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Pipe Elements

Calculation modules
according to
EN 13480-3:2002/2005

VOGEL

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Rohrleitungsbauteile

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In general apply for all calculation modules

The universal tool for calculation and piping design according EN 13480-3: 2002/ 2005 offers 23 modules for the most important design features and proof of piping elements in the design stage for engineers in Germany and Europe.

The calculation can be carried out alternatively in English or German in a technical data sheet, which can be printed as a verification document or project record. Help and comment functions and specific data from the database support the data entry. Design and recalculation can be carried out on site or in the office with minimal training. Each calculation can be individually assessed and adjusted to give optimal results.

The data base is expandable, and can be modified to incorporate different codes and standards.

The usage of these modules requires trade knowledge in the field of piping design. The computed results need to be interpreted with regards to construction by a professional.

The program modules have been created in diligence and underwent elaborate testing by professionals. Numerous test calculations have been carried out.
Nevertheless, software errors and bugs can't be ruled out completely. Publisher, editor, author and translator can't be held responsible for faulty calculations and the results and consequences.
Notification of possible flaws or improvements of any kind are appreciated.

Technical quieries per e-mail to:

module@vogel-buchverlag.de

Module structure

By inserting the CD-ROM into the drive of the PC, the software starts automatically with the window for language selection. After language selection, the table of contents for the calculation modules opens. The single modules are accessible by mouse click as plain data sheets.

Detailed sketches, illustrated formulae, hints for mistakes, guide values, selection lists, and explained commentaries are supporting data entry and make calculations and results transparent. Only yellow highlighted data entry cells are editable for easy user guidance, other cells are protected.

Data entry conditions for avoiding faulty entries

Stored information by "mouse over" (red corner triangle)

Optimized user wizard: Data entry possible only in yellow cells
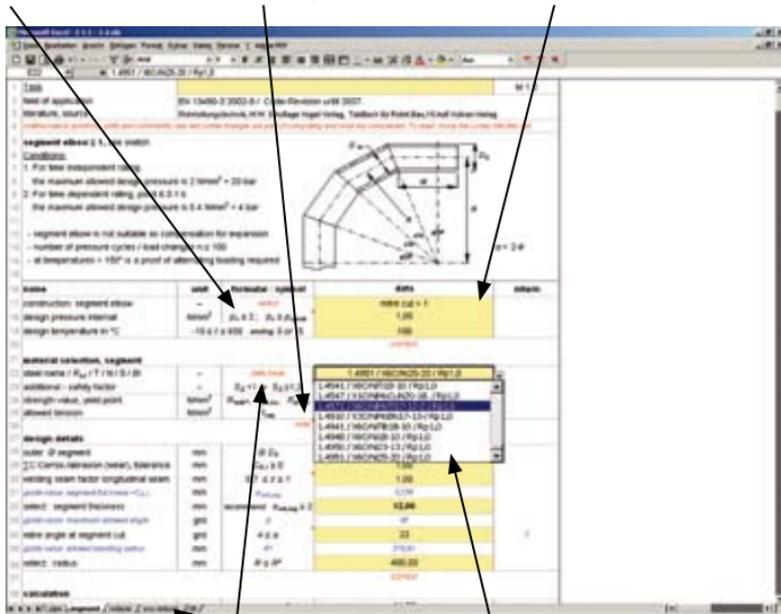
Expandable database

Reference to drop down menus

Drop down menus for selection of pre-selected or user defined steel types, gaskets and characteristics

Important instructions for module usage

All calcualtion modules are compatible with Microsoft EXCEL from version 97 and higher. Use of the modules requires the deactivation of the EXCEL macro virus protection.

Deactivation of EXCEL – macro virus protection
Please check if the macro virus protection is deactivated. In case you keep the macro virus protection in "active mode", EXCEL prompts that macros could contain a virus. In this case you click the button, which activates the macro mode.

Entry of calculation data
The computing should be carried out step by step from top to bottom. Faulty data entries or faulty results will be prompted by the system and commented. In case a fault is highlighted, please correct the data entry appropriate to the hint or at your own technical discretion. Guide values will be shown for following certain data entries e.g. pre-selection of pipe wall thickness, reinforcement thickness, tolerance allowance, allowed geometric dimensions etc. For new calculations it is recommended to start with a plain data sheet, because by doing so internal validity checks for illegal data entries are performed.

Databases
Certain specifications (e.g. steel properties, type of gaskets, types of members) of structural members can be called up from databases. Therefore, please click on the appropriate yellow entry cell. Right beside the cell appears an arrow and if you click the arrow a drop down menu opens automatically. Select by clicking at the chosen specification for the calculation and note the superimposed entry guide values.

Technical assistance with „mouse over"
You can find technical assistance in red triangle marked cells (upper right corner). If you hover the mouse cursor over those cells, information will

be superimposed. Very important notes are stored in cells, which are carrying in addition to the red triangle also the word **note**. This information should always be followed.

Entry of decimal separators
Please use by entry of decimals the appropriate regional decimal place/type settings of your PC (comma/point). You find the regional settings of your PC under "system or control panel" at "regional and language options \ regional options".

Integrated Databases

Data Base DB: piping steel, sheet metal, forgings, bolts
The data base is linked to each module group (i.e. EXCEL worksheet) and labeled as **DB** in the EXCEL worksheet index. The database contains about 200 steel types including the most important manufacturing thicknesses and adherent properties. The database is clearly arranged with distinct headlines, which enables the user to distinguish exactly seamless pipes versus welded pipes, sheet metal or forged steel.

In order to offer a high flexibilty for the user in terms of material selection, it is possible to expand the database with user defined steel properties. Those can be edited or changed at any time. The data entry cells are highlighted in **blue**. Instead of the default entries **designation 1, designation 2** etc the requested steel name should be entered in those fields. The allowed characteristic values of the steel (0.2% or 1%) should be entered into the remaining cells.

New: as of this version all existing characteristic values in the data base can be edited by the user. Only steel designations and material codes

NA/ A35 / A40 are protected. Caution: changes of characteristic values should be carried out under special care and the remaining data must be cross checked (via an interpolation cycle).

Important information of module data base with „mouse over"

New as of this version: All characteristic values are freely editable
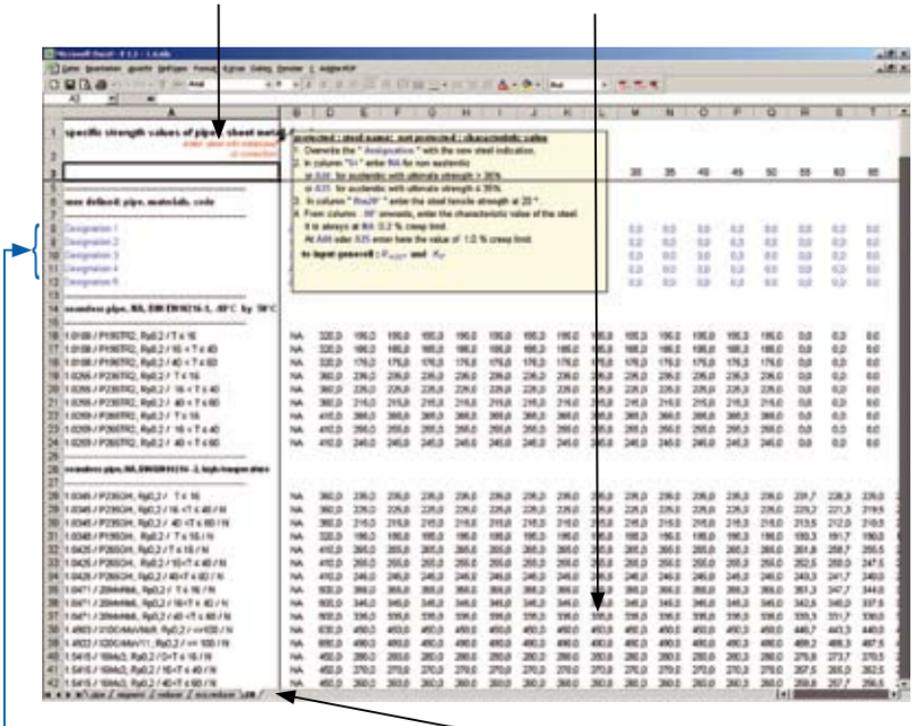
Entry area for user defined steel (blue letters)

Sheet index of data base

Data Base gask 1 in module group 4: flat endcap (blindflange)

Prior to selection of the gasket, it should be decided whether the gasket is for a raised flange or full face type.

The decisive factor is the operation pressure and the required effective tightness. Characteristic values and calculation options are carried out according to "Taylor series approximation". According to above menti-

oned procedure (refer to database **DB**) it is also be possible to edit "user defined" gaskets and to modify existing characteristics.

Data base gask 1 / gask 2 / gask 3 in module group 6: Flanges
The calculation of flanged connections according EN 1591-1:2001/prA1 2005 is the optimized technical up to date calculation method. It allows for calculating the strength and the leakage proof of the flange joint. For the calculation required characteristic data according to the standard are provided from the database **gask 1 / gask 2 / gask 3**. In case there is no data for a specific application inside the database, a similar type of gasket might be selected out of the database. However, it's preferred to use the specific data of the manufacturer, according to afore said standard. This data can be entered as "user defined" gasket into the database according to above mentioned procedure (refer to database **DB**). Amendments of existing characteristics in data bases **gask 1 / gask 2 / gask 3** are not possible.

Data base DB in module group 7: External pressure
For the proof of external pressure strain applies for steel other strength criteria, compared to internal pressure. For austenitic steel, the yield point is instead of 1% now at 0.2%.
Also in this database it's possible to enter "user defined" data into the data base according to above mentioned procedure (refer to database **DB**), or to amend existing data as well.

Commented sample calculation with module 1.3, reducer

The step by step development of following sample calculation is essential for the basic understanding of the module architecture and functions. There for start the module **1.3 (Reducer)** and follow the instruction given below.

Pay attention to entering conditions in column **formula /symbol** while entering data. Data can be entered only in yellow cells, all other cells are protected. A red triangle indicates cells with important information, consider those essential information by "mouse over" with the curser inside the cell.

References to code and guide values for the entry data are indicated in **blue letters**.

Row 1:	Data entry of concrete technical specification
Row 12:	Data entry of internal design pressure in N/mm² = **2,25**
Row 13:	Entry of design temperature (last digit must be 0 or 5) in °C = **185**
Row 14:	If the calculation indicates *correct*, the data entry can be continued. If not the values need to be checked.
Row 15:	Click into the yellow cell and select out of the drop down menu **data base** the type of steel under the headline "Sheet metal, A, DIN EN10028-7, AD W2 T ≤ 75" **1.4301 / X5CrNi18-10 / Rp1,0**
Row 16:	Entry of additional safety factor = **1,0** This additional safety factor is applied additional to defined safety factors. Please refer to additional information (red triangle).
Rows 17-18:	Indication of specific values from the data base and allowed tension. The allowed tension applies for EN 13480-3. This code in the database does not allow further utilization of tension according to specific codes of other countries, thus amendments are not recommended.
Row 19:	If the calculation indicates *correct*, the data entry can be continued. If not the values need to be checked (temperature, steel type selection).
Row 21:	Entry of outer diameter of the large cylinder in mm = **1650,0**

Row 22:	Entry of outer diameter of the small cylinder in mm = **1200,0**
Row 23:	Entry of aperture angle in ° = **35** Angles smaller than 5° can be calculated as straight pipe.
Row 24:	Entry of radius or welding seam in mm **= 0,0** (see drawing) An entry of 0,0 will be taken as welding seam.
Row 25:	Entry of all summed up allowances in mm (= minus tolerances + corrosion) **= 1,0**. Please refer to additional information (*note*).
Row 26:	Entry of welding seam factor = **0,85**
Row 27:	This row indicates a guide value of the thickness for part 1 = **25,0** The column **formula/symbol** indicates C01 = 0. That highlights that the calculation is only using wall thickness of available materials. Guide values offer the engineer an orientation for following value entries.
Row 28:	According to the rounded up guide value in row 27 (we would recommend always to round up), follows the data entry of the thickness of part 1 in mm = **25,0**
Row 29:	If the calculation indicates *correct*, the data entry can be continued. If not the values need to be checked. Open the info box under *note, help* and continue as proposed.
Row 30:	The iteration calculation starts with mouse click.
Row 37:	Up to this row, the required theoretical thickness from part 1 in row 28 is calculated by optimization = 22,25 and the allowed internal pressure at the left **= 2,250339…** and at the right rounded **= 2,25** displayed (due to the rounded up input value the iteration calculation starts from a higher value to the target value). The iteration shows as result *correct*. Now the first part of the calculation is completed.

Row 38:	This row indicates the 2. guide value **= 1,49**. This is the actual value out of the calculation and the still missing thickness of part 2.
Row 39:	Entry of rounded off calculation value in mm **= 1,4** (we would recommend always to round off).
Row 40:	*correct* is displayed. Open and read the information under *note, help* and continue as suggested.
Row 41:	The iteration calculation starts with mouse click.
Row 45:	Check row 45 and correct if necessary the value in row 39 (see *note, help* in row 40) until the ticker √ in row 45 appears.

Now the data entries and iterations for this module are finished. The following sequence indicates the minimum required construction dimensions including C0,1.

As practical thickness and length for the reducer can be selected:
Part 1 = 24 mm, min length = 265 mm
Part 2 = 24 mm, min length = 225 mm
Part 3 = 24 mm constant over entire cone shell.

InfoClick-Code

After code entry on

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the onlineservice **InfoClick** offers additional information and updates: