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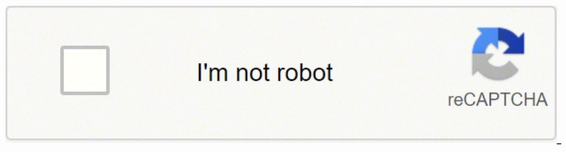

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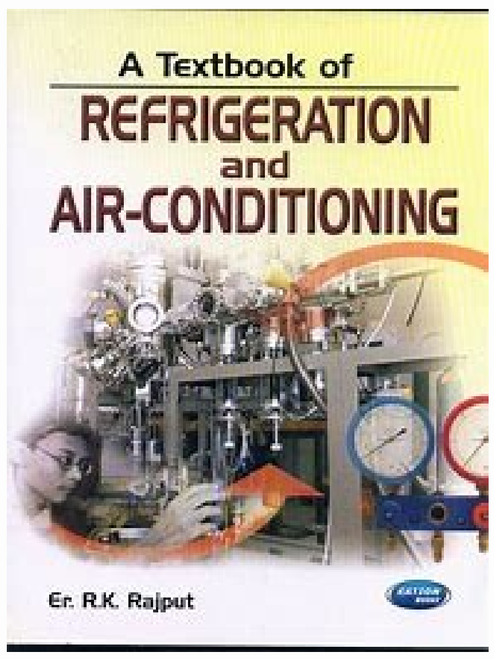

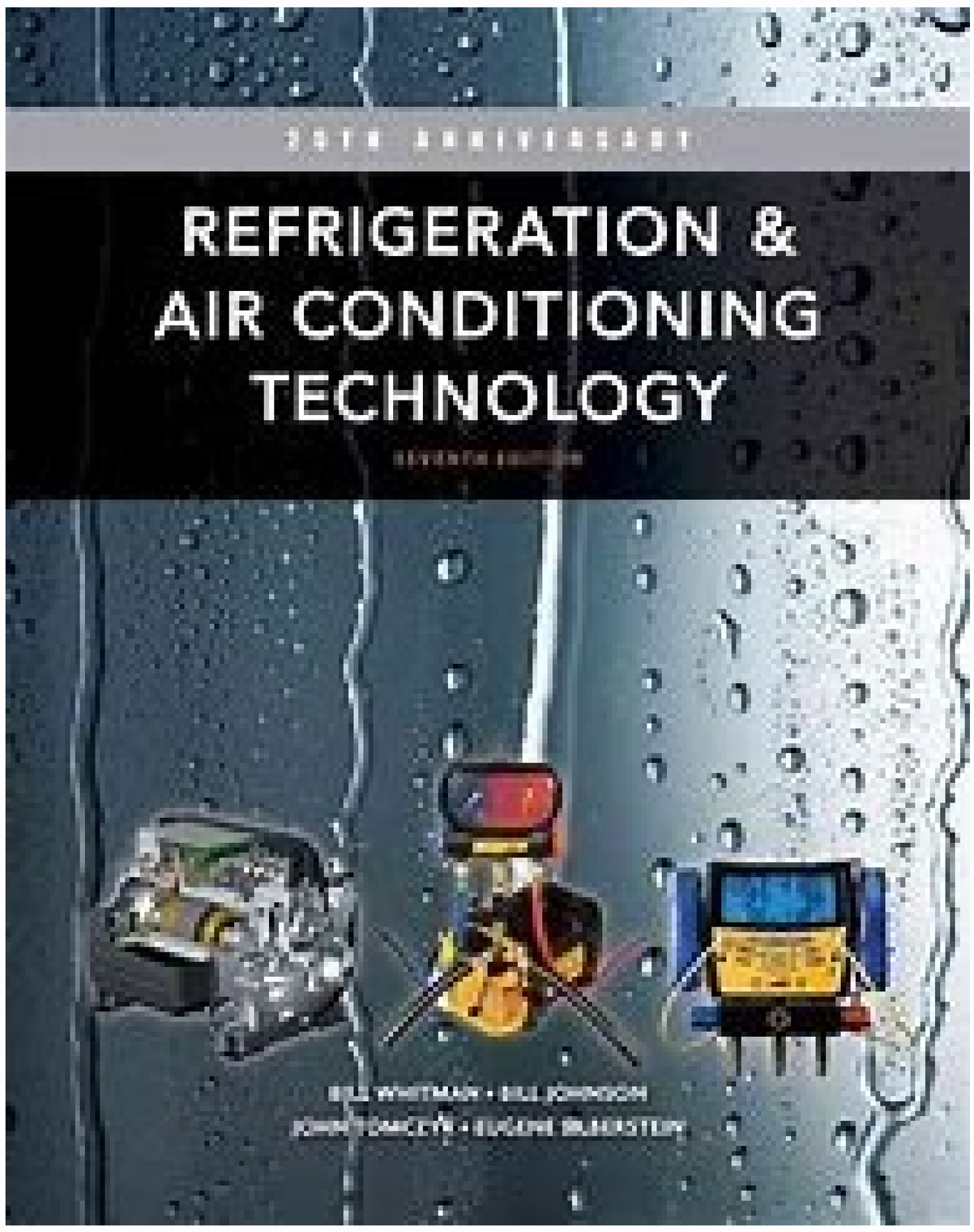

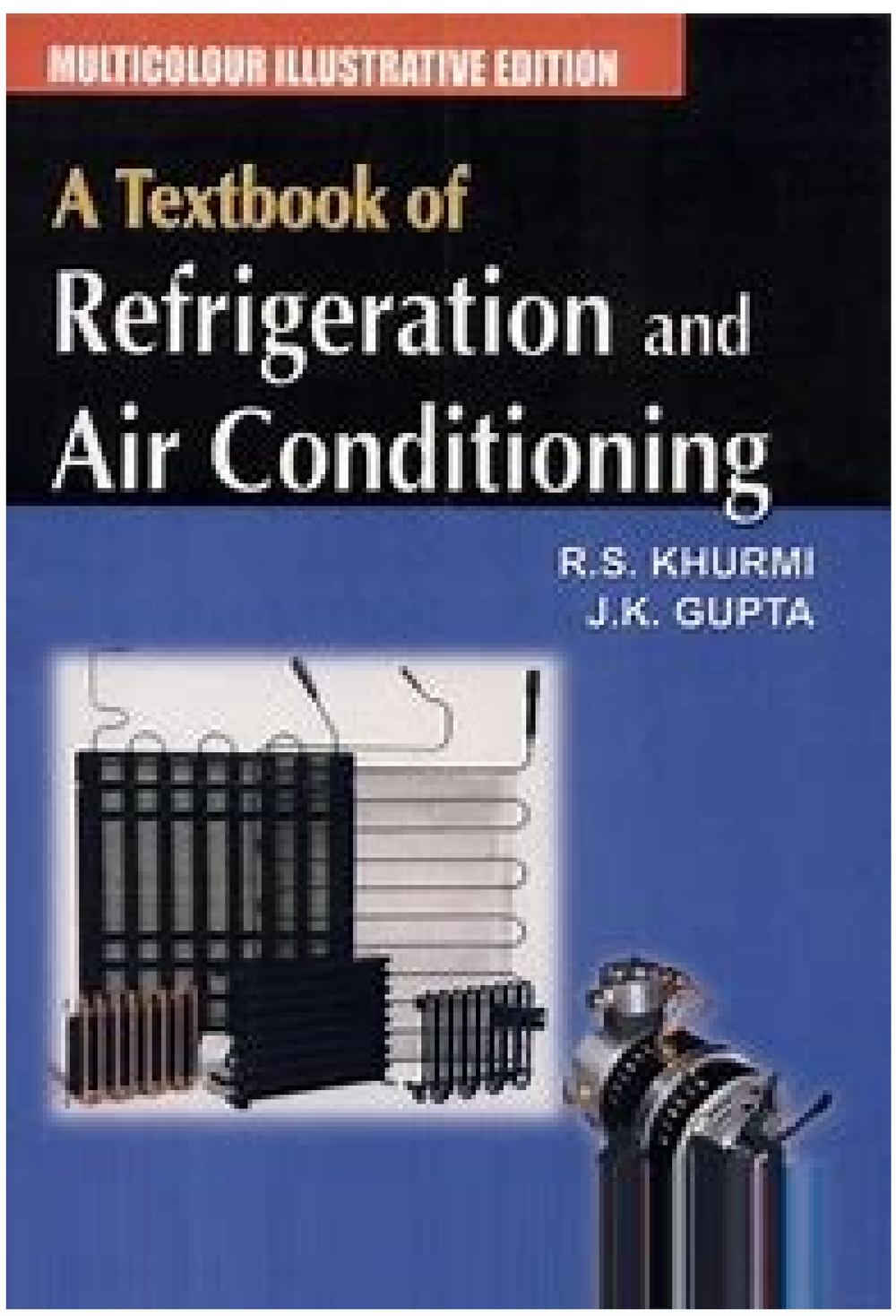
MULTICOLOUR ILLUSTRATIVE EDITION
A Textbook of
Refrigeration and
Air Conditioning
R.S. KHURMI
J.K. GUPTA


CONTAINER
REFRIGERATION

Refrigerants used today. Refrigerants. Refrigerant and oil. Refrigerants chart.

Inspectedia does not tolerate conflicts of interest. We have no relationship with advertisers, products or services discussed on this website. Amount of refrigerant charge for air conditioners and heat pumps: This series of air conditioning repair articles discusses the diagnosis and correction of abnormal pressing pressures as a means to evaluate the status of the compressor engine of Air conditioning, which in turn, is a way into how we evaluate and correct the loss or reduction of air conditioning refrigeration capacity. We explain how the overload or refrigerant subload is detected in an air conditioning or heat pump and we list the effects of overloaded or subloaded refrigerant. We discussed how to diagnose refrigerant pressure problems; How to determine the proper amount of refrigerant charge. Definitions of the HVACR pressures Â «Top side» and Â «lower side»; typical pressures of the refrigerant; Effects of overloaded or subloaded coolant. We also provide an Ass Index for this topic, or you can test the upper or lower page Search Box as a quick way to find the information you need. What are the typical pressures of the air conditioning system or heat pump during normal operation? Measuring the refrigerant pressure in the air conditioning, the heat pump or other cooling systems can diagnose a series of operating problems, including A leakage of refrigerant, overload or under load. Refrigerant pressure readings, measurements in the compressor unit / air conditioning capacitor and that are too low on the high pressure side (compressor output) or on the low pressure side (input of the compressor or suction line), they can indicate a problem with compressor capacity to develop normal pressure ranges and, therefore, affect the cooling capacity of the air conditioning system. The output pressures of the abnormally high compressor are possible but less likely. Content of the series of refrigerant articles Gas properties Replacements / substitutes GWP1 Fuel pressure Graphs & Details R22 R22 Remaining life, R22 REFRIGERANT PRISIONS R32 R 410A