.6
13	70.0	92.6	156.0	87.3	51.2	113.6
16	77.9	101.6	170.1	96.8	57.4	124.2
18	86.3	111.2	185.1	106.6	64.0	135.5
21	95.2	121.4	201.0	117.1	71.1	147.4
24	104.8	132.2	217.8	128.4	78.7	160.1
27	115.0	143.6	235.6	140.4	86.7	173.4
29	125.8	155.7	254.4	153.1	95.2	187.5
32	137.3	168.4	274.3	166.5	104.3	202.4
35	149.5	181.8	295.3	180.8	114.0	218.1
38	162.5	195.9	317.3	195.9	124.2	234.6
41	176.2	210.8	340.6	211.9	135.0	252.1
43	190.7	226.4	365.1	228.7	146.4	270.4
46	206.0	242.8	390.9	246.5	158.4	289.6
49	222.2	260.0	418.0	265.3	171.2	309.9
52	239.3	278.0	446.5	285.0	184.6	331.2
54	257.3	296.9	476.5	305.8	198.7	353.5
57	276.3	316.7	508.0	327.6	213.6	337.0
60	296.3	337.4	451.2	350.5	229.2	401.7
63	317.4	359.0	576.0	374.6	245.7	427.7

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BluOne Delivery Timelines

From: / Transit Days	Adelaide	Alice Springs	Brisbane	Broome	Cairns	Darwin	Katherine	Mackay	Melbourne	Perth	Sydney	Tennant Creek	Townsville
Adelaide		3	4	7	6	4	4	7	2	5	3	3	5
Alice Springs	3		6	5	8	3	3	9	4	6	6	2	8
Brisbane	4	6		7	3	4	6	2	3	5	2	6	3
Broome	7	6	8		7	2	5	9	7	2	8	5	7
Cairns	6	8	3	7		7	8	6	6	8	5	8	2
Darwin	5	3	5	3	6		2	8	6	5	6	2	6
Katherine	5	3	5	5	8	2		9	7	7	7	2	6
Mackay	7	8	3	9	2	7	9		6	8	5	9	2
Melbourne	2	4	3	7	6	4	7	6		4	2	5	5
Perth	5	7	6	3	8	5	7	9	5		5	7	8
Sydney	3	5	2	8	5	5	7	5	2	5		6	4
Tennant Creek	4	2	6	7	8	3	3	9	5	7	6		8
Townsville	7	8	3	7	2	6	6	2	5	7	4	8	

- Contact prior to 1.00pm for a same day Pickup
- After 1.00pm same day subject to availability.
- Transit times are measured on working days ONLY and starts from the day AFTER the freight is collected or received in.
- Regional transit times are available on request from Client Services.
- Any out of the ordinary pickup requirements, please provide advance notice.

8 March, 2016

Joe Coetzer

CEO

Bluone

BLUON TDX 20 FLAMMABILITY AND TOXICITY

Please see the below response form Bluon Energy Corporation regarding the A1 rating of TdX 20 and the concern of R32 as a component of TdX 20.

1) Bluon Energy Corporation Response:

"We, like many other blends, use other refrigerants in our blend to suppress the flammability characteristics of R32. In TdX 20, we utilize three components (R125, R227ea, and R236fa) with fire suppressant capabilities which allow our product to have a non-flammable A1 rating."

Richard Honnette
VP Operations
Bluon Energy Corporation

2) Further Information:

In addition, please see the associated flammability reference from our EPA SNAP Application (page 6) and the associated summary from Chilworth stating TdX 20 is non-flammable, representing a flammability rating of 1. The toxicity can be summarized to state that all five components of TdX 20 are in the safety group classification of A. The ASHRAE 34 Standard Safety Group Classification for TdX 20 is A1.

Kind Regards

Joshua Buckley
Partner & VP Global Sales
Bluon HVAC Solutions

Client: Bluon Energy, LLC.

Contact: **Richard Honnette**
Job title:
Report No: BE15776/1214/ANK
Report date: 12/20/14
CTI Ref: **BE15776/ANK**

Fractionation and Flammability Study for Refrigerant Blend TdX 20

Prepared by... .....

Andrew Kusmierz
Senior Process Safety Specialist

FOR AND ON BEHALF OF CHILWORTH TECHNOLOGY, INC.

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PAGE NO.

1 SUMMARY

At the request of Bluon Energy, Chilworth Technology (CTI) performed an ASHRAE Std 34 based fractionation/flammability study of the refrigerant blend R32/125/134a/227ea/236fa.

Tests performed validated computer model used for simulations of leak scenarios required by the standard, as well as found the blend to be non-flammable.

The blend nominal composition is given by R32/125/134a/227ea/236fa [redacted]

Part II - ALTERNATIVE-SPECIFIC INFORMATION

Section A - PHYSICAL AND CHEMICAL PROPERTIES – See Appendix B to the Instructions to see which properties apply to which uses.

1. Molecular weight **89.89** kg/kmol (g/mol)	2. Physical state at 20 ºC **Gas** (Condenses under pressure)
3. Melting point at 1 atm. pressure **- 103º C**	4. Boiling point at 1 atm. pressure **- 39.9 ºC**
5. Specific gravity **1.18 (20ºC)** g/ml	6. Odor threshold **Not determined** mg/m^3
7. Solubility using solvent **Unknown** @ temperature ºC	g/L
8. Solubility in water @ temperature **Not determined** ºC	
9. Partition coefficient **Unknown**	Log K_{ow} Log K□
10. Vapor pressure @ 20º C **93.1 psig** (Also provide vapor pressure-temperature curve for refrigerants.)	11. Critical temperature **92.0ºC** / 12. Critical Pressure **656.1 psia**
13. Are spectra attached? **No**	14. Disassociation constant **Not applicable**
15. Particle size distribution **Not applicable**	16. Volatilization from soil **Unknown**
17. Volatilization from water **Unknown**	18. Viscosity @ 20 ºC **0.1744 cP**
19. pH@concentration **Not applicable**	20. Thermal conductivity (for foam blowing agents) **Not applicable**
21. Adsorption coefficient **Not applicable**	22. Flammability limits (LFL, UFL) **None** % vol
23. Flash point **None per ASTM E681-09**	24. Heat of combustion **604 kJ/mol**
25. Maximum pressure rise **None for nonflammable**	26. Maximum rate of pressure rise **None for nonflammable**
27. Other (specify) NIST REFPROP Ver. 9.1 **TdX 20 Pressure – Temperature Chart**	

28. Flammability: Provide any information on flammability concerns. For example, if any abatement techniques are being used to minimize the risks associated with flammable substances or mixtures, detail those techniques below. If a substitute is flammable, an assessment of overall risk in each end-use may be required. For flammable refrigerants, provide a fault tree analysis for each end use. For flammable foam blowing agents used in spray foam, provide a training program that addresses flammability concerns specific to this substitute. (See Appendix B to Instructions for sector-specific data requirements for flammable substances).

TdX 20 is non-flammable at Worst Case of Formulation (WCF) and Worst Case of Fractionation for Flammability (WCFF) as per ASTM E681 Standard and the ASHRAE Standard 34-2013.

See attached Fractionation and Flammability Study provided by Chilworth Technology, Inc. (a DEKRA company).

Mark (X) this box if this page contains CBI ☐

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R22 REPLACEMENT

TdX | 20

TdX 20 is a true “drop-in” with no oil or metering device change required. It is the only refrigerant purpose built for energy efficiency, equal to or superior cooling capacity and cost savings. Performance of TDX20 improves capacity, reducing set temperatures and run time during each cycle faster than R-22. Over 24 hours of operation run time reductions of up to an hour and a half have been observed.

- GLOBAL WARMING POTENTIAL IS 1650 (GWP) LOWEST OF ALL DROP IN R-22 REPLACEMENTS
- 6 YEARS OF IMPERICAL TESTING TO UNCOVER THE UNIQUE PHENOMENA OF OUR MULTI-PHASE TECHNOLOGY
- TdX 20 CAN PAY FOR ITSELF IN 12-36 MONTHS AND PROVIDES AN ROI OF 35-100%
- PROPRIETARY BLEND OF 5 EPA APPROVED AND COMMERCIALLY USED REFRIGERANTS
- REDUCES ENERGY CONSUMPTION BY 20% (AVG.) LOWER AMP DRAW AND REDUCED RUN TIME
- SIGNIFICANT DECREASE IN CARBON FOOTPRINT

DON’T REPLACE YOUR R22 SYSTEM
MAKE IT PERFORM BETTER AND LAST LONGER

UPGRADE IT TO

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