

Product information

Practis B.V.
Schapedrift 91
3371 JJ Hardinxveld-Giessendam
Tel: +31 (0)184 620 111
Fax: +31 (0)184 614 222

Practis Belgium N.V.
Hoogkamerstraat 42
B-9100 Sint-Niklaas
Tel: +32 (0)3 7807330
Fax: +32 (0)3 7776192

e-mail: info@practis.com

TABLE OF CONTENTS

1. Introduction	3
1.1. What is AKS?.....	3
1.2. How can AKS be applied?	3
1.3. For whom is AKS intended?	4
2. Characteristics of AKS	5
2.1. Types of risk	5
2.2. Types of formula	5
2.3. Multilingual application.....	6
2.4. Link with Microsoft® Excel.....	6
2.5. AKS as IBSEN Component.....	7
3. Functional description.....	8
3.1. Management of formulas	8
3.2. Composition of formulas	9
3.3. Calculation of formulas	9
3.4. Statistical details	10
3.5. Assumptions	10
3.6. Yield curve	11
3.7. Options and set-up configuration	11
4. Security aspects.....	13
4.1. Authorisation	13
4.2. Life cycle.....	13
5. Technical aspects	14
5.1. Actuarial Business Tool	14
5.2. Actuarial Component	14

1. Introduction

1.1. *What is AKS?*

AKS (Actuarial Knowledge System) is an application which offers an effective solution for composing and calculating actuarial formulas for life risk but also for other areas like disability risk. Actuarial factors, composed of internationally standardised actuarial symbols, can be calculated in the traditional way, based on life tables, or based on the calculation technique with Markov chains.

1.2. *How can AKS be applied?*

Actuarial Business Tool

Actuarial experts often use Microsoft® Excel, in which each person manages his/her own (programmed) formulas. The link between AKS and Excel enables direct calls from Excel to formulas defined within AKS. Assumptions and interest rates used within these formulas are flexible. Through this, making prognoses and other calculations in Excel is simplified. Also the uniformity and management of the formulas have been optimised.

AKS Business Tool is available in two editions:

- AKS Expert Edition, for stand-alone use by the actuarial expert;
- AKS Enterprise Edition, network version for multiple users in one company.

Actuarial Component

AKS can also be integrated as a component within existing information systems or newly developed systems. This enables the actuarial expert to directly influence the actuarial calculations in operational information systems.

Advantages of AKS

- Fits the way of working and thinking of the actuarial expert;
- Manages actuarial formulas for various applications from a single point of definition;
- Reduces software maintenance; no need to integrate actuarial formulas within the programming code;
- Increases flexibility, shortens Time-to-Market;
- Facilitates application/spreadsheet development through integration in Microsoft® Office;
- Is a powerful tool for the actuarial expert
- Using yield curves is even possible within traditional formulas

1.3. For whom is AKS intended?

Target groups of AKS are:

- Actuarial advisory agency
- Actuarial departments of insurers/pension funds
- Actuaries
- Administration offices
- Insurers, pension funds and other IT service providers who want to integrate a tool for actuarial rules within their application

2. Characteristics of AKS

In this chapter the characteristics of AKS are being described.

2.1. Types of risk

The actuarial formulas are distinguished by type of risk. The types of risk supported by AKS are:

- life/death;
- disability;
- others tailor-made (for example medical treatment).

N.B. When AKS Expert Edition or AKS Enterprise Edition is purchased, one can choose between AKS with actuarial formulas for the risk life or AKS with actuarial formulas for the risks life and disability.

2.2. Types of formula

Net formulas

AKS offers the possibility to define net actuarial formulas, in which standard actuarial formulas and mathematical operators are used. These symbols and operators are represented in a graphical way. Below, one can find an example of a formula of the type risk life/disability:

$${}_{n_5}E_x * {}_{m_1-n_5}E_{x+n_5} * \left((I^{(s)})a_{x+m_1}^{(t)} + (I^{(s)})\bar{A}_{x+m_1} * (0.5 / \tau) \right)$$

Also disability formulas, based on the Markov chains calculation technique, can be composed and calculated with AKS. Dependent of the number of various states, in which an insured person can be, one can define the dimensions of the underlying matrices. The survival probabilities between the various states also have to be defined by the user. Therefore, one can also define insurance with multiple transition possibilities (as f.e. the so-called KAZO tariff in the Netherlands).

Gross formulas

Combining the net formulas with various loadings composes gross formulas. The actuarial expert can define these loadings, so one can for example store the cost structure used in an organisation in AKS.

At the input of a loading, one can indicate whether the loading:

- is constant or variable,
- is derived from a table,
- is the result of a certain formula.

2.3. Multilingual application

AKS is a multilingual application available in four languages (Dutch, English, French, and Spanish).

AKS' multilingual nature makes it easy to add languages to the system.

