Release notes WANDA 4.0 Liquid

May 2011

Release announcement

Deltares is pleased to announce the availability of Wanda 4.0 Liquid, the successor of WANDA 3.7. Wanda 4 has a new sophisticated architecture which allows other physical domains like gas dynamics and heat transport to be simulated using the same well-known graphical user interface. For more information on the Heat and Gas modules (currently under development, prototypes are available), check the Wanda 4 brochure.

WANDA 3 users should read the section "What's new" carefully since a few important definitions have been changed.

Downloading

Wanda 4.0 Liquid is available via our wiki support site: http://wanda.deltares.nl.

Installation

Read the separate installation guide to install Wanda 4.0 Liquid.
Users with a stand-alone license (USB dongle) can install Wanda 4 and Wanda 3 side by side on the same PC. This is not possible for server licenses.
Please note that Wanda 3 cannot open cases created or edited with Wanda 4.

Helpdesk support is provided via wanda.support@deltares.nl

What's new in Wanda 4.0 Liquid

The highlights of the Wanda 4.0 Liquid release are:
- The architecture of Wanda has changed significantly, allowing for new modules such as Heat and Gas and supports, besides the existing suppliers and fall types, components with more than 2 hydraulic connect nodes
- New 3 and 4 connect node components like Tee, Y and cross junctions for accurate local head loss calculations
- Friction model for non-Newtonian fluids (slurries) (Optional feature)
- New "all-in one" PIPE model for pressurized flow, supporting several friction models, circular and rectangular cross sections. Velocity head is taken into account in the calculation of pressures as well as cavitation
- New standard components "inclined airvessel" and "shaft"
- New optional component "Turbine" with wicket gate
- Support for different H-node types
- Windows 7 and 64-bit versions of Windows XP/Vista/Windows7 are fully supported

What's changed in Wanda 4.0 Liquid

PIPE model
- The four different WANDA 3 PIPE types (rough, lambda, Xi-losses, L_equiv.losses) for pressurized flow are replaced by 1 generic type.
  There are still two different pipe symbols available but they both use the same input and algorithm. This allows the user to use the symbol according to his preference.

- The reference for the PIPE elevation (geometry input) is now explicitly the centreline of the pipe . In Wanda 3 the cavitation computation assumes that the specified pipe profile was at the inside top (soffit). During conversion of a wanda 3 case, you will be asked how to adjust

the existing pipe profile to the new reference elevation (see page 4 of this release notes)
The new elevation definition has several consequences:
  o The pressure condition for cavitation is always located at the top of the pipeline, i.e. ½ D above the centreline elevation.
  o The pressure output depends on the vertical location (bottom, top or CL) and is defined in the Modes & Options dialog:
    ▪ Pressure time series: at the top (soffit), centreline or bottom (invert) of the pipeline.
    ▪ Minimum pressure: at the top or the centreline pipe.
    ▪ Maximum pressure: at the centreline or the bottom.
  (In WANDA 3 the three different pressures (current time, min, max) were all related to the same elevation)
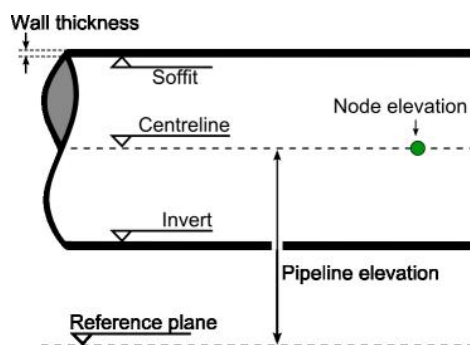
- The velocity head is taken into account; In Wanda 3 this was deemed negligible. This may result in small changes in the pressure output (see manual chapter 3.7, page 3-166). It will also result in small changes in the cavitation output.
- The pressure rating of the pipe can be shown in the location charts (both in pressure and head location charts). Visibility of the Input fields for the pressure rating is set in the Mode & Options window.


Pipes with different pressure ratings

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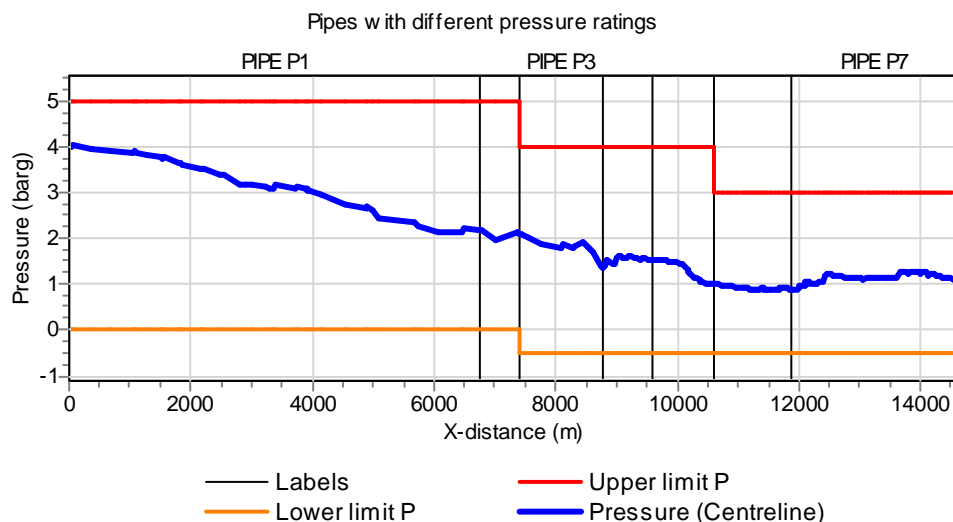
Free surface flow Conduit (optional component)
- The two different WANDA 3 Free surface flow conduits (Q>0, Q = 0) for open channel flow are replaced by 1 generic type called CONDUIT with different initial states available through several drop-down input fields.
  This component supports critical and sub-critical flow regimes in an open channel and pressurized flow when the conduit will be filled completely. Waterhammer is not taken into account.
- The Conduit has its own shape:

- The reference for the CONDUIT elevation (geometry input) is now explicitly the bottom (invert) of the conduit. The geometry of Wanda3 cases is automatically converted to the new definition.
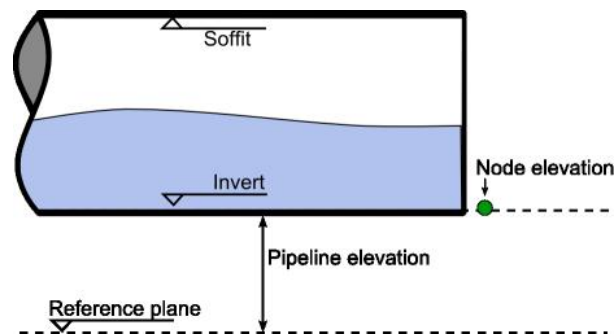
- The code of the Conduit is made more robust (improved numerical stability).
- The numerical model of the Free surface conduit component is valid for slopes up to 14% (8 degrees). For slopes larger than 14% the component will issue a warning. For slopes larger than 35% (20 degrees) the component will issue an error, stopping the simulation.
- The Wanda 3 component "Free surface flow waterhammer pipe" is no longer available in Wanda 4 as this was a research component.

H-Node with initial head
In an isolated part of a network (e.g. due to closed valves) the head is not defined. Wanda 3 used a trick to handle this (initialize one of the valves with a very small opening). This trick is no longer permitted due to the new architecture and because the user had no influence on which valve was used by the solver.
If the program detects an isolated part, it will ask you to use the "H-node with initial head" to define the proper value (see also manual chapter 4.4, page 4-181). In unsteady state calculation the behaviour of this type of node is identical to the default H-node.

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SENSOR connections

- Connection points of SENSOR components for measuring hydraulic properties have been changed. The user interface automatically re-connects the Sensor to the correct location during conversion.
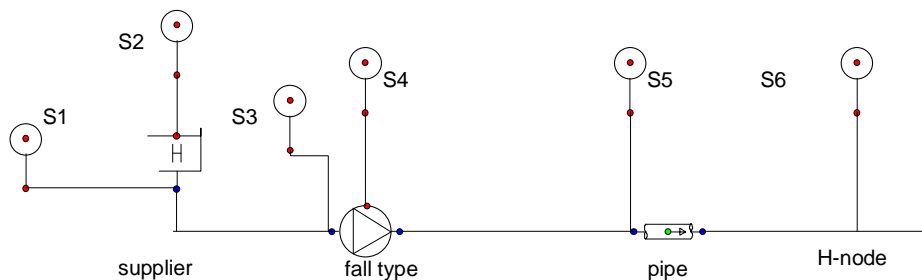
New connection layout for SENSOR components in Wanda 4.0

Sensor connected to	parameters	Remarks
Hydraulic connect point (blue node) of component (all types incl. PIPE)	Standard output	i.e.: Head, discharge, pressure, velocity, void fraction (cavitation).
Control connect point (green or red node) of component (all types incl. PIPE)	Component specific output (incl. pressure and head differences)	e.g.: Pump speed, valve position, etc.
H-node	Standard output	i.e.: Head, Pressure, Void fraction (cavitation).

OUTPUT properties

- Due to the introduction of the three- and four-node components, the sequence of the standard output properties (Head, discharge, pressure, velocity) has been changed.
- The PIPE output in the connect points is available separately to create time serie in those points without defining a location; to reduce the amount of output properties of the pipe, the visibility of the connect point output is controlled in the Mode & Options window
- The output properties 'Head drop' and 'Pressure drop' for the PUMP component have been replaced with new output properties: 'Pump Head' and 'Pump pressure'. If you used these values as measured signals in a Wanda3 control system, you have to re-enter the measured quantity in the sensor manually.

Reports and charts

- The text-based input and output report feature from WANDA 3 has been removed. Wanda 4 now generates a comma-separated file with the model input, steady state and transient simulation data which can be used directly in a spreadsheet.
- In the legend, the sequence of lines in the location charts has been changed due to the new pressure rating lines. The "labels" entity is no longer displayed in the legend.
- The legend of a pressure chart contains the reference elevation (invert/centreline/soffit)
- Chart settings changed by the user, are preserved during editing of the model.

Backwards compatibility and conversion

- WANDA 3 cases will automatically be converted to the new Wanda 4 file format. A backup copy of the old case (MyCase_old_version) will be saved before the conversion takes place.
- Wanda 4 cases cannot be opened and/or modified with older versions of Wanda.
- The user will be asked to select the desired action to take during conversion, see screen shots below: