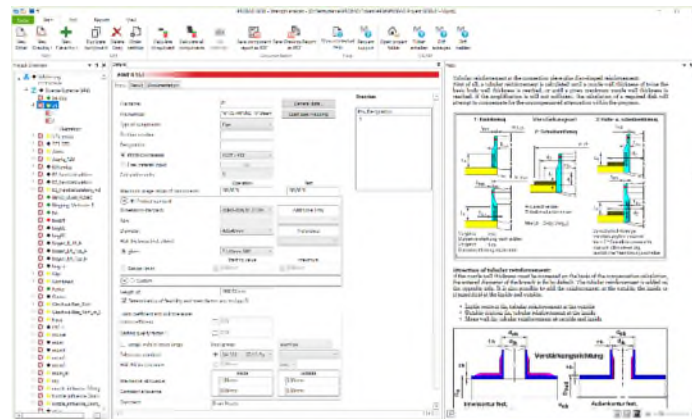




PROBAD

Code-based Strength calculations of Pressure parts



PROBAD Release January 2018 New Features and Improvements

The program system PROBAD is checked and modified continuously within the scope of the maintenance agreement.

List of innovations, improvements and corrections of the new PROBAD-Releases
ASME I und ASME VIII/1, Edition 2017
ASME B31.1 and ASME B31.3, Edition 2016,
and ASME-Piping Series

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Materials in acc. to ASME II-D, Edition 2017:

- The following new materials have been integrated into the PROBAD material file:

PROBAD Number	Nominal Composition	Product Form	Specific. No	Type/Grade Class
No. 41618	Cr-8Ni	Plate	SA-240	304L
No. 70316	Cr-12Ni-2Mo	Welded Tube	SA-249	TP316L
No. 704/705	16Cr-12Ni-2Mo	Welded Tube	SA-249	TP316
No. 70625	Cr-7Ni-4Mo-N	Forging	SA 182	F53

Materials according to ASME II-D, Edition 2017

- A complete documentation of all available materials can be found on the installation-CD under the name
ASME_II_Material_A_Edition_2017.pdf (yield strength values)
ASME_II_Material_B_Edition_2017.pdf (allowable design stresses)
In these documents the sources (pages in ASME II-D) for all materials and modifications compared with the last release are listed.

- The following new materials have been integrated into the PROBAD material file:

PROBAD Number	Nominal Composition	Product Form	Specific. No	Type/Grade Class
No. 41618	Cr-8Ni	Plate	SA-240	304L
No. 70316	Cr-12Ni-2Mo	Welded Tube	SA-249	TP316L
No. 704/705	16Cr-12Ni-2Mo	Welded Tube	SA-249	TP316
No. 70625	Cr-7Ni-4Mo-N	Forging	SA 182	F53

Materials according to ASME B31.1, Appendix A, Edition 2016:

Materials according to ASME B31.3, Appendix A, Edition 2016:

Materials according to ASME B31.3, Appendix K, Edition 2016:

- A complete documentation of all available materials can be found on the installation-CD under the name ASME_Material_B31_Ed_2016.pdf
In this document the sources (pages in ASME B31) for all materials and modifications compared with the last release are listed.

- The following new materials were integrated into the PROBAD-Material File:

PROBAD Number	Nominal Composition	Product Form	Specific. No.	Type/Grade Class
Nr. 703	16Cr-12Ni-2Mo	Welded Pipe & Tube	A 249	TP316L
Nr. 704/705	16Cr-12Ni-2Mo	Welded Pipe & Tube	A 249	TP316
Nr. 492	22Cr-5Ni-2Mo-N	Bar	A 479	...



ASME I, Edition 2017, Release 4.07

Result Documentation

In the new release for ASME I a short and a long documentation of results is available now:

- The short results are in tabular form and fit on one page usually.
- The first page of the long results always contains the tabular short form, followed by the detailed results including calculation factors, required wall thicknesses ect.
- The long form of results can also be demanded including the protocol of the input data.

In the results documentation input values are now marked by an asterisk '**'.

Edition 2017: Adjacent openings and Nipple fields

ASME I, Edition 2017 now contains clear rules to decide, whether more than 2 adjacent openings have to be regarded as nipple field and thus reinforced via a efficiency factor E:

- If the reinforcement zone of more than 2 openings overlap and if the center distance between any 2 of these openings is greater or equal $4/3 d$, according to PG-38.2 for each 2 openings a common reinforcement calculation according to PG-38.1 is sufficient.
If these openings are part of a definite pattern, then according to PG-38.4 the sectional areas between each 2 openings have to be controlled additionally according to Figure PG-38.4-1.
- However if at least one center distance is smaller than $4/3 d$, the reinforcement calculation has to be done either for an assumed opening enclosing all such openings, or according to PG-38.4 the openings have to be regarded as nipple field and thus have to be reinforced via the correspondent efficiency factor E according to PG-52 and PG-53.

The new release was modified as follows:

- If the reinforcement zone of more than 2 openings overlap and if the center distance between at least 2 of these openings is smaller than $4/3 d$, a warning is displayed, that these openings have to be calculated either by an enclosing opening or as nipple field.
- If the reinforcement zone of more than 2 openings overlap and if the center distance between any 2 of these openings is greater or equal $4/3 d$, it is pointed out via a hint, that, in case of being part of a definite pattern, an additional check of the sectional areas between each 2 openings has to be done according to Figure PG-38.4-1.
In the new release this additional check can be done by entering the ,type of reinforcement = Nipple field $p > 4/3 d$ ' for these openings.
- If a nipple field is entered with all center distances greater equal $4/3 d$, a hint is displayed, that this nipple field may be regarded as adjacent openings and the reinforcement calculation may be done according to PG-38.1.
Mostly this method results in a smaller shell thickness.

Edition 2017: Forged flat head

In the new release according to ASME I, Edition 2017 a forged flat head according to Figure PG-31 (b-2)' with factor $C = \text{Max} \{ 0.33 m ; 0.2 \}$ is now available.

Up to now this type of head was described in Code Case 2697.

Rename of orders or drawings

Via the menu ,File > Order > rename' or ,File > Drawing > rename' the name and number of an existing order or drawing can now be modified. In the following calculations the new names and numbers are documented.



Maximum allowable calculation pressure

In the new release the maximum allowable pressure is even documented for insufficient dimensions. In this case of source the allowable pressure is less than the calculation pressure.

Saturation temperature

According to ASME I, PG-27.4, Note 2 for unheated tubes PROBAD determines the allowable design stress for the calculation temperature, but at least for the saturation temperature. In the new release the saturation temperature is documented in the results, if one of the components (header and/or nozzle) was defined as unheated tube.

ASME VIII/1, Edition 2017, Rel. 7.07

Edition 2017: Reinforcement according to Appendix 1-9 and 1-10

In ASME VIII, Edition 2017 the Appendix 1-9 and Appendix 1-10 were deleted. Thus the correspondent reinforcement calculation of openings is no longer available in the new PROBAD release.

Edition 2017: Calculation in SI-Units

For calculations in SI-units those correspondent dimension limits are relevant, which are documented in brackets in the ASME-Code. Edition 2017 now documents more exact bracket values (e.g. in UG-36). These values are checked in the new release now.

Edition 2017: Heat Exchangers according to Section UHX

In the new release for fixed tube sheet heat exchangers with bellows expansion joints the axial displacement ΔJ of the expansion joint is now determined according to UHX-16 for all load cases and is documented in the results. Additionally the resulting maximum axial displacement range is documented.

Rename of orders or drawings

Via the menu ,File > Order > rename' or ,File > Drawing > rename' the name and number of an existing order or drawing can now be modified. In following calculations the new names and numbers are documented.

Conical Shell with attached cylinder

For conical shells with attached cylinder the limit angle Δ according to ASME VIII/1, Appendix 1-5 or Appendix 1-8 is documented additionally in the results of the new release.

