



Open PHA

HAZOP & LOPA Software



Overview Open PHA® Desktop and Open PHA Premium are powerful tools for performing, analyzing, and maintaining HAZOP, LOPA, and Security PHA Review studies.

The development of Open PHA is the result of Kenexis process safety engineering team experience facilitating thousands of HAZOP and LOPA studies. Open PHA was developed internally by process safety engineers with the intent of providing better HAZOP and LOPA software to address the shortcomings of traditional PHA software packages.

Open PHA Desktop is standalone desktop application available on Microsoft Windows®, Mac OSX®, and Linux® based operating systems. The Open PHA Desktop edition is available at no-cost and can be downloaded from the Kenexis website.

Open PHA Desktop is a complete HAZOP and LOPA software package supporting customized Risk Matrix, Likelihood Categories, Consequence Categories, and Risk Rankings, Nodes, Deviations, HAZOP & LOPA Worksheets, Recommendations, Safeguards, a Parking Lot, and Reporting.

Open PHA Premium is a module in the Kenexis Integrated Safety Suite (KISS). KISS provides technical safety professionals with a secure cloud-based multi-user platform for the design of engineered safeguards. Open PHA Premium also includes a collection of premium tools.

Deviation	Consequence	L Before Safeguards	S	L	RR	LOPA Required	Cause	Cause Hackable	Cases			Scenario Hackable	PHA Recommendation	PHA Comment
									Safeguard	Safeguard Type	Safeguards Hackable			
1.1 High Pressure	1.1.1 Potential overpressure of V-101. Potential loss of mechanical integrity. Potential rupture of High Pressure Separator resulting in large release of hydrocarbons and potential fire or explosion. Change	3	4	3	4	Yes	1.1.1.1 Production header pressure operates above 1200 psig. 1.1.1.2 External fire in the vicinity of HP Separator V-101.	Yes	1 Relief valve PSV-101A opens to flare header. 2 PT-101D high pressure shutdown closes HP separator inlet valve SDV-101. 3 Control valve PV-101B will open to flare. 6 PT-101D low pressure shutdown mitigates hazard by closing SDV-101.	PSV SIF BPCS SIF	No Yes Yes Yes	25 Consider performing a LOPA analysis to understand this high consequence scenario in more detail		
1.2 Low Pressure	1.2.1 Potential breach of high pressure pipeline with subsequent pressure reduction to HP Separator M-101. Potential hydrocarbon release to environmental and subsequent impacts. Potential fires/explosion.	1	4	0	0	No	1.2.1.1 Production header pipeline rupture (see 1.2.1.2) upstream of SDV-101.	No	6 PT-101D low pressure shutdown mitigates hazard by closing SDV-101. 7 Automated low pressure shutdown upstream of the production header.	SIF Safety Instrumented Function	Yes Yes		Safety Consequence: Potential for gas blowby into the Low Pressure Separator V-102. Potential for overpressure of Low Pressure Separator. Potential for loss of mechanical integrity. Potential for rupture o...	
1.3 High Temperature	1.3.1 No credible causes	0	0	0	0	No	1.3.1.1	No	8 High level shutdown LT-101B closes inlet valve SDV-101	Safety Instrumented Function	Yes		Environment: Potential for gas blowby into the Low Pressure Separator V-102. Potential for overpressure of Low Pressure Separator. Potential for loss of mechanical integrity. Potential for rupture o...	
1.4 Low Temperature	1.4.1 No credible causes. Auto-refrigeration of gas flashing across PV-101A, not expected to result in safety concerns.	0	0	0	0	No	1.4.1.1	No	9 Operator response from 101A - not independent from other failures	Operator Response to Alarm	No		Asset Consequence: Potential for gas blowby into the Low Pressure Separator V-102. Potential for overpressure of Low Pressure Separator. Potential for loss of mechanical integrity. Potential for rupture o...	
1.5 High Level	1.5.1 Potential overflow of the High Pressure Separator M-101 with liquid flow to the Gas Export Pipeline. Potential for Off-Spec product.	3	0	2	0	No	1.5.1.1 Failure of control loop LIC-101A such that valve is too much open. 1.5.1.2 Failure of envelope sensitive SDV-102A with process problem. 1.5.1.3 Slug present from 301 into production header.	Yes	10 Relief valve PSV-102, which is sized for gas blow-by. 11 Low level shutdown LT-101B closes low pressure separator inlet SDV-102A.	Pressure Relief Valve Safety Instrumented Function	No Yes			
1.6 Low Level	1.6.1 Potential for gas blowby into the Low Pressure Separator V-102. Potential for overpressure of Low Pressure Separator. Potential for loss of mechanical integrity. Potential for rupture of vessel or associated piping. Potential release of flammable materials. Potential fires/explosion.	3	5	1	3	Yes	1.6.1.1 Failure of control loop LIC-101A such that valve is too much open.	Yes	10 Relief valve PSV-102, which is sized for gas blow-by.	Pressure Relief Valve	No			
1.7 High Flow	1.7.1 No credible consequences (see M-101 - EN 101A - not of Int.)					No	1.7.1.1 Production header inlet line breach.							