You can indicate the desired language per user. This means for example that English-speaking users can start AKS in English, while a Dutch-speaking user can work on the same system using AKS with a Dutch interface.

N.B. For the AKS Expert Edition one has to choose the desired language during the installation. This cannot be modified afterwards.

2.4. Link with Microsoft® Excel

A direct link has been realised between Microsoft® Excel and AKS. This enables the actuarial expert to use AKS formula result when making prognoses or other calculations in Microsoft Excel.

When making a calculation Excel can call upon AKS using content of it's cells for AKS' input and output data.

At modification of these input details in the cells, the cell(s) that hold the AKS formula's result(s) are automatically reprocessed and updated.

N.B. The link with Microsoft® Excel is standard in the AKS Expert Edition. In the AKS Enterprise Edition this link is available as option and per user.

2.5. AKS as IBSEN Component

AKS is one of the IBSEN (Insurance Business Engines) components. In IBSEN all the actuarial factors (mortality chance, annuity, single premium) which are being used for the policy administration calculated by AKS

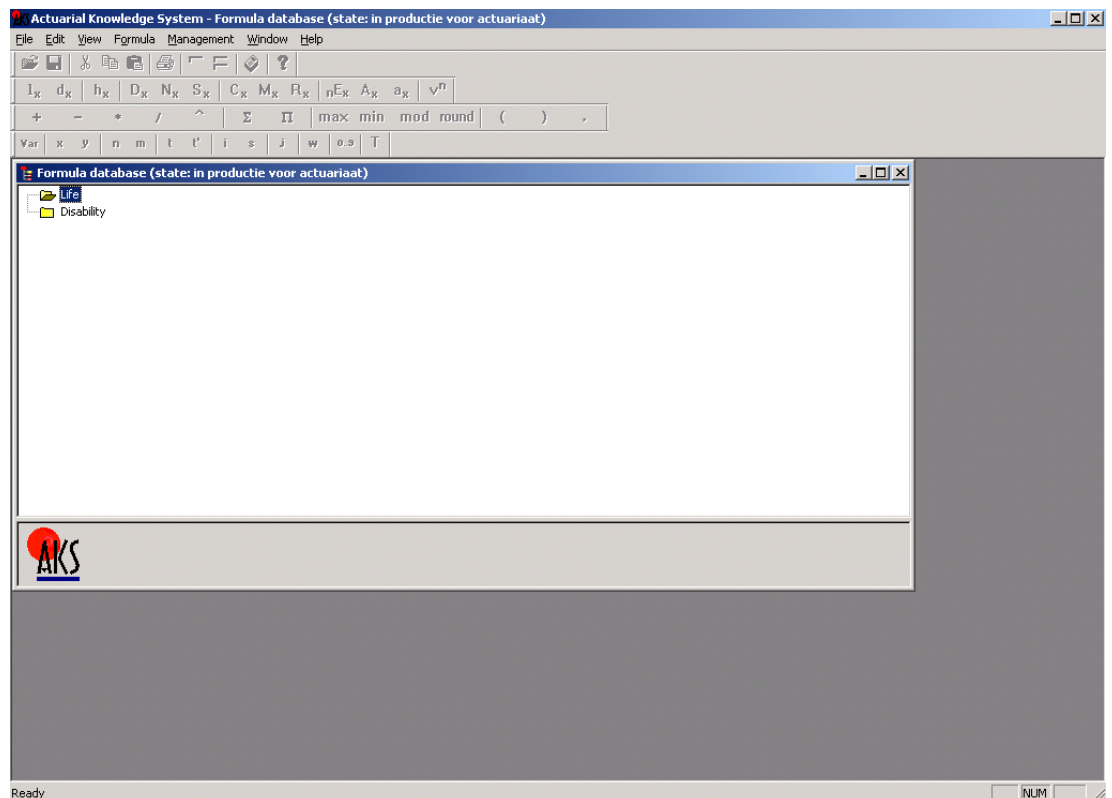
The different IBSEN components are to a large degree independent from each other. Each component supports a specific task for the insurer, from product design up to policy administration. This makes it easy to implement the different components apart from each other and enables integration with external components.

For more information about IBSEN please visit our website www.practis.com or consult the product information of IBSEN.

3. Functional description

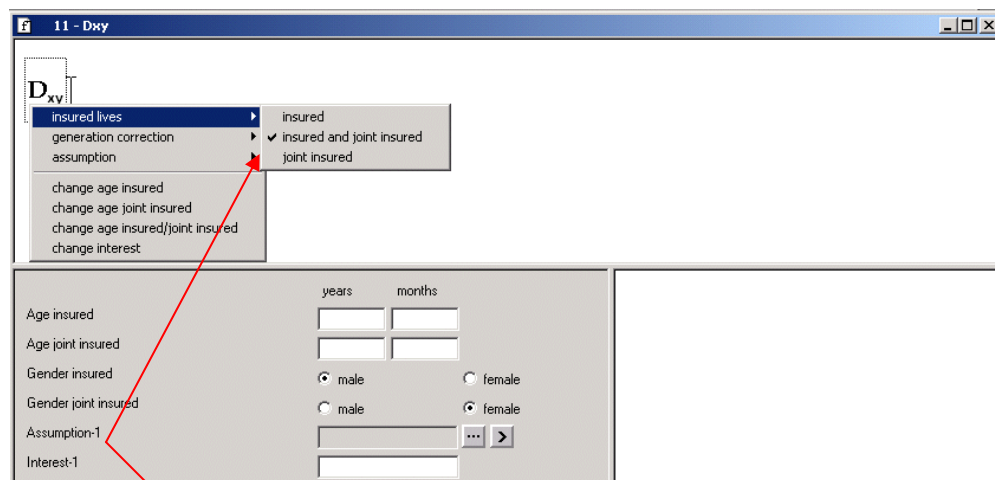
3.1. Management of formulas

In AKS, formulas are stored in a formula database. This formula database is based on the explorer structure as it is used in Windows Explorer. Formulas are sorted by placing them in folders. The user can create the folder structure himself.



3.2. *Composition of formulas*

AKS offers the functionality to compose net and gross formulas. The symbols for the formula to be composed are located in toolbars with actuarial symbols for the risk life/death and for the risk disability and toolbars with operators and variables. Furthermore one can define the properties of a symbol, such as the insured lives, commencement of payment, and moment of payment.

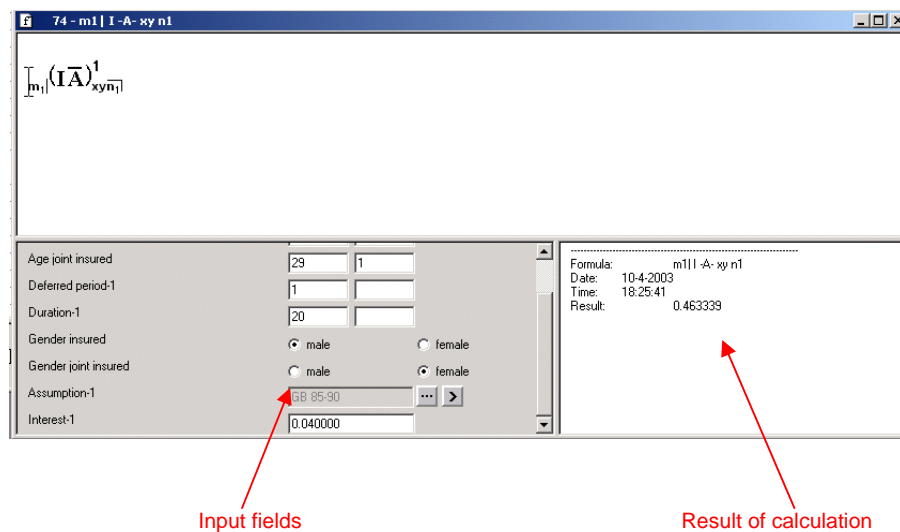


Adding property's

The formulas can be calculated immediately. AKS checks the formulas only on the correct (mathematical) syntax. The semantic correctness is the responsibility of the actuarial expert.

3.3. *Calculation of formulas*

In order to calculate a formula in AKS, one has to enter all the necessary details in the displayed fields.



The relevant input details for the formula, such as the age of the insured person(s), the age difference, the gender/sex, the assumption and others, are shown as input fields. The fields depend on the properties and their values, which are attributed to the actuarial symbols.

When calculating it is possible to make a choice between a calculation for one result or for a list of results. In order to get a list of results, one has to complete the ranges of the input details. The result(s) of the calculation is presented directly in AKS.

3.4. *Statistical details*

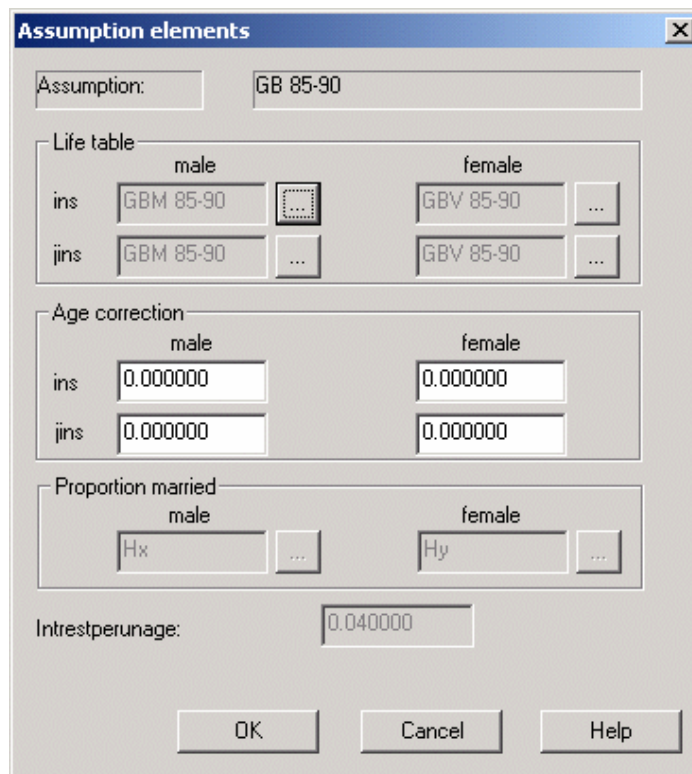
AKS offers the possibility to manage the necessary statistical details, such as survival tables, marriage frequencies, Carenz periods etc. One can also generate statistical details by mathematical functions, for example Makeham.

The range of the statistical details is automatically indicated at the import of a table.

3.5. *Assumptions*

In AKS, combinations of statistical details for the calculation of the actuarial formulas are stored. Such a combination is called an *assumption*. Assumptions can consist of survival tables, age corrections and marriage frequencies. Assumptions can be created, modified and deleted in AKS.

An example of an assumption for the risk life is represented here:



N.B. Within AKS it is possible to make use of a generation table (life table per year of birth).

3.6. *Yield curve*

AKS provides options to calculate formulas using either a fixed interest or a yield curve (this is also possible within traditional formulas). A yield curve shows the relationship between the interest rate and the time. A yield curve is a table per term. Tables can be imported and managed easily within AKS.

3.7. *Options and set-up configuration*

AKS offers options which can be set up by the user and which influence the working of the system.

Examples are:

- set-up related to the user interface;
- the choice of using a fixed interest or a yield curve
- showing the formula number
- way of rounding

- set-up of default values to use within the calculations
- location of the formula database.

N.B. In AKS Expert Edition one cannot adapt the file location of the database after installation.

By setting up a configuration, the user can influence the calculation technical processing, as the way of interpolation and how the non-integer durations are handled.

4. Security aspects

AKS is secured by authorisation provided to the users. Formulas are secured by maintaining a life cycle.

N.B. In the AKS Expert Edition, neither authorisation nor the formula life cycle is applied. However, the user can use all functions and formulas can always be adjusted.

4.1. Authorisation

In order to use AKS, you need an identification code and a password. The combination of the identification code and the password determine the rights attributed to the user. The application manager of AKS can define the user groups. For each user group he has to determine the authorisation level of the users in question. In AKS, this can be determined per function. Based on the authorisation tables and on the entered user name and password, user rights and language are determined.

4.2. Life cycle

A life cycle is a number of phases, which are in AKS defined in detail, as for example a formula or an assumption will pass through. The life cycle allows the user to first test formulas, assumptions and loadings before using them in production. Depending on the phase in which a formula, assumption or loading is, it can be modified or deleted. Following phases have been defined in AKS:

State	Description
Defined	The item has been composed but is not yet ready for testing
In test	The item is ready for testing
Validated	The item has been validated by an expert and can be transferred to the production environment now
In production	Other users or systems can use the item
Blocked - in production	The item can still be used, but not in new compositions
Removed	The item cannot or may no longer be used

5. Technical aspects

5.1. Actuarial Business Tool

The Actuarial Business Tool of AKS offers the possibility to compose AKS formulas with the graphical formula editor and then calculate the formulas. AKS Business Tool is a standard 32 bits Windows application. AKS is developed and tested on Windows XP (32-bits). AKS runs on all Windows (32 bits) platforms: Windows 95, Windows 98, Windows NT, Windows 2000, Windows ME and Windows XP and Windows Vista.

The hardware requirements are:

- Available disk space: 30 Mb
- Processor: no requirements
- Video card: minimal resolution 800x600

For the link with Microsoft Excel, an insert application has to be installed. This link requires at least Office 2000.

5.2. Actuarial Component

The actuarial component of AKS has been developed in standard ANSI C++ code and is therefore adequate for application on all platforms on which a C++ compiler is available. The component is standard supplied for application on all Windows (32 bits) platforms.

If the information system, which calls the AKS component, runs on a different platform, AKS has to be installed on this platform. This installation includes the copying of the source files, adjusting them according to the operating system and compiling. This compilation requires the presence of a (ANSI) C++ compiler.

There also has to be a link from the information system to the AKS component. The way in which this will be realised depends of the platform. Under Windows for example, this will be a call to a Dynamic Link Library (DLL), and on a Unix platform it will be a call to a Shared Object Library.