replacement R410A R410A R475 REFRIGERANT PRISIONS R134A Domestic HVAC, “Freon” Short service life, HFC Substitute for CFC 1430 REFRIGERANT R134 no less flammable PRESSIONS R290 Pure HC Propane R12, R22, R134A Also evaluated as sub for R502 3 Flamable R290 PRESSURE CHART [PDF] 3 R402A / HP80 HCFC Blend R502 to R402A CHART [PDF] 13 R404A Short life remaining2 to 3922 to R404A PRESS LETTER [PDF] 4 R407H Mixture of R32, R125, R134A, non-ozone resistant R22 / R-404A? 1490 PRESS LETTER R407H non-flammable [PDF] 5 R408A / FX10 HCFC Blend, ForaneÂ® R502 to R 408A PRESS MAP [PDF] 13 R410A Domestic HVAC Short residual life at 2088 to R410A REFRIGERANT PRESSIONS R448A Mixture of HFCs and HFO combined R32, R125, R134A, R1234YF, R1234ZW R404A or R507 12 73 non-flammable R448A / N40 PRESS LIST [PDF] 6 R449A Mixture of HFCs and HFO R404A 1282 non-flammable R449A PRESS LIST [PDF] 7 R452A Mixture of HFCs and HFO until 1945 PRESS LIST LIST R452A Non-flammable [PDF] 8 R502 CFCs, Freon (chloropentafluoroethane) R-22 / R115 to R502 PRESS CART [PDF] 12 R507 50%-50% Mixture of R-125 and R-143A R22, R502 to R507 PRESS CART [PDF] 11 R600A Iso-butane 3 Flamable R600A PRENSURE CHART [PDF] 9 R134YF Automotive AC R134A 4 Flamable R1234YF PRENSURE CHART [PDF] 10 R1234ZW [citation required] Â Â Â Â Notes to the table above GWP = Global Warming Potential. By 2025, high global warming potential (GWP) refrigerants with a GWP of more than 750, will be banned together with HVACR equipment that uses this gas. R404A, commercial use banned after 2020, is replaced by R448A, R449A, R452A, R407H. R290 PT Chart, A-Gas, Units 7 & 8 Gordano Court Serbert Close Portishead, Bristol BS20 7FS UK, +44 1275 376 600 Offices worldwide, website: www.agas.com, accessed 2020/02/10 Original source: R490 PT Chart, A-Gas, op. cit. accessed Source: R407 Data, Daikin Chemical Europe GmbH am wehrhahn 50 40Â 211 DÃf1Â "4SEldorf, Germany Phono: + 49Â 211 -179Â 225-0 Fax: + 49Â 211-179Â 225-39 Daikinchem.de, recovered 2020/02/10 Original source: . PDFR407H: zeotropic mixture of 32.5% by weight R32, 15% R125, and 52.5% R134A. It is a refrigerant for R404A / R507 and a refrigerant for R22. Data R448A, (N40) Press and temperature, FSW op. CIT. Recovered on 2020/02/10 Original source: alternative graphic: R448A data SOLSTICEÂ ,Â® N40 = R448A [PDF] Honeywell Advanced Materials 115 Tabor Road Morris Plains, NJ 07Â 950 Honeywell-refrigerants.com Recovered 2020/02/10 Original Source: WP-CONTENT / UPLOADS / 2018/02 / SPM-FLP-00643-PT-CHART-SOLSTICE-N40_3X5_LR.PDF R449A / XP40 DATA, FSW Cannock Delta House, Fairway, Bridgtown, Cannock, Staffordshire, WS11 0DJ Email Sales @ FSW. uk.com tel: 01Â 543 437Â 010 recovered 2020/02/10 Original source: . PDF R452 DATA, FSW, OP CIT., Recovered 2020/02/10 Original Source: .pf R600a Data, ISO-Butane, A-Gas, OP. CIT. Recovered 2020/02/10 Original source: R600A DATA, ISO-Butane, A-Gas, OP. CIT. Recovered 2020/02/10 Original source: ï © R507 Data, Agas, Op. Cit., ëf R502 Datra, R502 is replaced by R402A / R-408A, recovered at 2020/02/10 Original source: À- R402A data, refrigerant change guidelines R-502 A R-402A / R-408A [PDF] (2005) Copeland / Emerson TECNOLOGÍ AS, 1675 W. CAMPBELL ROAD SIDNEY, OH 45365-0669 (937) 498-3011 EXCERPOCIOS DE COPELEST-CORP.COM: Copeland does not beat the wholesale change of CFC refrigerants to HCFCS or HFCS. If a system is not escaping refrigerant to the atmosphere, and is working properly, there is no technical reason for replacing the CFC refrigerant. In fact, changing the refrigerant can annul U.L. List of the unit. However, once the decision has been made to make the change of R-502 to the interim R-402A or R-408A, the following guidelines are recommended. R-402A / R-408A should be used only on systems that currently use R-502. It should not be mixed with R-502 or any other refrigerant nor should it be used to replace CFC-12 or HCFC-22 R408A data, see # 13 above. The comparison of the pressure / ambient temperature for refrigerants, the notes to the table above are the vapor pressures unless otherwise indicated [6], the alternative table for the pressure and temperature of R448A (N40), FSW OP . CIT. Recovered 2020/02/10 Original Source: Air conditioning high side and low The lateral pressures first explain the pressure of the compressor of the air conditioner "on low side" and "on high side" and what they mean. Air conditioners and training manuals See: Low compressor air conditioner Engine pressure: This is the pressure in the refrigerant scroll line of the air conditioner (low lateral pressure during compressor operation) and this will be a number Relatively low, less than 100 Psi.Duting operation operation The refrigerant is returning to the cooling coil compressor (evaporator) in this line. If we connect the suction line directly to a sealed vacuum test indicator, actually, we would find that the compressor could pull a real on the line. We used to use a rotating compressor engine of “old Frigidaire” design as our vacuum pump when we needed to take air out of a refrigeration system before charging it with new The lower side of an air