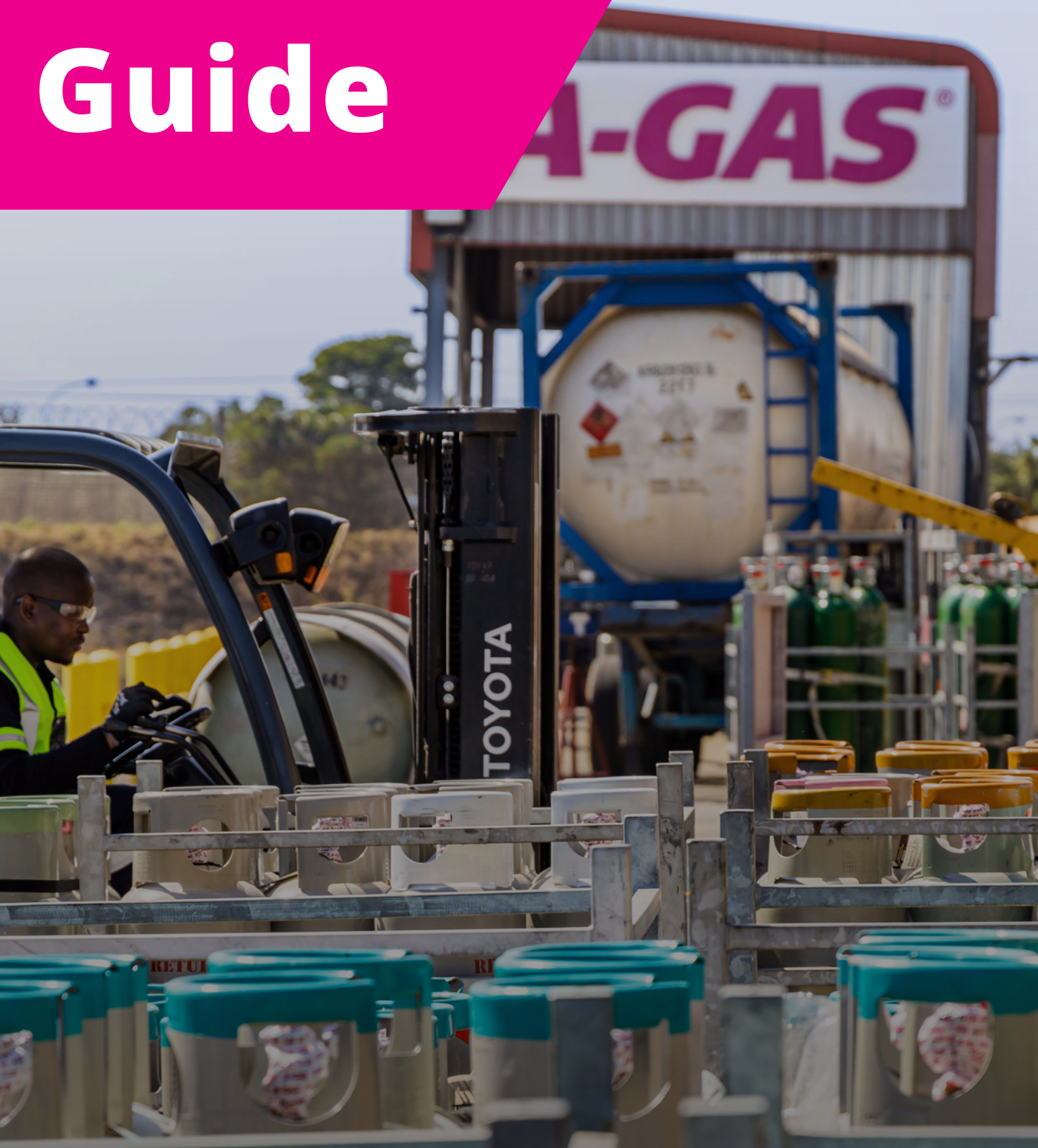


Retrofit Guide

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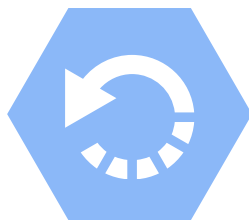
1. IDENTIFY YOUR REFRIGERANT

Before retrofit works select an alternative refrigerant. The selection is based on **operational parameters** as well as **system design**. A-Gas can assist in the selection of the most appropriate refrigerant solution for your system. Call our team on +27 (0)21- 551-8790 or complete the contact us form on our website www.agas.com.

2. RECORD OPERATIONAL DATA



Recording the system operational parameters to establish the equipment normal operating conditions is recommended. Data should include pressure / temperature measurements throughout the system; including the main compressor suction and discharge along with condenser and evaporator conditions. This information will be **invaluable when calibrating the system to the new refrigerant**.



3. RECOVER THE CURRENT CHARGE AND RECORD THE QUANTITY OF REFRIGERANT RECOVERED

The **existing charge should be recovered**, and its **weight recorded**. Recovery should be carried out using a suitable recovery machine capable of achieving a good evacuation level to ensure that there is **minimum vapour left in the system**. The charge has to be **collected in a recovery cylinder** for safe and legal refrigerant disposal via an approved route. A-Gas, in conjunction with our wholesaler partners, have a fleet of recovery cylinders with the required waste Consignment Documentation. **A-Gas recovery cylinders are NOT SUITABLE for Ammonia or Hydrocarbons**. For more information on our cylinder tracking and cylinder management tool, GTO please visit www.gastrakonline.com.

4. CHOOSE COMPRESSOR LUBRICANT



A-Gas recommends that you use a **lubricant approved by the compressor manufacturer**. Check with the compressor manufacturer for the **approved viscosity grade of lubricant** for the compressor in the system being retrofitted. A-Gas through our wholesaler partners supply a range of high quality Poly Ester Oil (POE) called Emkarate lubricants.

Please note, A-Gas recovery cylinders are NOT SUITABLE for Ammonia. A-Gas have developed a Gas management solution tool; Gas-Trak Online. For more information about how GTO can provide a tracking and cylinder management tool please visit [Gas Track Online](http://www.gastrakonline.com).



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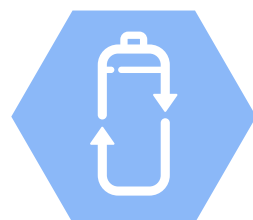
5. DRAIN THE LUBRICANT AND RECORD THE QUANTITY OF LUBRICANT REMOVED

Drain the **compressor of lubricant**, not forgetting to include the oil separators and/or suction accumulators. **Record the volume of lubricant removed from the system.** This value will be used as a guide to determine the quantity of new lubricant required.

6. CHANGE LUBRICANT FILTERS (IF PRESENT)



If the system has lubricant filters, **change these filters at the same time.** New filters will help to protect the system and minimize the amount of original oil charge left within the system. It is advisable to **flush the system with a suitable flushing fluid** to ensure all residual oil is removed from the system. A-Gas through our wholesaler partners supply a flushing fluid called A-Flush.



7. RECHARGE COMPRESSOR AND COMPONENTS WITH THE CORRECT GRADE OIL

Add correct volume of suitable oil the **compressor and oil separator**, the volume of oil drained as described above can be used as a guide.

8. EVALUATE THE EXPANSION DEVICE



Most **expansion valves** should operate satisfactorily with the chosen retrofit refrigerant but **may require an alternative orifice or changing completely.** A-Gas recommends consulting with the equipment manufacturer before carrying out a retrofit.



9. REPLACE SEALING DEVICES

If **converting from an HCFC** there is a requirement to **replace all elastomeric ("O" Ring) seals** as required. (This should not be required if changing from a current HFC to an alternative HFC or HFO).

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10. REPLACE THE FILTER DRIER

Following any system maintenance, it is good service practice is to **replace the filter drier**. Contact your wholesaler to obtain a replacement filter drier **compatible with the retrofit** refrigerant.

11. CHECK FOR SYSTEM LEAKS

Check the system for leaks using normal service practices.

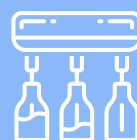


12. EVACUATE THE SYSTEM

To ensure **removal of air and other contaminants**, it is recommended to **evacuate the system to a vacuum level of 2 Torr or better**, with the evacuation pump connected to both the high and low pressure side of the system. Attempting to evacuate a system with the pump connected to only the low side of the system does not guarantee complete removal of moisture and other contaminants. **Use a good electronic gauge to measure the vacuum** as standard refrigeration gauge manifolds are not calibrated for this low pressure.

13. CHARGE SYSTEM WITH RETROFIT REFRIGERANT

When **charging the system with the new refrigerant**, it is important to note that the majority of retrofit products are blends and not pure single component refrigerants. For this reason, **specific charging procedures are required to ensure optimal system performance**. It is essential when using any refrigerant from the 400 series, (Zeotropic Refrigerants) that the system be liquid charged. Vapor-charging a 400 series blend can result with an inaccurate refrigerant composition and may damage the system. **A-Gas cylinders are equipped with a dual port valve to simplify liquid charging**.



NOTE: To prevent compressor damage, **do not charge liquid into the suction line of the unit.**

A-GAS recommend initially charging the system with 90-95% by weight of the original charge.

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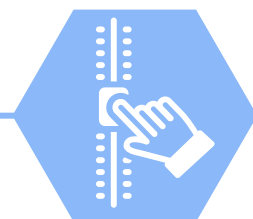
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14. CHECK SYSTEM OPERATION

Start the system and let conditions stabilise. Compressor suction saturation pressures for the new refrigerant after stabilisation may not be similar to that of original operating conditions. Compressor discharge pressures may differ from the original operation. The **condenser fan and ambient controls may require adjustment.** It may be necessary to reset the high pressure cutout to compensate for the changes to operational pressures of the system. This procedure should be done carefully to avoid exceeding the system conditions.

15. ADJUST REFRIGERANT CHARGE, IF NECESSARY



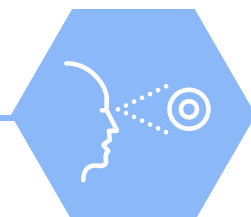
The **required quantity of charge will depend upon the original charge and which product is to be used**, contact A-Gas for guidance on this. To avoid overcharging the system it is best to charge the system by **first measuring the operating conditions** (including discharge and suction pressures, suction line temperature, compressor amps, and super heat) before **using the liquid sight glass as a guide.** Use dew-point pressure as a reference in determining the appropriate saturated temperature for a superheat setting. To determine the saturated temperature for a sub cooling calculation, use bubblepoint pressure.



16. LABEL COMPONENTS AND SYSTEM

After retrofitting the system, it is a **requirement to label the system**, in accordance with relevant standards to identify the **type of refrigerant** along with its **GWP, total System GWP**, the **type of lubricant** (by brand name) and **viscosity grade** in the system. This will help ensure that the proper refrigerant and lubricant will be used to service the equipment in the future.

17. MONITOR THE SYSTEM



Observe system operating parameters. Check the **condition of the oil.** It may become necessary to change the oil and oil filters along with suction filters (if fitted) shortly after the retrofit has taken place since the retrofit activity can cause material to be returned to the compressor. **A-Gas offers a range of analysis services.** For more information please visit our website or contact us on +27 (0) 21- 551-8790.

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Checklist

- ☐ Record operational data for original system performance (current, suction pressure, discharge pressure, super-heat, sub-cooling etc.).
- ☐ Recover refrigerant charge using appropriate recovery equipment.
- ☐ Record the amount of refrigerant recovered (required for waste documentation as well as calculating new charge requirements).
- ☐ Choose compressor oil. Consult compressor manufacturer for recommendations.
- ☐ Drain the existing oil from the compressors, separators and oil reservoirs.
- ☐ Measure amount of oil recovered.
- ☐ Change / clean compressor oil filters if present.
- ☐ Evaluate the expansion devices; consult the valve manufacturers for recommendations. Some systems may require new valves or orifice assembly components.
- ☐ If converting from an HCFC there is a requirement to replace all elastomeric ("O" Ring) seals as required (this should not be required if changing from a current HFC to an alternative HFC or HFO).
- ☐ Replace filter driers and suction filters.
- ☐ Recharge the system with the correct grade and specification of oil; use the same amount that was removed.
- ☐ Leak check the system and make repairs as required
- ☐ Evacuate the system.
- ☐ Charge the system with new refrigerant. For guidance on quantity contact A-Gas. Remember to liquid charge from the cylinder. The initial charge should be approximately 90 -95% of the advised charge by weight with final adjustment being made during final commissioning of the equipment. Record the amount of refrigerant charged.
- ☐ Check system operation and operating controls. The operational pressures may be different to original and condenser fan and ambient controls may require adjustment to allow for this.
- ☐ Adjust refrigerant charge if necessary
- ☐ Label components and the system with the type of refrigerant and lubricant including quantities used.
- ☐ Monitor the system observing the condition of the oil. Change filters as necessary. The retrofit activity changes to operational conditions may return oil and other residues from the original installation to the compressor unit