Features	Open PHA Desktop	Open PHA Premium
Integrated HAZOP and LOPA	X	X
Configurable HAZOP and LOPA Worksheets	X	X
Configurable Risk Criteria	X	X
Recommendation Tracking	X	X
Deep Copy	X	X
Search & Replace	X	X
Implicit & Explicit LOPA Support	X	X
Cross-Platform Support (Windows/Mac/Linux)	X	X
Requires Internet Connection		X
Study / Facility Dashboarding		X
Revision Manager		X
Integration with Vertigo SIS Lifecycle Management		X
One Click Report Generating from Custom *.DOCX Template		X
Study Content Translation		X
Bowtie Generation		X
PHAWorks Import		X
Share and Collaborate with Project Teams		X

Standardized Data Structure The data structure design is fully integrated using an open-source standardized data structure that is revolutionizing PHA documentation. The standardized data structure allows the development of tools that can display a single set of data as a HAZOP worksheet, LOPA worksheet, or bow-tie diagram. Gone are the days of porting and manipulating data and worrying about the consistency of information across multiple files, studies, or data structures. The Open PHA platform was developed on an open-source standardized data structure from its inception with a deliberate effort to eliminate the problems presented with other software. As a result, data from multiple scenarios can be rolled up into easier to use hazard registers and visualized with graphical approaches like bow-tie diagrams, eliminating the frustration of managing replicated data in multiple locations and different languages.

Security PHA Review Security PHA Review studies are also integrated into Open PHA, allowing for the easy review of a HAZOP to record if the cause and safeguards can be compromised by a hacker or malware, ultimately determining if additional effort is required to secure the scenario against a cybersecurity risk.

Tracking Dashboarding and recommendation tracking provide oversight into what the status of studies, recommendations, risk ranks, safety-environmental-asset severities.

Deep Copy Open PHA features a “deep copy” function that captures the associated information to be copied. Deep copy is useful in situations where a node or deviation is like another. In these situations, a node or deviation is copied, pasted, and only the information that is different will be changed. This is much more efficient than building out a new node from scratch and helps to expedite HAZOP and LOPA meetings.

Implicit & Explicit

Open PHA supports both explicit and the less common implicit LOPA. In an Explicit LOPA, the team establishes a TMEL target based on a consequence severity, then explicitly defined frequencies of cause and applies frequency modifiers such as conditional modifiers, enabling events and probabilities of failure for IPL's. In an implicit LOPA, the team works with the concept of "LOPA credits".

Premium Features

Open PHA Premium adds features that make processing HAZOP and LOPA results much easier once you return to the office.

Open PHA Premium running in KISS makes sharing HAZOP and LOPA information across your organization seamless. You can also easily setup individuals outside of your organization so that they can see HAZOP and LOPA results securely. This includes Kenexis if you want additional assistance with complex situations, SIL Calculations, focused QRAs, or Fault Tree Analysis. Just like online banking, not even Kenexis can see your data in KISS unless you share it.

Open PHA Premium leverages the power of the Kenexis Integrated Safety Suite to synchronize Independent Protection Layers (IPLs) in LOPA studies with the SIS lifecycle management tools in Kenexis Vertigo. During project or conceptual design phases, Vertigo SIF lists can be automatically generated from IPL lists in Open PHA Premium. Following HAZOP and LOPA revalidation studies, Vertigo SIL Verification calculations and Safety Re-

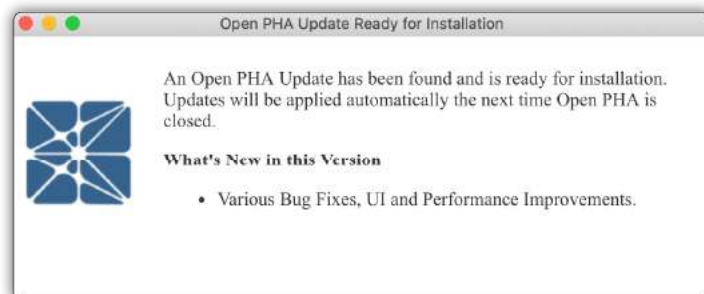




quirements Specifications can be synchronized with Open PHA Premium automatically to update Risk Reduction and SIL Requirements.

Further Integration We realize that organizations have installed software applications on individual computers and transitioning to secure cloud-based solutions may either be a slow process, or in some cases not feasible yet. Because HAZOP and LOPA studies are the core of process safety documentation we believe it is important for the information contained within the HAZOP and LOPA to be easily shared across common applications and platforms. Open PHA was developed with an Open-Source Standardized Data Structure which makes it easy for programmers with application program interfaces (APIs) to pull data from HAZOP and LOPA studies into third party and custom software tools. This philosophy is a paradigm shift in PHA software as file data structures have historically been proprietary to prevent third-party access and discourage the use of competing software tools.

Support Support is key to our corporate culture, consequently KISS is kept up to date automatically and each time Open PHA desktop is started it will check to see if it is latest version and update itself at no cost as shown below.





Transition Kenexis can help with the transition from your existing system to Open PHA, contact us at info@kenexis.com or call at +1-614-451-7031.

About Kenexis Kenexis, an independent consulting engineering firm that provides technical safety services for process industries, and other industries that manage risks related to chemicals or stored energy. Kenexis is helping change the way that safety and security are incorporated into industrial business practices by providing best-in-class software tools, associated training, and comprehensive technical support.

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