

ARTI REFRIGERANT DATABASE

The *ARTI Refrigerant Database* is an information system on alternative refrigerants, associated lubricants, and their use in air-conditioning and refrigeration. The database consolidates and facilitates access to property, compatibility, safety, environmental, application, and other data. The main elements of the database include data summaries (profiles) for 544 refrigerants and blends, detailed toxicity reviews for common refrigerants, tabular compatibility summaries for 80 plastics and elastomers, and bibliographic citations for 7,440 documents. Nearly all of the citations include summaries or indications of key topics or fluids addressed. Some of the documents distributed through the database provide results from unpublished tests or studies.

FREQUENTLY ASKED QUESTIONS

What is the focus of the *Refrigerant Database*?

The database addresses refrigerants (including azeotropic, near-azeotropic, and zeotropic blends) as well as associated lubricants (including mineral oils, alkylbenzenes, polyalkylene glycols, polyolesters, and others). The key concentration areas are properties, refrigerant-lubricant compatibility (e.g., compatibility with metals, plastics, elastomers, motor insulation, desiccants, and other materials), thermal and chemical stability of refrigerant-lubricant systems, refrigerant-lubricant system properties (such as miscibility, solubility, viscosity, and lubricity), environmental impacts, flammability, toxicity, and other safety information. The effects of refrigerants and lubricants on heat transfer, system capacity, and system efficiency also are emphasized. Refrigerant application, retrofit, and research are covered for alternative refrigerants.

What data are included in the citations and refrigerant summaries?

The citations and synopses provide full bibliographic descriptions and detailed abstracts of contents, materials, procedures, test ranges, key findings, and similar information. The goal is to permit computerized searching of information by specific refrigerant or refrigerant-lubricant combination, topic, author, organization, material (by generic or commercial name), refrigerant property, publication, or report number. Almost any word, number, or combinations of them can be sought; searches are not based on predefined keywords. The search program offers a collection of synonyms and related terms to enhance searches.

The refrigerant summaries provide screening and reference information for refrigerants. They may be searched with and cross reference standard designations, chemical names, structural and empirical formulae, composition groups, Chemical Abstract Service (CAS), Registry of Toxic Effects of Chemical Substances (RTECS) numbers, European Inventory of Existing Chemical Substances (EINECS) numbers, common names, trade names, and historical designations and names. The summaries describe common uses and – for alternative refrigerants – applications under consideration. They then provide selected physical,

environmental, and safety (flammability and toxicity) data and classifications as well as standard container colors. The safety data include both occupational exposure limits and proposed Refrigerant Concentration Limits (RCLs) for applicable refrigerants. The summaries also indicate the initial commercialization and phaseout dates for most of the refrigerants. The information provided is keyed to the citations, to enable users to examine the source data along with underlying assumptions, uncertainties, and limitations.

Does the database provide thermodynamic property data?

It provides summary physical and thermophysical data including thermodynamic data at representative conditions and critical parameters (temperature, pressure, density, and specific volume). It provides other data including molecular mass, normal boiling and freezing/melting points, and – for representative conditions – heat of vaporization, thermal conductivity, viscosity, and similar information. It is not an equation-of-state model, but it does identify sources for them and for transport property models, for numerous refrigerants and blends.

What is the current version of the *Refrigerant Database*?

The current version is the July 2001 release (dated 2001.07.31). Newer or additional information may be available since then for some refrigerants, but the vast majority of the information remains useful and the keyed source references offer leads to further data.

What are the system requirements for the computerized version?

The search and retrieval software provided with the database is designed to work with microcomputers that are fully IBM compatible using Intel 80286, 80386, 80486, and Pentium™ processors. A minimum of 384 kB of RAM is required. The software is written for the MS DOS® disk operating system, version 4.0 or higher. The program also will run on PC-DOS®, OS/2®, and Windows® 3.1x, 95, 98, NT 3.5x, or NT 4.0, 2000, or XP, but not on Windows® Millennium Edition (Windows® Me). The database and related software need approximately 16.5 MB of space on the hard disk; this requirement will increase as the database expands. Due to the nature of the database, very high compaction ratios can be achieved using the compression routines provided with DOS 6.0 and higher, Windows NT using NTFS, or with commercially-available counterparts; compression to less than 5 MB is typical.

Is there a specific version for Windows®?

There is no specific Windows® version at present, but the version distributed runs on nearly all versions of Windows®. All development internally is on Windows® NT 4 (SP6) or Windows® 98. The program does not have the familiar graphical user interface (GUI) some users have come to expect in Windows® programs. *Mark*, *cut*, and *paste* are supported under Windows® 95 and 98, but not under Windows® 3.x or NT.

We presently are exploring whether to develop the next version either as a Windows program, possibly with automated updating via the Internet, or on a Web Site accessible via common browsers on the Internet. That decision has not been made yet, and we would welcome your inputs.

Can I use the computerized database without Ferret™?

Yes, but not easily. The actual database consists of a single, flat (unformatted) file named REFRIGDB.DAT that can be accessed with user-supplied search software or some word processors; we do not provide instructions or assistance for them. The search and retrieval software, Ferret™, distributed with the database provides very fast, simple, and powerful capabilities, and we do provide user support for it.

Does the database run on networks?

The site and corporate versions both allow shared access to data files on a server as well as local installation from a server; these features do not work on the single-user version. Network printing will work with local printers and with shared (networked) printers that redirect or capture and reroute print streams, but not those that use other than a serial or parallel port assignment for printer selection.

Database installation requires selection of program and data installation locations (drives and folders or directories), which can be the same or different. We recommend that the program be installed locally, for speed and so that each user can configure it individually (for example, to select personal preferences for file inclusion). The data files can be either installed locally or on a shared server to simplify updating and reduce local disk storage requirements.

How is the database distributed?

The computerized version of the database is distributed on 3 1/2" diskettes for use on microcomputers running DOS, OS/2®, Windows®, or similar platforms. It also will run on most Apple computers with DOS emulators. The *User's Manual* and the July 2001 database update may be downloaded from www.JamesMCalm.com.

You may download several PDF files from report summaries of database entries from 1991-1999 from www.osti.gov/bridge/. These files are limited to listing of bibliographic citations in report form and do not include the refrigerant profiles or other data summaries. The files also are rather large (>5 MB) and less complete than the July 2001 release. You also may obtain a CD from the Air-Conditioning and Refrigeration Technology Institute (ARTI, rdb@ari.org) that includes six substantial reports in PDF file format of portions of the database. They afford only a primitive search capability and do not include the entire database. Five of these reports are older versions from 1999 and one is from 2000; none of the six are the latest version.

Can I share the database with colleagues?

The database is distributed under a license arrangement with three options:

- individual user license: one user at one location or one user on a single portable (notebook) computer,
- site license: all company, organization, or agency staff working at one geographical location as well as use by them on portable systems for travel and home systems, and
- corporate license: all staff working for a single company, organization, or agency in one country including use by them on portable systems for travel and home systems. This license includes all plants and company-owned sales and service offices, but not franchised offices, in the same country.

Site and corporate licenses also allow noncommercial personal use by eligible users as well as duplication of installation disks for installation on multiple computers or networks for these authorized uses. The site and corporate versions also allow installation from a network server or shared use of the data files on a server.

All current university staff, faculty, and at one campus may use the database under a site license. All current staff, faculty, and at one university with multiple campuses in one country may use the database under a corporate license. Site and corporate licenses do not extend to alumni except those eligible as current staff, faculty, or students.

Can I resell the database?

No. Additional users must obtain one of the licenses outlined above.

How can I obtain documents cited in the *Refrigerant Database*?

The *User's Manual* provides guidance on obtaining referenced documents.

How can I obtain more information or order the database?

You may obtain more information and an order form from www.JamesMCalm.com. Please mail the completed form with payment to: James M. Calm, Engineering Consultant, 10887 Woodleaf Lane, Great Falls, VA 20066-3003 USA. Questions on the database should be directed to database@JamesMCalm.com.

Acknowledgments: The Refrigerant Database is sponsored by the Air-Conditioning and Refrigeration Technology Institute (ARTI) with financial assistance from U.S. Department of Energy under Cooperative Agreement No. DE-FC05-99OR22674. Additional funding and in-kind support is provided by the air-conditioning and refrigeration industry through the air-conditioning and Refrigeration Institute (ARI) and by in-kind cost sharing by James M. Calm, Engineering Consultant. Development of the database is part of the ARTI 21-CR Program as a continuation of work begun in the MCLR Program. Support by the cited parties does not constitute an endorsement of the views expressed in the database.

Disclaimer: The Refrigerant Database was established to facilitate access to information to accelerate use of alternative refrigerants, to enable phase out of chemicals of environmental concern. The information contained in the database is not all-inclusive and has not been verified. Its suitability for specific uses has not been established, and no representation is made to support reliance on it. Users must determine the appropriateness and adequacy of the data for specific purposes.

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