Flange

- Up to now in case of $K = A/B > 5$ the calculation factors T,U,Y,Z according to Figure 2-7.1 were determined for $K = 5$ (incl. message). Since ASME VIII contains no explicit limit for K, also for $K > 5$ the factors T,U,Y,Z are determined via the correspondent formulas in the new release.
- Up to now in case of $h/h_0 > 2$ the values F,V,FL,VL,f according to Figure 2-7.2 up to 2-7.6 were determined for $h/h_0 = 2$ (incl. message). Since ASME VIII contains no explicit limit for h/h_0 , also for $h/h_0 > 2$ the values F,V,FL,VL,f are determined via the correspondent formulas of Table 2-6.1 in the new release.
- In the new release now also metric bolts with small diameter M6, M8 or M10 can be selected.



Nipple fields

In PROBAD ASME VIII up to now for nipples the section UG-45 was not taken into account. But since according to Interpretation VIII-1-15-10 also nipples must have a minimum nozzle neck thickness according to UG-45, the PROBAD calculation was modified.

ASME B31.1, Edition 2016, Rel. 4.00

ASME B31.3, Edition 2016, Rel. 2.00

New user interface

SIGMA designed a new user interface for the PROBAD modules ASME B31.1 and ASME B31.3.

- Die entire graphical user interface has been converted to the Microsoft standard interface.
- All program commands are explained by tooltips.
- The administration of orders, drawings and data sets has been changed into project files where several orders can be managed in one file.
- The number of project files is not limited any more. Files can be stored anywhere.
- The drawings of two (and in the future of all) calculation modules can be managed in one order.
- Calculation modules can be selected and licensed when the program is executed.
- PROBAD now supports the import of input files of the previous release and conversion into the new data format.
 - An unlimited number of orders, drawings and data sets can be integrated into one project file
 - orders, drawings and data sets from both calculation modules can be migrated into one project file.
- If possible the inputs of one assembly are combined to one screen page. The inputs of subordinate components (e.g. nozzles...) are shown on the next pages in this case.
- Already during the input process required input parameters are pointed out.
- Inputs are checked during the input process and if incorrect they are highlighted and commented by adding a tooltip.
- Text inputs now can be of unlimited size: if the text amount can't be handled by the calculation process a warning occurs. In this case a shortened text is transferred to the calculation core.,.
- Reports (output files) can be created in PDF- and RTF- (MS Word) format.
- Reports can be generated for single components, complete drawings and the list of pressure parts.
- Th input and the calculation can be carried out in SI units and in US units. Units can be selected independently either in the input process or calculation.
- The graphical interface can be used in German or English language
- The material selection dialog has been replaced by a user interface completely equipped with filters and list functions.
- For each selected material a data specification can be shown and stored in pdf format.
- The material data sheet can be added to a calculation report (pdf reports only)

Results Documentation

In the new release for both PROBAD modules a short and a long documentation of results is available now:

- The short results are in tabular form and fit on one page usually.
- The first page of the long results always contains the tabular short form, followed by the detailed results including calculation factors, required wall thicknesses etc.
- The long form of results can also be demanded including the protocol of the input data.



ASME-Piping series, Release 1.08

Renaming a project

Via the menu ,File > Project > rename' the name and number of an existing project can now be modified. In following calculations the new project name and project number are documented.

- **Material Selection**

In the selection list for ASME materials the product type of the single materials is only displayed in contracted form. In the new release the complete product form is displayed in a window after marking one of the selection lines.

Nozzles

The schedules of the wall thickness of the main pipe and of the nozzle are documented in the results now.

Flanges according to ASME B16.5

Now according to ASME B16.5, Edition 2017 for Class 150 – 600 also the standard dimensions of flanges NPS 22 are available additionally.

Also for material group 1.18 the rating table at T = 650°C (1200°F) was revised according to ASME B16.5, Edition 2017.

Blinds according to DIN 2626

Up to now the thickness of blinds were designed in steps of millimeters or 1/32 inch respectively, if no thickness was entered. In the new release the dimensions according to DIN 2626, Edition 06/2016 are available additionally.

ASME VIII, Edition 2017: Reinforcement according to Appendix 1-9 and 1-10

In ASME VIII, Edition 2017 the Appendix 1-9 and Appendix 1-10 were deleted. Thus the correspondent reinforcement calculation of openings is no longer available in the new PROBAD release.