

MODULE LIST

2022



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I. LAUTERBACH VT

LV SOFTWARE AND SERVICE SINCE 1978

LV Software is technical-scientific software for thermal process engineering as well as pressure vessel design and pipeline construction and is used worldwide since 1978.

Lauterbach Verfahrenstechnik GmbH has been a leading supplier of technical **design software** in the field of **pressure vessel design and process engineering** for more than 40 years. As a professional service company, we perform **design, consulting and training** for our customers.

The LV team has grown increasingly within the last years and consists of engineers with long-time experience in the fields of process engineering, mechanical engineering as well as computer science. In addition, it is supported by partner companies as needed, which enables it to respond quickly and competently to customer requests.

COMPETENT CONSULTING FROM A SINGLE SOURCE

Since this catalog with approximately 400 programs only provides a first insight, our LV team will be happy to answer any questions you may have. For us, the hotline is an important part of customer support - especially after the purchase!

Contact persons are engineers who have developed the Lauterbach VT programs and work with them on a daily basis. Training courses concerning program usage or specialist advice are held in our office or at your company as "company-specific training course.



Dipl.-Ing. Dietmar Fischer

Managing director and partner
Head of Software Development
Pressure Vessel Design and Piping, FE Calculations



Dipl.-Ing. Hassan Gharib

Pressure Vessel Design
CAD and FE calculations



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Pressure Vessel Design
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Process Engineering



M.Sc. Karen Böhler

Process Engineering

II. ATLAS PROGRAM SYSTEM



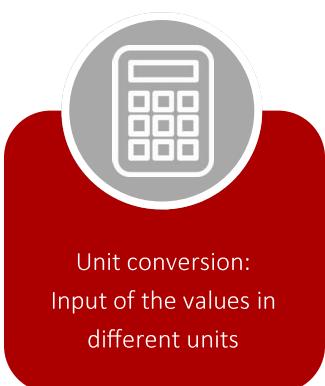
ENGINEERING SOFTWARE FOR DESIGN AND CALCULATION OF PROCESS ENGINEERING EQUIPMENT

Not to write programs for every new task, but to combine modules (programs/modules) to new systems allows a fast and cost-efficient reaction to individual customer requirements. The individual modules are manageable and standardized in structure - all in a common interface.

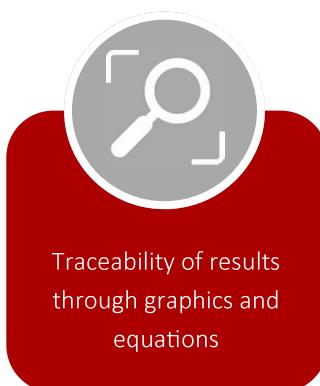
We offer tailor-made software solutions to solve special problems that do not seem to be solvable with standard methods. We are happy to accompany you on your way and to bring you closer to your goals.

ESSENTIAL FEATURES

The complete solution "LV Design ATLAS 10" developed by Lauterbach Verfahrenstechnik is the most powerful program system to date with over 400 individual programs in the specialist areas of thermal process engineering, pressure vessel design, process engineering and piping . This also includes the LV optimizer developed by Lauterbach VT, which finds the desired optimum for all applications. Customer knowledge is combined in the same programming technology via the LV program generator in an integrated overall solution.



Unit conversion:
Input of the values in
different units



Traceability of results
through graphics and
equations

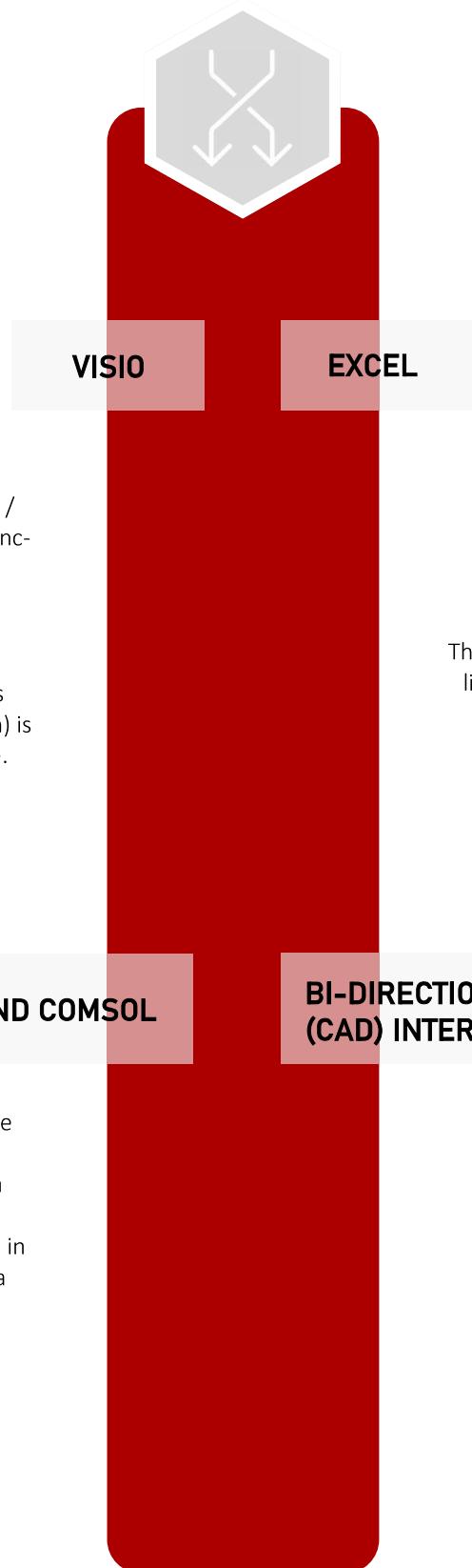


Multilingual
documentations in
German and English



INTERFACES

Due to the bidirectional data exchange from Lauterbach VT to third-party software, our programs can be used in their interface (e.g. add-in technology). For this purpose, Lauterbach VT offers ready-configured interfaces to MS-Excel, MS-Visio and Solidworks (CAD). A universal CAD interface is also available via the integrated MS Excel interface.



An interface to Microsoft Visio is now available for the calculation programs / modules. This extends the range of functions of the calculation programs by a multitude of helpful functions.

You will receive the price on request.

A license of Microsoft Office as well as Microsoft VISIO 2016 (Standard Edition) is required to use the LV-VISIO interface.

LV Software has a standard bi-directional interface from version 8.7 (105), with which data can be transferred from LV to Excel and from Excel to LV.

The Excel interface is free of charge, licensing as a stand-alone program extension for recurring tasks is available on request.

Prerequisite for the use is Microsoft Office 2010.

Here, proven calculations based on the VDI Heat Atlas 11th edition are integrated into a Comsol simulation. Via the interface, the parameters can be linked with values of the LV program - in both directions. The creation of such a link is very simple via drag and drop.

While you design, the LV program calculates simultaneously, or you calculate in the LV program and Solidworks automatically takes over the visualization.

III. SOFTWARE FOR PRESSURE VESSEL DESIGN



AD 2000 / SECTION B AND S

Module	Program description
PROJECT	Basic module / data sheet
B0	Calculation pressure acc. to B0 / test pressure acc. to HP30
B1	Cylindrical and spherical shells under internal pressure
B2	Conical shells under internal and external pressure
B3	Dished heads under internal and external pressure
B4	Spherical dished covers
B5	Flat heads and plates with anchors incl. B51A and B51C and module B51 heat exchanger tube sheets and plate deflection
B6	Cylindrical shells under external pressure
B7	Bolts
B8	Flanges (incl. 25V module)
B9	Openings in cylindrical, conical and spherical shells under internal pressure
B10	Thick-walled cylindrical shells under internal pressure
B13	Single-wall expansion joints (see EJMA / EJR)
PMAX	Maximum allowable test pressure for pressure vessel parts (incl. NZUL module)
IGEL	Strength proof of nozzles, determination of local loads by NozzleSpecApp and their superposition for horizontal and vertical vessels Requires B1 + B3 + B9 (see also ESMC 912)
WERK	Material data base comprising more than 4700 entries (not standalone)
Module package AD 2000 / Section B	

S1	Simplified proof against oscillating stress incl. NZUL module for calculation of number of allowed load cycles
PMAX/ Nzul	Determination of the maximum allowable test pressure for pressure vessel components (incl. Nzul module)
S2	Proof against oscillating stress For complex geometries we recommend determining the principal stresses by FEM
Module package AD 2000 / S1 + S2 incl. PMAX / Nzul	

S3.0	Proof of strength according to AD - S3/0 incl. load table
S3.1	Vessels on skirts
S3.2	Horizontal vessels on saddles incl. EN16.14
S3.3	Vessels with dished heads on support legs
S3.4	Vessels on lugs
S3.5	Calculation of support rings and ring girders for vessels
S3.6	Calculation of vessels with nozzles under external loading

Module package AD 2000 / S3.0 - 4

Module package AD 2000 / S3.0 - 6

EUROPEAN STANDARDS / 1

DIN EN 13445 - 3 / PACKAGES

Module	Program description
PROJECT (AD)	Basic module, data sheet
EN07 / 08	Cylindrical, conical and spherical shells, domed/elliptical heads under internal and external pressure
EN 09	Single nozzles in cylindrical, conical and spherical shells
EN 10	Flat ends (no tubesheets)
EN 10.04-06	U-tube tubesheet, fixed tubesheet and floating tubesheet heat exchangers according DIN EN 13445-3 / chapter 13
EN 1591	Module package 1591 for the design of round flange connections, bolts and gaskets according to DIN EN 1591 or DIN EN 13445-annex G, incl. flange modules ANSI-flanges (AFLT), DIN EN1092, DIN28034 (VFLN), DIN28033 (SFLA) and the flat gasket according to DIN EN 1514 (1514N) gasket parameters according to DIN EN 1591-2 (159N)
PDEN	Test pressure and material characteristics according to DIN EN 13445-5 / chapt. 10.2.3.3.1
PMAX-EN	Maximum allowable test pressure for pressure vessel parts
UNRD	Calculating the departure from the true circle of cylinders and cones according to DIN EN 13445-3, annex E. (see also ENAF module)
WERK	Material data base with about 4700 records
Basic package EN 13445 (corresponds AD 2000 / B)	

EN 16.08	Horizontal vessels on saddles incl. S3.2
EN 16.09	Horizontal vessels on ring supports
EN 16.10	Vertical vessels with support brackets
EN 16.11	Vertical vessels with dished heads on legs, even oblique
EN 16.12	Vertical vessels with skirts, verification of skirts, anchors and skirt openings
EN 16.13	Vertical vessels with ring supports
EN 16.14	Shells under global loads (s. auch S3.2)
EN 22	Module EN 22 calculates the wind loads according to DIN EN 13445-3 chapter 22.4 and works in conjunction with module EC1 acc. to DIN EN 1991-1-4 (Eurocode 1).
Vessel Support Stability package incl. EN 22	

EN 17	Simplified assessment of fatigue life/ conservative
EN 18	Detailed assessment of fatigue life
Fatigue Life Package	

DIN EN 13445 - 3 / COMBINATIONS

Basic Package EUROPE

DIN EN 13445-3 + AD

Module package AD 2000/Section B + Basic Package EN 13445

Special Package EURONORM

DIN EN 13445-3

Basic Package EN 13445 + EN 11 (EFL) + Vessel Support Stability

EUROPEAN STANDARDS / 2

DIN EN 13445 - 3 / ADDITIONAL MODULES

Module	Program description
ENAF	Allowable external pressure for pressure vessels with out-of-roundness exceeding tolerance according to DIN EN 13445-3, Annex F, incl. Module UNRD
ENAJ	Alternative method for the design of heat exchanger tubesheets DIN 13445-3 Annex J
ENAO	Physical properties of steels acc. to DIN EN 13445-3 Annex O
EN 11 (EFL)	Round steel flanges according to EN 1092-1 – Calculation per DIN EN 13445-3 chapter 11 (Taylor-Forge method). In general, DIN EN 13445-3, chapter 11 permits a calculation for internal and external pressure for the most different flange types and covers almost all possible design
EN 12	Bolted domed ends convex or concave to pressure DIN EN 13445-3 chapter 12 (requires EN 11 module)
EN 15	Rectangular pressure vessels according to DIN EN 13445-3 chapter 15 (rectangular cross-sections with additional stiffening, s. also B5A1)
EN 16.04 / EN 16.05	Local loads on nozzles in spherical and cylindrical shells incl. EN16.14
EN 16.06	Line loads according to DIN EN 13445-3 chapter 16.6
EN 16.07	Lifting lugs → Einzellast an Zylinderschalen und gewölbten Böden nach DIN EN13445-3, Kap.16.7 (bisher Modul LUG)
EN 20	Reinforcement of flat walls according to chapters 20 and 21

DIN EN 12516 - 2 / VALVES AND FITTINGS

12516-2

Calculation of valve bodies according to DIN EN 12516-2
Structured into four modules 12516-2A-D incl. gasket module 1514N (manufacturer data) and 159N (gasket parameters)

DIN EN 12516-2 specifies the calculation methods for valve bodies. In this standard you will find many options for the calculation of general pressure housings and different flange types.

DIN EN 13480 - 3 / PIPING (s. LV-Pipe II)

Module	Program description
ER06	Piping components under internal pressure according to DIN EN 13480-3 chapter 6
ER07	Dished heads under internal pressure according to DIN EN 13480-3 chapter 7
ER08	Openings and branches according to DIN EN 13480-3 chapter 8
ER09	Piping components (Cylindrical pipes, pipe bends, reducers and dished ends) under external pressure according to DIN EN 13480-3 chapter 9
ER11	Integral attachments to metallic industrial piping according to DIN EN 13480-3 chapter 11 Calculation of supporting and guide trunnions
	Additionally the module package EN1591 for flanges is included in the package

Basic Package EN 13480

DIN EN 14025 / TANKS FOR THE TRANSPORT OF DANGEROUS GOODS

ADR	Minimum thickness and test pressure according to EN 14025 / ADR / RID
DECK	Covers for manholes according to DIN EN 14025 Chapter. 6.3.6
	Additionally, modules EN 07/EN 08/EN 09 and EN 1591 are included in the package

Basic Package EN 14025

EUROCODE 1

EC 1 (EN 1991)	Wind loads according to DIN EN 1991 1 - 4, edition 1 N.A. Germany. Eurocode 1 (action on structures, see also EN 22)
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EUROCODE 3

EC3 Cyl	Stability proofs/buckling proofs for cylindrical shells according to DIN EN 1993 - 1 - 6 and DIN EN 1993 - 4 - 1 (Eurocode 3)
EC3 Stiff	Ring-stiffened circular cylinder shells/stiffening rings under external pressure according to DIN EN 1993 - 1 - 6 (Eurocode 3)
BULK	Effect of loads from the bulk material on the silo stability according to EN 1993 - 4 - 1 section 3.5

Package

EC3 T	Design of conical funnels (cones) according to DIN EN 1993 - 4 - 1 (Eurocode 3)
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Bemessung und Konstruktion von Stahlbauten nach DIN EN 1993/replaces DIN 18800 Teil 4
Literature: ECCS (European Design Recommendation 5th Edition by J.M. Rotter and H. Schmidt)

US AMERICAN STANDARDS / ASME

ASME BOILER & PRESSURE VESSEL CODE VIII / DIV. 1

Module	Program description
PROJECT	Basic module / data sheet
UG27	Thickness of cylindrical and spherical shells under internal pressure
UG28	Thickness of shells and tubes under external pressure
UG29	Reinforcement rings at cylindrical shells under external overpressure
UG32	Dished ends under internal overpressure
UG33	Dished ends under external overpressure
UG34	Flat ends or plates with flange moment incl. Module AP14
UG37	Openings in shells and heads (covers UG39 and spherical shells UG45)
UG99	Test pressure according to ASME VIII UG-99 and UG-100
AFL / AFLT	Flanges according to ASME VIII / 1 incl. flange catalog according to ASME B16.3 (AFLT)
ASME B31.3	Steel pipes, pipelines, elbows, branches according to ASME B31.3 Used standards are ASME B36.10 and B36.19
APY	flat face flanges with metal-to-metal contact outside the bolt circle according ASME BPVC Appendix Y
ATB	Spherical dished heads according to Appendix 1 – 6
TEB 2	Pipe bends and T-pieces according to ANSI / ASME B31.3
UHX a - c	U-tubesheets, Fixed tubesheets and floating tubesheets according to section UHX of ASME BPVC VIII-1
WERK	Material data base with ca. 4700 material records

Module Package ASME VIII / Div. 1

ABDR	Connection ends, pipe bends, T-pieces according to ASME B31.3
ASME B31.1	Steel pipes, pipelines, elbows, branches according to ASME B31.1 Used standards are ASME B36.10 and B36.19
Annex 3-F	Fatigue strength verification for pressure vessels according to ASME VIII / 2
AP14	Welded flat heads with large, single round and central openings according to ASME VIII-1 Mandatory Appendix 14
AP26	Single wall bellows expansion joints according to ASME VIII-1, Appendix 26 (U-shape bellows only)
APA	Basic principles for the determination of allowable loads for the connection tube/tube sheet according to ASME BPVC VIII Nonmandatory Appendix A , Edition 2017

FLANGE COMBINATION PACKAGE

Flange calculations according to the standards **DIN EN 1591** or **DIN EN 13445** - 3 Appendix G / **AD 2000 & ASME VIII**

The module package comprises the modules EN 1591 as well as AD 2000 B7 + B8 + DIN V2505, ANSI flanges (AFL + AFLT), module 1092 (DIN EN 1092), VFLN (DIN 28034), SFLA (DIN 28033) as well as the gasket modules 1514 (DIN EN 1514) and 159N (gasket parameters according to EN 1591 - 2)

NOZZLE VERIFICATION / BUCKLING ANALYSIS / FEM

acc. WRC 107 or DIN EN 13445 - 3 / by FE method (LV-FEM)

Für standardisierbare Probleme wie z.B. Stutzen mit äußereren Lasten auf zylindrischen Grundkörpern oder auf gewölbten Böden bietet Lauterbach VT eine integrierte FE Berechnung an. Diese enthält verbesserte Netz- und Grafikoptionen sowie die Möglichkeit, Verstärkungsscheiben, schräge Stutzen, schräge und tangentiale Stutzen mit und ohne Verstärkungsscheiben zu berechnen.

Module	Program description
WRC / WRCK	Stresses in cylindrical and spherical shells acc. to WRC 107 (s. EN 16.04/EN 16.05)
EN 16.04 / EN 16.05	Local loads on nozzles in spherical and cylindrical shells incl. EN 16.14
LV-FEM	Calculation of stresses in cylinders and spherical shells with nozzle loads according to FE method. The nozzles can be arranged with or without reinforcement plate, vertically, obliquely or tangentially.

Module Package FEM Toolbox

PIPING

LV-PIPE II

Calculation of 3-D piping systems with the program LV PIPE II with enhanced graphics
Requires at least Office 2013

ADD-ONS FOR LV PIPE II

FE verification of attached nozzles
The piping forces and moments are directly transferred to the FE program

Calculation of flanges with superimposed piping forces,
Leakage verification according to DIN EN 1591

Metallic industrial piping according to DIN EN 13480

Stability proof of single pipe runs according to DIN 18800

Combi Package EUROPIPE

Program LV-Pipe II + Basic Package EN 13480

SPECIAL MODULES / 1

Module	Program description
1092	Round steel flanges acc. to DIN EN 1092-1 incl. strength proof
1514N / 159N	Flat gaskets. Geometry according to DIN EN 1514-1. Gasket data according to DIN EN 13555. Extensive manufacturer database
10220	Calculation of welded / seamless steel pipes according to DIN 10220 (replaces 2448 / 2458)
A2	Design of safety valves for pressure vessels
AKR	Stress verification for pressure vessels with knuckles in the external shell
B1 1	Pipe bends under internal pressure according to AD 2000 / B1 Annex 1
B51 A	Verification of axial forces according to AD-Merkblatt B5 section 6.7.1.7 (demanded in B5)
B51 C	Verification of flat tube sheets with protruding flange edge
B51 F	Fatigue strength of fixed heat exchanger tube sheets according to the guidelines Catalogue Strength (RKF) Part 5 and 6)
B5A 1	Calculation of plain rectangular pipes and partial chambers according to B5/1 (rectangular cross-sections)
BEIN	Stress verification for vessels on supporting feet
BIEG	Surface moments of inertia of profile steels
BOG	Pipe bends under internal pressure according to TRD 301, Annex 2
BV29	Calculation of chambers in divided and undivided design
DICH	Calculation of gasket characteristics (see also module 1514N)
ECKA	Sizing of diagonal stays on fire tube heads
ELKR	Elasticity criterion and support span of pipelines according to HP100R (simplified)
FGB	Flat domed heads according to John F. Harvey / Schwaigerer
HLB	Stress verification of pressure vessels with welded-on half-pipes
HOSE	Y-shaped branches under internal pressure according to TRD-301
HPR	Elasticity criterion and spans as well as construction regulations for pipelines made of metallic materials according to AD2000 / data sheet HP 100 R
IGEL	Nozzle verification on pressure vessels, determination of local forces and moments from the NozzleSpecApp and their superposition for vertical and horizontal vessels. see also ESMC 912 (requires AD/ B1+B3+B9)

Package IGEL + AD / B1 + B3 + B9

EMSC 912	BASF works standard: Load transformation at nozzle loads for horizontal tanks on two saddles according to BASF E-S-MC 912 (April 2016) with consideration of the Nozzle-SpecApp
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more modules on the
next page!

Module	Program description
KRVE	Forces and deformation conditions of pre-stressed bolted connections. (Metal-to-metal gaskets.)
KSTA	Calculation of stresses, displacements, shear forces and moments of columns with additional support bearings.
LOBO	Free resting perforated plates & perforated plates with anchors and supports according to AD/B5
PODEST	Verification of vessels on a single, central cylindrical support element according to WRC 537 and AD 2000 S3.3
PRAT	Geometrical values of the brackets used in AD Merkblatt S3.4
RING	Verification of double jacket connections on vessels (acc. to RKF)
RUER	Strength verification of nozzles and block flanges with / without mutual influence in agitator covers and heads

I. LAUTERBACH VT

II. ATLAS PROGRAM SYSTEM

III. PRESSURE VESSEL DESIGN

IV. PROCESS ENGINEERING

V. OTHER

SPECIAL MODULES / 2

Module	Program description	
SEGB	Segmental bends with one or more segments according to ASME B31.3	
SFLA	Flange geometry according to DIN 28036 (included in module package EFL or 1591)	
SG	Gauge glass flange similar to DIN 28120	
SPAR	Design of clamping rings	
SPIE	Interface for strength calculation, graphical processing of tube sheets, determination of the relevant values (number of peripheral tubes and characteristic length)	
STUT	Determination of additional stresses due to pipe forces on nozzles	
TEB/TEB1	Heat exchanger heads according to TEMA	
TEM	Longitudinal stresses in shell and tubes of heat exchangers with stationary tube sheets Strength calculations according to TEMA	Package TEB / TEB1 / TEM
TEB 2	Pipe bends and T-pieces according to ASME B31.3 with external loads	
TR28	Support rings with/without additional ring carrier according to DIN 280084-1 as an addition to S3.5	
TST	Cylindrical shells with vertical branch under internal pressure	
UBC	Earthquake loads according to Uniform Building Code 1997	
UNRD	Out-of-roundness of cylindrical and conical shells according to EN 13445-3, Annex E	
VFLN	Welding neck flanges according to DIN 28034	
WARZ	Calculation of knuckles of jacketed vessels	
WTOR	Calculation of shafts subjected to a torsional moment	
ZAPF	Calculation of trunnions according to DIN 28085	
ZIEH	Tightening torques of bolts. ISO and UNC threads	

WITHDRAWN STANDARDS

2413	Pipe bends: Calculation of wall thickness against internal pressure according to DIN 2413 part 2
2448	Seamless steel tubes according to DIN 2448 (corresponds to DIN EN 10220)
2458	Welded steel tubes according to DIN 2458 (corresponds to DIN EN 10220)
2505	Flange connections according to DIN 2505 (partly replaced by 1591)
250S	Bolts according to DIN 2505 (partly replaced by 1591)
25V	Flange connections according to pre-standard DIN 2505
2505 + 250S + 25V Package	
2605	Pipe bends according to DIN 2605
18T4	Verification of structural safety of unreinforced circular cylindrical, conical or spherical shells (DIN 18800 Part 4) > replaced by Eurocode
VERK	Stress in the cylindrical vessel without attachments due to wind loads DIN 4133 has been withdrawn
WND/WIND	Wind loads for structures not prone to vibration in accordance with DIN 1055 Part 4 edition 1986 / 2005 DIN 1055 part 4 has been withdrawn > replaced by EN 22 and Eurocode 1.