conditioning system is always located inside the space to cool down, or inside an air controller that moves air through the space to cool down. By lowering the pressure on the cooling coil located on the “low side” of the air conditioning system, the compressor allows the liquid coolant to be discharged into the cooling coil where the change of coolant status from a liquid to a gas absorbs the heat and brings the cooling coil to the temperature of proper functioning. The low side of a refrigeration system is half low pressure and low temperature system. Normally, this is the indoor air controller, located inside the space that will cool down by bringing the indoor air to the operating temperature. (For a refrigerator, this is typically from 38 to 45 Â° F.) High air conditioner compressor pressure: The output (high pressure next to the operation) is the pressure of the compressed refrigerant gas as it leaves the compressor engine. In other words, the refrigerant gas returns to the compressor via the suction line of the cooling coil (which cools the building air). The low-pressure refrigerant gas is compressed to a high-pressure refrigerant gas inside the compressor engine. This high temperature refrigerant gas is then cooled down to condense into a coolant before it is returned indoors to the air controller and evaporator coil that will be used to cool the construction air. (Therefore, we get the name of the “condensation coil” and “condensation unit” or “condenser” for the external half of an air conditioning system). Components on the top side of an air conditioning system, such as the compressor, the condensation coil, and the fan unit used to cool the condensation coil is located outside the space or refrigerated, and will be immersed in the air at room temperature, let's say 72 ° F.ho where the magic of air conditioning occurs. While the compressor can produce a temperature in the outdoor condensation coil that is above the ambient, environmental air temperature, It will flow from the condensation coil to the outer air (for example, outer air blown through the condensation coil by a fan). If you studied the thermodymother at high school, he learned that heat always flows from the safer to the coldest material. The effect is to transfer the heat collected in the interior or conditioned space to the outside air. The high side of a cooling system is at high temperature and the highest pressure (refrigerant) and will always be above room temperature. Thus, in a cooling system it will be outside to transfer heat to the outside air. A heat pump designed to pump the heat in a building, of course, reverted in T-22hese roles when in heating mode. Temperature pressure graphics for common refrigerant HFC R-134A Table of pressure / temperature temperature Ambient in Â ° F1 R134A Steam pressure on sea level R-134A Low lateral pressure R-134A Lateral pressure Alta3 65.71 F (18 ° C) 65 PSIG 25 -35 PSI / 172-241 KPA 135-155 PSI / 931-1069 kPa 69.24 ° F (21 ° C) 70 psig 35-40 PSI / 241-276 KPA 145- 160 PSI / 1000-1103 KPA 75.86 Â ° F (24 ° C) 80 PSIG 35-40 PSI / 241-310 KPA 150-170 PSI / 1034-172 KPA 90.37 Â ° F (32 ° C) 105 psig 45 -55 PSI / 310-379 KPA 250-270 PSI / 1724-1862 KPA 100.40 Â ° F (38 ° C) 125 PSIG 50-55 PSI / 345-379 KPa 315-325 PSI / 2172-2241 KPA 109.4 Â ° F (43 ° C) 145 PSIG 50-55 PSI / 345 -379 KPA 340-345 PSI / 2344-2379 KPA Notes to the Table About Other Refrigerant Properties R134A View a full table of pressure / HFC R-134A In HFC R-134A pressure temperature table - source cited below. R134A temperature / pressure relationship: See table on R134A Alternative name: 1,1,2-tetraflurotane or CH2FCF3 R134A Eblication point: Ã‚,26.3 Â ° C (Ã‚,15.34 ° F) to the pressure rich atmosphere (sea or 1 ATM) R134A density: 0.00425 g / cm3, gas-shaped: this is a molar mass of r134a colorless: 102.03 g / mol R134A Gas Cylinder Identification: Light Blue R134A Condition: Some efforts to eliminate the use of this refrigerator, replacing it with HFO-1234YF or OTHR OTHR 1. Exterior room temperature 2. Typica Low pressure or suction side, may vary according to the equipment and the measurement controls 3. High typical lateral pressure, may vary according to the equipment 4. These PSIG readings for the R-134A are what It is expected that the pressure of the gas is in a closed container at the given temperature and in a steady state. HFC R-134a Pressure Temperature Chart [PDF], Pacific Sea Breeze Marine Products, 100 Grace Way, Scotts Valley, CA 95 066 USA, Tel: 831-600-7878 Website: Technical_Library R134a Refrigerator PT Chart [PDF] AGA, OP, CIT. Recovered 2020/02/10 Original Source: agas.com/media/2404/r134a-pt-chart.pdf HFC R-14 R-22, R404, R134A R404A R407 HCFC-142B and most of the other refrigerant gases, GrÃ Press and temperature silhics below this table of examples of refrigerant pressures for R-22, we provide links to complete pressure / refrigerant temperature graphics such as PDF files Ã, © 2021 inspectedia.com ambient temperature in Ã, Â ° F1 R22 Steam pressure at sea level R-22 low side pressure Side pressure R-22 high-side pressure 0Ã, ° F (-17.8 ° C) 24 psig Ã, Ã, 30ã, Â ° F 54.7 50 psig Ã, Ã, Ã, Ã, ã, Ã, Ã, Ã, Ã, Ã, Ã, Ã, Ã, Ã, ã, 57.5 Ã, 40â € ° F 68.3 Ã, 50Â ° F 83.8 Ã, 60Â ° F 101.4 ã, 65Â ° F 111 25-35 135-155 PSIG 70Ã, ° F (21.1Ã ° C) 121 , 5 35-40 140-165 75Â ° F 132 40-45 150-175 80-50 ° F 143.5 40-50 175-220 85Â ° F 170 60 250 90Â ° F 168.5 Ã, Ã, 95Â ° F (35Â ° C) 181.9 68 PSI 250+ 100Â ° F 196.2 Ã, Ã, 110Â ° F (43.3Â ° C) 226 , 4, 120Â ° F 260.9 Ã, 260 PSI 150 Ã © ° F (6 Ã ° C) 381.7 Ã, notes on the table Previous Other properties for the temperature / Refrigerant pressure R22: See the table above Alternative names R22: CHCLF2 Chlorodifluoromethane, DDifluoromonchloromethane, TÃ © Rhine Rhine: Hydrochlorofluorocarbon (HCFC) R22 Eblicing point: -40.8 degrees Celsius at atmospheric pressure (sea level or 1 atm) density R22: 3.66 g / cm3, in gaseous form â € " deals with a colorless gas r22 molar mass: 86.47 g / mol Gas cylinder R22: light green R2 state: it is no longer in active use, replaced by R458A R458A Outdoor room temperature 2. Typica Low pressure or suction side, may vary according to the equipment and medicine controls â € "It is â € œpress readings," PSIGÂ "3. Typical high lateral pressure, It may vary according to the equipment 4. These PSIG readings for the R-22 are what is expected that the pressure of the gas is in a closed container at the given temperature and in a steady state. The low pressure coolant switches in Carrier HVACR are usually opened at 50 psi and close to 100 psi. - Prah, Frank, CMS, Â «Refrigerant 410a», [PDF] Refrigeration Service Engineers Society, 1666 Rand Road, Des Plaines IL 60 016 USA, Tel: 847-297-6464, Recovered 2016/08/29, Original source: Both ancient R-22 and R-134 operate at lower pressures than R-410A. R22 Refrigerant Practical rules in a well-loaded and running air conditioning system using R-22 R-22 Low-Side refrigerant = 30 psi at 90Â ° F ambient temperature R-22 Low-Side Presure-typical operating Range = 58 â € "85 psig (varying according to the temperature of the indoor hollow light bulb and the outer ambient temperature, where higher tymical loads increase the pressure vapor line) R-22 high pressure = 2 x room temperature (F) + 50 PSI Opinion: This general rule gives pressures a little higher than those shown in our Previous R-22 pressure table and temperature. Example: at 75Â ° F Table pressure: R-22 High side pressure = 150-175 PSIG calculated pressure: R-22 High side pressure = (75 x 2) + 50 = 200 psig â € œYou must take this as Top limit Refrigerant pressure / graphic temperature and table Downloads Refrigerant Pressure / Temperature Charts for R-22, R-410A, R-134A, R-404A Refrigerants [PDF], Advantage Engineering, Inc. 525 East Stop 18 Road Greenwood, IN 46 142USA, Tel: 317 Website: www.advantageengineering.com Electronic mail: salts@advantageEngineering.com HCFC-142B Gas Refrigeration Gas Op. cit., TEMPERATURE / REFRIGERANT PRESSURE CHARTS for R-407, R-22, R410a, R-407c, R-134a, R404a [PDF], Op. cit., REFRIGERANT REFRIGERANT TEMPERATURE Letters for R-11, R-113, R-123, R-12, R-13, R-134A, R-114, R-14 or FreÃ3n-14, Tetrafluoromethane, R-22, R-23, R-410A, R-409A, R-416A, R-500, R-503, R-507, R-503 [PDF] Frigerants, Inc., Office Central 2530 Sever Road, Suite 300 Lawrenceville, GA 30 043 Tel: 1-800-473-3766, Website: www.airgasrefrigerants.com Email: ARF-Contact.us@airgas.com HCFC-142b GAS REFRIGERANT GAS Product Information [PDF], DAIKIN AMERICA, INC. 20 Olympic Drive, Orangeburg, No. Y 10 962, USA Telephone: +1-845-365-9500 Fax: +1-800-365-9570 Fax: +1-845-365-9598 , DAIKIN CHEMICAL EUROPE GmbH Immermannstr. 65D, 40 210 Dusseldorf, Germany Telephone: +49-211-179 225-0 Fax: +49-211-16 Chemical Division Umeda Center Bldg., 2.4.12, Nakazaki-Nishi, Kita-ku, Osaka 530-8323, Japan Telephone: +81-6373-4342 Fax: + 81-6-6373-4390 HCFC R-142b REFRIGERANT GAS MSDS [PDF], refrigerador nacionalants, Inc., 661 Kenyon Ave., Bridgeton NJ 08 302, USA Example R32 Refrigerant Pressures View these complete refrigerant pressure and temperature charts as PDF files that you can download Temperature room 1 Pressure meter room psig / Bar R-32 Low Side Pressure2 R-32 High Side Pressure3 0°F (-18°C) 48. 72 / 3.36 105 psi 450 psi 32°F (0°C) 103.21 / 7.12 68°F (20°C) 199.13 / 13.73 86°F (30°C) 264.8 / 18.26 96.8°F (36°C) 310.89 / 21.44 107.6°F°F (42°C) 362.51 / 25 150.8°C F (66°C) 634.81 / 43.78 Notes from the previous table Other properties of R3 Coolant Ambient temperature around the compressor/capacitor Assuming a lateral suction temperature of 2°C / 35.6°C F Assuming a discharge temperature of 51°C / 123.5°F R32 has a low GWP of 675. Me, too. R32 is a substitute for R310A and is a “low-flammability” refrigerant gas. By 2025, high-global-warming-potential (GWP) refrigerants with a GWP greater than 750, together with the that they use that gas. R32 Presião letter "n / temperature [pdf] Ages, op. cit., cit., 2020/02/10 Original source: Example R-410A refrigerant pressures for each type of refrigerant you use, you will want to pick up a table of Refrigerant pressure / temperature of your provider. A typical pressure / refrigerant temperature graph R-410A will give refrigerant pressures at several temperatures (environments) ranging from under freezing more than 160 ° F. Here are some examples: room temperature In the vapor pressure of ° F1 R410A at sea level temperature (Ã, ° C) R-410A low lateral pressure R-410A lateral pressure high3 -10 ° F 26.9 PSI -23.3, Â ° F 48.4 -17.8 ã, 10 ° F 62 Ã, 32 ° F 101.4 0 Ã, 40 ° F 119 Ã, 83 psig 257 psig 45 ° F 120 Ã ¢ 130 418 51 ° F 155 Ã, 55 ° F 155 Ã, Ã, 65 Â ° F 155 Ã, 60 ° F 170.7 15.6 Ã, 64 Â ° F 175 Ã, 76 Â ° F 185 Ã, 72 ° F 205 Ã, 72 ° F 205 Ã, 73 Â ° F 210 Ã, 73 ° F 210 Ã, 73 Â ° F 210 Ã, 75 Â ° F 218.7 23.9 120 psig 410-420 psig 76 ° F 220 ° F 28 ° F 240 ° F 240 Ã , 84 ° F 250 Ã, Ã, 84 Â ° F 254 Ã, Ã, 87 Â ° F 284 Â ° F 260 Ã, Â ° F 260 90 Â ° F 275 Ã, 93 ° F 290 Ã , 95 ° F 296.4 35 ° F 31 ° F 31 ° F 31 Â ° F 310 Â ° F 366 ã, 110 ° F 366 Ã, 110 Â ° F 366 Â ° F 405 Ã, 134 Â ° F 500 Ã, 150 Â ° F 613.9 65.6, Notes to the table over the typical range of low side pressure for R410A in the field: 115-120 PSI High prescription high pressure range for R410A INT EH Field: 410-420 PSI By 2025, high-heating high-heating refrigerants (GWP) with a more than 750 GWP, will be banned along with systems that use that gas. R410A has a GWP> 2,000. R410A thumb refrigerant rules in a properly charged and working air conditioning system using the refrigerant R-22 R-410A typical typical range Type of operating operation = 102-145 psig (which varies According to the temperature of the indoor hollow light bulb and the ambient temperature outdoors, where higher the heat loads increase the pressure of the steam line) Other properties for the R410A R410A RELATION OF THE TEMPERATURE / PRESSION: See table on alternative names R410A: R410A: / 50% CHF2CF3 - 410A is a mixture of difluoromethane (CH2F2, R-32) and Pentafluoroethane (C2HF5, R-125) R410A Boiling Point: -55.3Â, ° F or -48.5Â ° C at atmospheric pressure (Sea Level or 1 ATM) R410A Critical Temperature 72.8Â, ° C R410A Density: 3.0 g / cm3, in Gas Form - AS ColorLess Gas, Vapour Density: 3.0, Vapor Pressure at 21.1Â Â ° C (MPA) = 1.383 R410A MOLAR MASS: 86.47 g / mol R410A Vapor Pressure at 21.1Â ° C (MPA) = 1.383 R410A Gas Cylinder Identification: Rose Color R410A STATUS: IN USE 1. Exterior room temperature 2. The typical pressure Of low pressure or on the suction side for the R410A is approximately 120 psi, varying by room temperature, here assuming 75Â ° F, can vary by the equipment and medicine controls 3. The typical pressure on the high side for the R410A is of