

Supplement to Documentation
ASME Steam Properties for Industrial Use
Professional Version Software
Version 1.1, April 2003

Introduction

In 1997, the International Association for the Properties of Water and Steam (IAPWS) adopted a new international standard for the thermodynamic properties of water and steam; this standard is known as IAPWS-IF97. The ASME, through the Subcommittee on Properties of Steam of its Research and Technology Committee on Water and Steam in Thermal Systems, produced software based on this formulation. This software, called *ASME Steam Properties for Industrial Use*, replaced previous ASME software that had been based on the previous (1967) international standard. Version 1.0.1 of *ASME Steam Properties for Industrial Use* was issued by ASME Press in 1998.

Since the software was first issued, minor problems have come to light in some of the subroutines in Version 1.0.1. These would not affect most users, but could produce erroneous numbers or nonconvergence in certain situations. Therefore, a “bugfix” update to the software has been produced; this is Version 1.1.

Since the changes to the software for Version 1.1 are fairly minor (for example, all subroutines still have the same argument list as in Version 1.0.1), it was decided that it was not necessary to produce new documentation for Version 1.1. This supplementary document therefore describes only changes from the original documentation.

Changes to “Executable Programs using IAPWS-IF97 Steam Properties” (starting p. 5)

These programs are now included in the install process, so the instructions about copying files on page 5 are no longer applicable. The file STMEXEC.txt is no longer included; its information is included in stmlib.txt. By default, the Version 1.1 files will be installed in the directory \Program Files\ASME Steam

Changes to “Library and Source Code Documentation” (starting p. 17)

Because of the wide variety of compilers and systems in use, we no longer supply “make” files for any specific compiler. This means that the files listed on page 18 whose names begin with MK and CR are no longer a part of the product, and the compilation instructions starting on page 23 are no longer applicable. To incorporate the FORTRAN source code into your application, please follow the instructions for the compiler you are using.

On page 18, the files on your disk after installation should now be as follows:

The top-level directory (by default, \Program Files\ASME Steam) will have the files stmprop.exe, stdtable.exe, stmlib.txt, and sps97.txt, described on page 18, along with supp11.pdf (a copy of this document).

The source code subdirectory (by default, \Program Files\ASME Steam\Source) will have the 92 FORTRAN source files (.for) and 5 include files (.inc) described on page 18. NOTE that 6 of the FORTRAN files (stmprop.for, stdtable.for, charnum.for, chngunit.for, pctimdat.for, and xtracalc.for) are only needed if you wish to build the stmprop or stdtable example programs. The

other 86 FORTRAN files are those that should be compiled (in a directory that contains the 5 include files) and linked to incorporate these properties in your own applications.

For users of Version 1.0.1 who wish to substitute only the files that have changed, 23 of the 86 steam property calculation files mentioned above have been changed for Version 1.1 (this list does not include minor changes in the files for the stmprop and stdtable example programs). In many cases the changes are quite minor, but we recommend replacing all 23 files at once to ensure that no inconsistencies are introduced. The following files have been changed: HPT, HSSICL, HSSISS, MISCSB, PHS, PROPREG, PSATT, PSV, SPT, SSSICL, SSSISS, SVT3, TPH, TPS, TRANSP, TSLH, UTIL, VFT, VPH, VPS, VPT, XPH, XPS.

Changes to “ASME Bridging Filenames ...” (starting p. 25)

HPS3SI (p. 26): This routine does not exist. Call HPSSI instead.

CRVEL (p. 28): The second argument is H in Btu/lbm (argument list is correct; text was wrong).

SURFT (p. 28): The date of the applicable IAPWS release is September, 1994. Users should also note that all values from this subroutine in Version 1.0.1 of the software were incorrect due to an incorrect unit conversion.

CONVT (p. 35): The temperature argument for this function should be in degrees Celsius, not K.

XPH and XPS (p. 41): It should be noted for these sets of routines that they return a value of 0.0 for a subcooled liquid and a value of 1.0 for a superheated vapor.

SPREG (p. 42): This routine, previously used for some internal error handling, is obsolete and is no longer included.

Changes to References (p. 51)

Information on the IAPWS-95 implementation mentioned at the bottom of Reference 1 is also available at the website:

<http://www.nist.gov/srd/nist10.htm>

Reference 2 has been published as: W. Wagner *et al.*, “The IAPWS Industrial Formulation 1997 for the Thermodynamic Properties of Water and Steam,” *ASME J. Eng. Gas. Turbines & Power*, 122, 150-182 (2000).

The IAPWS Releases mentioned in References 1 and 3 may now be obtained from the “Releases and Guidelines” section of the website:

<http://www.iapws.org>

In addition, a new ASME “steam tables” book has been published, which documents the property calculation methods implemented in this software. The reference is

W.T. Parry, J.C. Bellows, J.S. Gallagher, and A.H. Harvey, *ASME International Steam Tables for Industrial Use*, ASME Press, New York (2000).