TECHNICAL RULES FOR STEAM BOILERS (TRD)

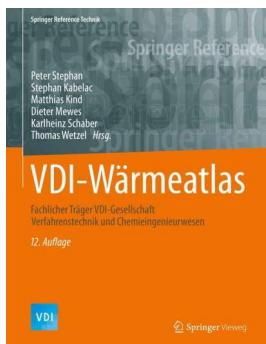
The regulations TRD became invalid on 1.1.2013. It was replaced by DIN EN 12952-3.

Module	Program description
Proj	Basic module, BOM
301	Cylindrical shells under internal pressure according to TRD 301
303	Spherical shells according to TRD 303
305	Flat walls, anchors and stiffening beams according to TRD 305
306	Cylindrical shells under external pressure according to TRD 306
309	Bolts according to TRD 309
WERK	Material database with approx. 4700 material entries
Basic Package TRD	
301 / Anl. 1	Calculation of alternating stress caused by swelling internal pressure or by combined internal pressure and temperature changes
AUZY	Openings and branches in cylindrical shells of drums, collectors and pipelines according to DIN EN 12952-3
BOG	Pipe bends under internal pressure according to TRD 301 / Annex 2
HOSE	Y-shaped branches under internal pressure according to TRD-301
303 / Anl. 1	Calculation of spherical shells with openings against alternating expansion stress of the inner hole edges
304	Calculation of dished flue ends according to TRD 304
508 a	Calculation of the fatigue of components at creep and alternating stress according to TRD 508 / Appendix 1

IV. PROCESS ENGINEERING



CALCULATION SOFTWARE FOR THE VDI HEAT ATLAS / 12. EDITION



The VDI Heat Atlas has been implemented since the 5th edition (formerly VDI-Verlag, then Springer-Verlag) under license as a calculation program by Lauterbach VT and always adapted to the current editions.

Now a German version (12th edition) and also again an English version (2nd edition) are available as text part. Both can be provided by us.

Note:

The LV calculation program is based on the chapters of the text part, whereby the relevant chapters were included as individual modules.

please find the detailed listing on the Internet.

Module Package 1

VDI Heat Atlas 12. Edition

Module Package 2

VDI Heat Atlas including cyclone calculation (CYCL)

TEXT PART VDI HEAT ATLAS

Prices subject to change Springer Verlag



Text part German 12. Edition (hardcover book)

Text part English 2. Edition (hardcover book)

eReference / eBook German (per Company site)

eReference / eBook English (per Company site)

Print + eBook German

Print + eBook English

PHYSICAL PROPERTIES

Module	Program description
BIER	Physical properties of beer and wort
CO ₂	Physical properties of carbon dioxide
EGAS	Physical properties of natural gas L and natural gas H as well as properties of natural gases of any composition
FRIG	Physical properties of refrigerants, extended
Gasmix	Nitrogen / oxygen / hydrogen / carbon monoxide / carbon dioxide / water / sulphur dioxide / sulphur trioxide – mixture of any composition
GLYC	Physical properties of ethylene glycol + 1,2-propylene glycol (Antifrogen® N + L) + organic salts KF + SOL
H ₂ O	Physical properties of water (steam tables)
H ₂ SO ₄	Physical properties and phase equilibrium of sulphuric acid
HABA	Calculation of the reference value α_0 for bubble boiling of pure substances (pool boiling, flow boiling of saturated liquids)
HCL	Physical properties of hydrochloric acid
HE	Physical properties of helium gas
HFO	Physical properties of heavy fuel oils and diesel
HNO ₃	Physical properties /phase equilibria of nitric acid
HX	Mollier H-X Diagram
JTHO	Final temperature of adiabatic throttling processes of natural gases
LUFT	Physical properties of air
N ₂	Physical properties of nitrogen
NA	Physical properties of sodium liquid and sodium vapour
NaOH	Physical properties of sodium hydroxide solution (caustic soda lye)
NH ₃	Physical properties of ammonia
O ₂	Physical properties of oxygen
OEL	Physical properties of 13 typical machine oils
PROPER 1	Thermodynamic calculation of physical properties (max. 15 components)
PROPER 2	PROPER 1 with hydrocarbon cuts according to API-Data-Book
PROPER 3	PROPER 1 with phase equilibrium calculation (DDB Flash, Version 6.0) according to Prof. Gmehling (max. 10 components)

Proper 1 + 2 + 3 Package

PSYC	Calculation of humid air from a psychrometric humidity measurement
RGAS	Physical properties and composition of flue gases
SAC	Physical properties of sucrose-water solutions
SAWA	Physical properties of seawater
S-TAB	Storage of property tables in the programs
T-OIL	Physical Properties and Range of Application of Thermal Oils (extended)
TSO ₃	Determination of the dew point temperature in flue gases with SO ₃ and H ₂ O components

COMBUSTION

Module	Program description
RG	Rauchgaswerte für feste Brennstoffe, Heizöle und Erdgas (s. auch RGAS)
VGAS	Verbrennungsrechnung für Gase

HEAT EXCHANGERS / STANDARD PACKAGES 1

The list of modules included in the standard basic package can be found on the Internet.

A print additionally in English is determined with 10 % of the list price, if no price is shown.

Exchanger Type	Program description	Package
Shell-and-tube heat exchangers	Basic version for the calculation of single-phase media (liquid / gaseous), condensation of pure substances on smooth pipes, strongly revised tube sheet layout module SPIE, true-to-scale sketch	WTS
	Refined vibration analysis at extra cost : Module	GVLV
<i>As WTS extension:</i>	1. pure substance condensers with desuperheating zone, condensation and subcooling zone, TEMA, graphics, multitube / calculation without baffle plates 2. Double-pipe heat exchanger(concentric annular gap) and hairpin heat exchanger (hairpin, shell without baffles). Thermal and hydraulic design of a hairpin heat exchanger incl. modules G2 + GGO + GGLR 3. Fin block: Thermal and hydraulic calculation of shell-and-tube heat exchangers with fin block	KOND DPW LAM
Electric heaters	Standard version for thermal and hydraulic design of forced-flow, electrically heated shell-and-tube heat exchangers	EWTS
Evaporation	Evaporation of pure substances on smooth pipes incl. tube sheet library, TEMA, with additional physical properties	VERD
Tube vibration analysis	The calculation can be performed for the whole tube bundle or only for a particularly endangered row of tubes under the inlet nozzle or in the window zone.	GV
Double-pipe heat exchangers	Double-pipe heat exchangers (concentric annular gap, tube-in-tube) (s. also Hairpin)	DP
Multi-component condensers	Cross-flow condenser with smooth / finned tubes incl. DDB-Flash. (Multi-component condensation in the tubes)	MUKO

Module package WTS and VERD

Module package WTS and AC

Module package WTS and GV standalone

WÄRMEÜBERTRÄGER / STANDARDPAKETE 2

I. LAUTERBACH VT

II. ATLAS PROGRAM SYSTEM

III. PRESSURE VESSEL DESIGN

IV. PROCESS ENGINEERING

V. OTHER

Exchanger Type	Program description	Package
Cross-flow heat exchangers / air coolers	Standard version of register heat exchanger with plain or different finned tubes, partial condensation with additional physical properties Calculation of intermediate temperatures and steam / condensate quantities in steam / post-steam condensation in heat exchanger groups (12 heat exchanger arrangements)	AC DNK
	Helical coil heat exchangers (pipe coil in a flow-through vessel) for gaseous and liquid media, up to 5 parallel flow-through pipes	COIL
Coil-type heat exchangers	Helical double-pipe heat exchanger / coaxial heat exchanger. Calculation of heat transfer and pressure drop in double-pipe heat exchangers in helical design KOAX as extension of the COIL module package	KOAX
Thermal oil heaters	Calculation and simulation of thermal oil heaters (with extensive thermal oil data base) incl. T-OIL module	BREN
Coil type economizers/ flue gas heaters	Helical tube heat recovery boiler with up to 14 tube baskets, thermal oil heating, Physical properties H2O / HFO / Luft / OEL / RGAS / T-OIL	WAK
Multi-component mixture condenser	Calculation of pure / multi-component mixture condensers with / without inert gas (incl. PROPER 3) requires MS ACCESS	MESK
Plate heat exchangers	Calculation of pressure loss and heat transfer with chevron type plates, only for single-phase media, no condensation including essential properties	MMP
Triple tube	Heat exchanger with concentric triple tube	RS3
Storage Tanks	Calculation of heat loss for insulated and heated storage tanks. The ground plan of the storage tank can be round or rectangular. Heat losses via the roof due to radiation, via the floor with a new approach. Design of the heating coil for heat loss compensation.	TANK
	Calculation of heating time and cooling time. (Requires module TIME at extra charge)	TIME

HEAT EXCHANGERS / SPECIAL MODULES

Module	Program description
2049	Preparation of acceptance documents for air coolers according to VDI 2049
ACK	Natural convection in air coolers (extension of AC)
BIL	Matter and heat balance
CIRC	Shell-side pressure losses and heat transfer in shell-and-tube heat exchangers with disc and doughnut as baffle plate.
DRLL	Heat transfer and pressure loss during flow through corrugated and cross-corrugated tubes
DRRB	Pressure loss via cross-flow finned tube bundles
EQU	Auxiliary tool for equation evaluation, interim calculations and documentation of results
FN	Correction factor for the mean log. temperature difference in tube bundle / plate / cross-flow heat exchangers
GGLR	Shell-side Heat transfer inshell-and-tube heat exchangers with longitudinally finned tubes (only for single-phase media, no condensation)
GOO	Shell-side heat transfer of heat exchangers on plain tubes (<u>shell without baffles</u>)
GGRI	Heat transfer during flow via finned shell-and-tube heat exchangers with segmental baffles
HYBA	Calculation of the necessary increase of a column compared to a vertical evaporator
INLR	Heat transfer and pressure loss during flow through tubes with internal fins (only for single-phase media, no condensation)
KUDO	Presentation of results, in extracts for customers Supplement to AC, KOND, VERD and WTS
NETZ	Calculation of heat exchangers networks (Supplement to AC, WTS)
OPTD	Cost optimization of pressure losses in heat exchangers
PLRE	Recirculation of hot air in flow-through tube register heat exchangers (air coolers)
RBSA	Vibration analysis of tube bundle heat exchangers
RDV	Tube-side pressure loss of shell-and-tube heat exchangers
RIES	Heat transfer in free-falling films on horizontal tubes
TSIP	Calculation of the necessary increase of a column compared to a horizontal boiler evaporator. Hydraulic calculation of thermosiphons
TWIS	Heat transfer and pressure loss during flow through pipes with and without twisted-tape inserts
VENT	Power consumption of fans
WAKO	Wall condensation and thermal bridge factor on insulated walls
WROK	Heat transfer in tube bundles with small longitudinal pitch
ZELL	Stationary temperature distribution in the heat exchanger (cell model) Unsteady temperature distribution (Transient calculation) supplement to ZELL

SEPARATORS / DEMISTERS / CYCLONES

Separators

Module	Program description
HSA	Design of horizontal gravity separators
LOMA	Determination of the flow pattern in the Lockhart-Martinelli diagram
VSA	Design of vertical gravity separators

Demister

FLD	Design of demisters (fibre filters) for droplet and solids separation from gases.
Package 1:	Modules HSA and VSA
Package 2:	Package 1 + Module LOMA
Package 3:	Package 2 + Module FLD

Zyklon

CYCL	<p>Design of cyclones with axial inlet, spiral inlet or slot inlet. Separation of solid particles or droplets / droplets loaded with solids from gases.</p> <p><i>The approaches in the VDI heat atlas (by Muschelknautz) as well as by Löffler and Bürkholz have been completely revised. Calculation of dust cyclones for low dust contents according to a new approach</i></p> <p><i>Extra charge to ATLAS / VDI Heat Atlas 12. Edition</i></p>
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FLUID MECHANICS / HYDRODYNAMICS

Module	Program description
RNET	<p>Calculation and simulation of meshed pipe networks for gases, vapours and liquids with sprinkler system. Database with coefficients of friction.</p> <p>Interface to various expansion modules on request.</p> <p>Module package ROHRNETZ incl. FDP and L1.3</p>
BEHE	Design of trace heating systems
CAV	Control valves for liquids and gases
DROS	Flow measurement with throttle devices, orifice plates according to EN-ISO 5167-1/A1
FDP	Pressure loss in unmeshed piping systems incl. L1.3 module
KV	Design of control valves according to DIN IEC 534, noise calculation and time-dependent control behaviour
LOGI	Pressure loss over perforated grids
NPSH	Existing net positive suction head in pipelines incl. module L1.2 (VDI Heat Atlas)
STOS	Pressure surges in straight pipelines
TKL	Filling levels in storage tanks (vertical, horizontal) with bearing table
VSP	Leakage losses / flow rate with flow in annular gaps
ZDP	Friction pressure loss in two-phase pipe flows – see also module L2.2 (VDI Heat Atlas)

OTHER PROGRAMS

Module	Program description
BIL	Properties and heat balance
EQU	Tool for equation evaluation, for intermediate calculations and documentation of results
TABI	User table interpretation module
TAL	Emission distribution according to TA-Luft (as of 2005)
TIME	Berechnung Calculation of the transient processes during cooling or heating up

Included free of charge in the current version

Scenario Manager	<p>You create any calculation and define different variants for it in MS Excel. The program calculates these variants and outputs the results in tabular form to MS Excel.</p> <p>The great advantage of the Scenario Manager is that all input data for the various scenarios are completely predefined in an EXCEL table and are automatically transferred to the program. This saves an enormous amount of time, since almost any number of calculations can be performed at once.</p> <p>→ Optimization and target value search with freely definable boundary conditions</p>
Excel Interface	See II. Program system ATLAS - Interfaces

Add-on with costs

LV-VISIO	<p>Prerequisite for the use of the LV-VISIO interface is the license of Microsoft VISIO 2016 (Standard Edition), which we can arrange at a reasonable price</p> <p>LV-VISIO Interface</p>
LV-Excel Template	<p>Based on the free Excel interface. There links are saved only for one file pairing (LV file-Excel folder). With the additional module "LV-Excel-Templates" it is possible to save such links in a template file and to apply them to the corresponding module, if required.</p> <p>AddOn to LV-Software, Licensing on Request</p>