

LEAKS Suite of Softwares

using best practice methods promoted
by IWA Water Losses Task Forces

LEAKS (Leakage Evaluation and Assessment

Know-How Software) is a comprehensive suite of customisable softwares that allow the User to quantify leakage and leakage management options in pressurised water distribution systems.

LEAKS helps Utilities to understand the interlinked processes that cause leakage, and to identify opportunities for reducing leakage, saving money and increasing efficiency

Free Software *CheckCalcs*

This is an introductory software that allows you to quickly:

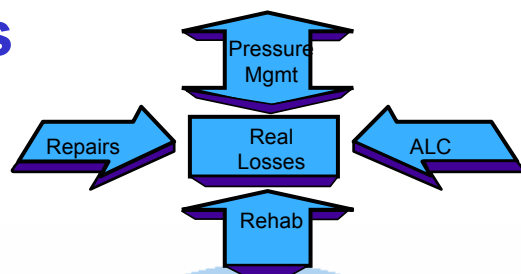
- calculate 'best practice' performance indicators for your systems
- identify appropriate priority actions, using international guidelines
- assess benefits from managing adverse effects of excess pressure

Standard Softwares

The Standard Versions are designed to introduce and explain the concepts, and to encourage Utility personnel to become familiar with the basic calculations and data requirements.

Professional Softwares

These are additional specialised groups of worksheets for more detailed calculations, predictions and analyses







The LEAKS Suite

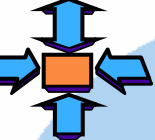
was created by Allan Lambert, an acknowledged expert in water loss management, for ILMSS Ltd and its international partners

It uses proven practical concepts, such as the IWA Water Balance and best practice performance indicators, BABE Component Analysis, and FAVAD pressure:leakage relationships

Specialist training and support are available if required – see main page of website for international contacts

Contact: www.leakssuite.com
or ILMSS@CastillianLtd.com

LEAKS Suite - Software Tools for applying IWA Task Forces and other methodologies	Standard Software for sale to Utilities	Customised Professional Software
 Water Balance & Performance Indicators	PIFastCalcs £550 <i>for a site licence</i>	Each of the Standard Versions can be customised to individual requirements This customisation can include the addition of more specialised Worksheets from the LEAKS Professional Workbook
 Pressure Management	PressCalcs £700 <i>for a site licence</i>	
 Active Leakage Control	ALCCalcs £1050 <i>for a site licence</i>	
 Economic Leakage Levels	ELLCalcs £1400 <i>for a site licence</i>	



CheckCalcs

This free software introduces the User to the '4 Components' approach to leakage management. It is used to provide a quick assessment of current performance, and to broadly identify opportunities for saving water and money.

CheckCalcs is an Excel Workbook with user-friendly colour coded Worksheets.

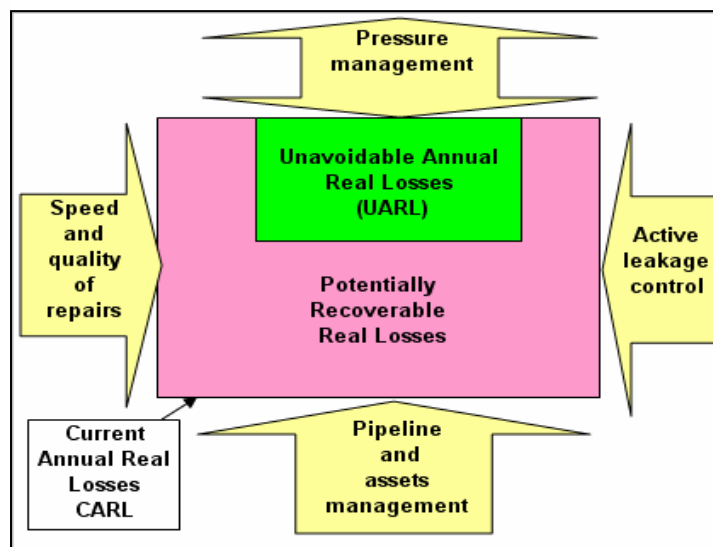
- Licence
- Introduction
- 4 Components approach
- IWA Water Balance terminology
- System Information
- Water Balance calculation
- Performance assessment
- ILI Guidelines
- Pressure Management opportunities
- Software
- Twin Track approach

STEP BY STEP

- Grey coloured worksheets are for User's information only, no data entry is required
- Enter basic data in 'System Information' and 'Water Balance calculation' Worksheets
- Assess leakage management performance, and benchmark within Bands A to D using international guidelines; check recommendations for action
- Categorise opportunity for pressure management (Low/Moderate/Medium/High); predict probable range of changes in leakage, repairs & consumption

If you want to reduce distribution system losses and save money, **CheckCalcs** could be a useful addition to your toolkit. Contact www.LeaksSuite.com to order a free copy

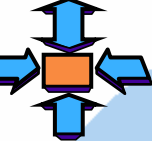
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Recommendations for BANDS	A	B	C	D
Investigate pressure management options	Yes	Yes	Yes	
Investigate speed and quality of repairs	Yes	Yes	Yes	
Check economic intervention frequency	Yes	Yes		
Introduce/improve active leakage control		Yes	Yes	
Identify options for improved maintenance		Yes	Yes	
Assess Economic Leakage Level	Yes	Yes		
Review break frequencies		Yes	Yes	
Review asset management policy		Yes	Yes	Yes
Deal with deficiencies in manpower, training and communications			Yes	Yes
5-year plan to achieve next lowest band			Yes	Yes
Fundamental peer review of all activities				Yes

Assumed % change in Pav	-10.0%
% of annual residential consumption outside property	30%
Do customers have private storage tanks? (Yes/No)	No

Probable range of predicted changes:	Lower	Median	Upper
% change in current leak flow rates	-5%	-10%	-15%
% change in new burst numbers and annual repair costs	-2%	-23%	-57%
% change in residential consumption	-0.4%	-1.0%	-1.6%



PIFastCalcs

The 4-component approach to management of Real Losses starts with an IWA best practice Water Balance and associated Performance Indicators (PIs).

PIFastCalcs does these calculations in more detail than 'CheckCalcs', with reliability bands, confidence levels, and valuation of components of Non Revenue Water

PIFastCalcs is an Excel Workbook with user-friendly colour coded Worksheets.

- Licence
- Introduction
- User Manual
- IWA Water Balance terminology

- Water Balance & PIs
- Consumption

- Graphs
- ILI Guidelines

- Running costs

OVERVIEW

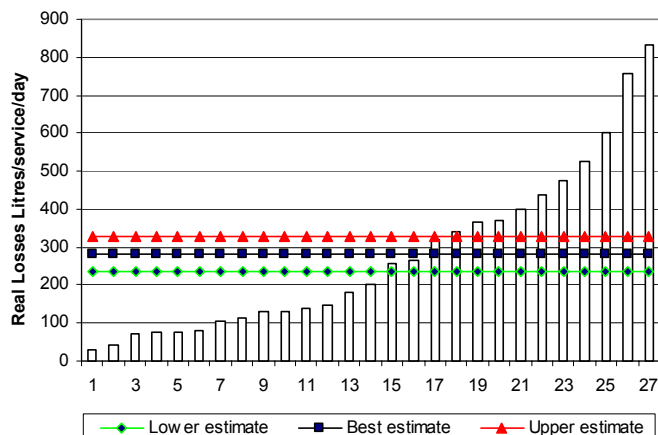
- 'Water Balance & PIs' is the principal Worksheet.
- Use of confidence limits identifies data deficiencies, and priorities to improve confidence limits for calculated Real Losses.
- 'Consumption' and 'Running Costs' Worksheets can be used for detailed information when appropriate.
- Designed for easy sensitivity testing
- How low could you go? Calculates Unavoidable Annual Real Losses (UARL) and Unavoidable Background Leakage (UBL).
- Compares performance with international (and regional?) data sets, and Guideline Bands A to D for ILI (Infrastructure Leakage Index)

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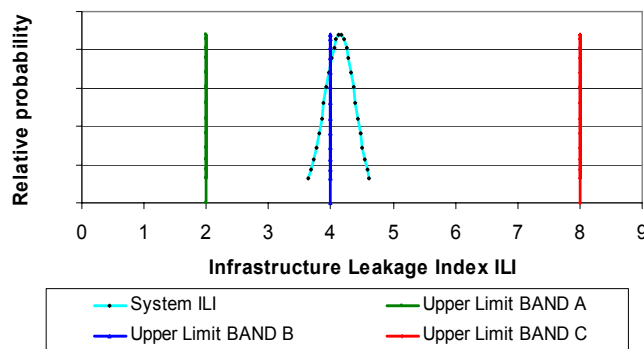
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System Input Volume	Authorised Consumption	Billed Authorised Consumption	Billed Metered Consumption	Revenue Water
			Billed Unmetered Consumption	
	Water Losses	Unbilled Authorised Consumption	Unbilled Metered Consumption	Non Revenue Water
			Unbilled Unmetered Cons.	
Apparent Losses		Unauthorised Consumption		
		Customer Meter Inaccuracies		
Real Losses		Leakage on Transmission & Distribution Mains		
	Leakage and Overflows at Reservoirs			
	Leakage on Service Connections up to metering point			

Real losses in litres/service connection/day, compared to an International data set



System ILI compared with Bands for developed countries



PressCalcs

Effective management of system pressures is the foundation of a successful and economic leakage management policy.

PressCalcs introduces and explains the key concepts and promotes systematic data collection and interpretation

This is because maximum pressures and surges (transients) influence:

- the flow rates from existing leaks
- the number of new leaks and bursts that occur each year, and their repair costs
- the efficiency and frequency of active leakage control interventions
- infrastructure replacement program investments

Average pressures may also influence some elements of consumption, and revenue.

PressCalcs is an Excel Workbook with 22 user-friendly colour coded Worksheets. It provides an introduction to practical predictions of how changes in pressure management are likely to influence leakage, new leak frequency, repair costs, consumption, operating costs and revenue for individual distribution systems.

After outlining the benefits of pressure management, the user can obtain a broad initial overview of the effect of pressure change in individual distributions systems (of any size), based on a combination of simple practical approaches to estimating:

- changes in annual real losses, consumption and revenue, new leak frequency, repair costs and operating costs
- the best practice equation and exponent for pressure:leak flow rate relationships

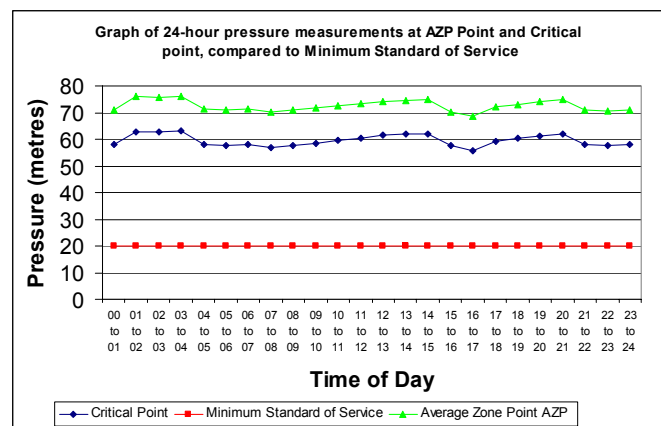
If you want to reduce distribution system losses and save money, **PressCalcs** could be a useful addition to your toolkit. Contact www.LeaksSuite.com to order a copy

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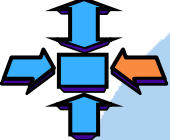


If the user wishes to proceed to investigations and predictions in individual sectors of a system, **PressCalcs** assists with the essential preliminaries of explaining and identifying the following items:

- key pressure measurement points (Average Zone Point, Critical Point)
- presence of surges, and/or excess pressures at critical point
- Night-Day Factor (NDF), relating leakage at night to 24-hour average leakage



Note: **PressCalcs** is not a Network Analysis Model. A water balance and calculated ILI are required for parts of this program



ALCCalcs

Active Leakage Control (ALC) – looking for unreported leaks – is a key aspect of the 4-component approach to managing Real Losses

Many Utilities do not have an ALC program and budget, and are unaware that the annual volume of their Real Losses could be significantly reduced by limiting the average run times of unreported leaks.

The simplest ALC method is 'regular survey', in which unreported leaks are identified by periodic acoustic surveys and inspections. **ALCCalcs** is an Excel Workbook with 25 user-friendly colour coded Worksheets, designed to assist and encourage Utilities to economically manage unreported leakage.

The first output of the **ALCCalcs** software, to help Utilities 'get started', is a rapid prediction for each system, with confidence levels, of:

- economic frequency of ALC intervention
- economic % of system surveyed each year
- annual budget for economic ALC (excluding repair costs)
- economic level of unreported real losses

These predictions are based on 3 local system specific parameters

- value/m³ of lost water
- cost of intervention
- average rate of rise of unreported leakage

Guidance is given on simple methods of estimating average rate of rise.

Efficiency of ALC can be improved by measuring and interpreting night flows in individual sectors.

If you want to reduce distribution system losses and save money, **ALCCalcs** could be a useful addition to your toolkit. Contact www.LeaksSuite.com to order a copy

Please specify Country, Currency, name of Utility, and contact e-mail.



Data entry		Calculated values		Data from another Worksheet	
Step 1: Enter Country, Currency, Volume Units, Utility and System					
Country	Country	Currency = Euro		Volume units = m³	
Utility	Enter Licensee's name when issuing			System	Whole System
Step 2: Enter mains length & number of service connections					Conf. limits+/-
Length of mains		300.0	km	1.0%	
Number of service connections		18000		2.0%	
Step 3: Enter key parameters for calculations (CV, CI, RR)					CL +/-
Variable cost of water CV		0.033	Euro /m3	10.0%	
Full system intervention cost CI		27000	Euro	5.0%	
Natural Rate of Rise of unreported leakage RR is categorised as being		3510	m³/day in a year	20.0%	
		195.0	litres/conn/day per year		
		11.7	m³/km mains/day/year		
			Very High		
Step 4: Review calculated figures for Economic Intervention					Conf. limits+/-
Economic Intervention every		14	months	2	
Economic annual % surveyed		88%	of system	14%	
Annual Budget for Intervention		23.9	Thousand Euro	3.9	
Economic Unreported Leakage		724	Thousand m³/year	117	
		110.2	litres/service conn./day	18.0	
		6.61	m³/km of mains/day	1.07	

ALCCalcs provides information and guidance on timing, analysis and interpretation of night flow measurements, including:

- identifying key system characteristics
- defining Average Zone Point (AZP)
- traditional performance indicators for night flow
- definitions of minimum night flow components
- pressure-dependent night flow components
- calculation of Night Day Factors, relating leakage at night to 24 hours average leakage

Note: Customised worksheets for component analysis of night flows are available as part of the **LEAKS Professional** software

ELLCalcs

The Economic Level of Leakage (ELL) is the level of leakage at which any further reduction would incur costs in excess of the benefits derived from the savings.

In the 4-component approach, the ELL is usually less than the Current Level (CARL), but more than the Unavoidable Annual Real Losses (UARL). The Short Run ELL (SRELL) is the ELL that can be achieved through repairs, pressure management and active leakage control activities, carried out individually to an economic level.

This technique is known in the IWA Water Losses Task Force as 'squeezing the box'. However, although all detected leaks should be repaired, it is not always clear if it would be more efficient to do pressure management before commencing Active Leakage Control, or vice versa, or both together.

ELLCalcs is an Excel Workbook with 20 user-friendly colour coded Worksheets, designed to assist the user in evaluating these options for individual systems, in terms of predicted changes in Real Losses and operating costs.

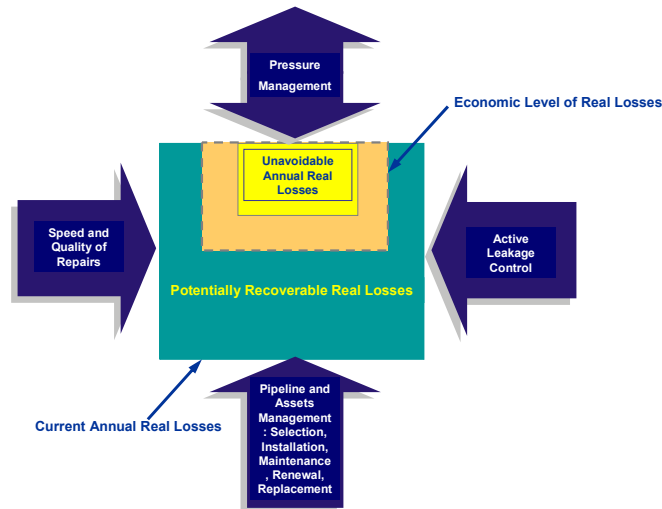
The calculations commence with a '**PIFastCalcs**' water balance calculation for a reference year. Burst frequencies are added on a 'System data' Worksheet, and Utility policies for repair times, pressure management, ALC etc are listed. A BABE component analysis is carried out to cross-check the Real Losses from the Water Balance calculation, and the 'Twin-Track' approach to pressure management and active leakage control is outlined.

Three sets of calculations are then carried out:

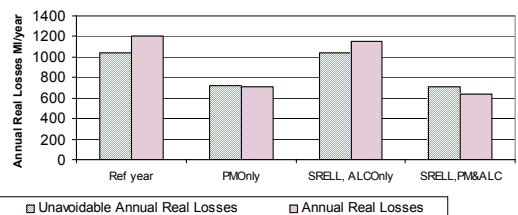
- PMOnly – to assess the benefits of basic pressure management only
- ALCOOnly – to assess the SRELL for an economic intervention policy of regular survey at the average pressure for the reference year
- PM&ALC – to assess SRELL for active leakage at a different average pressure

If you want to reduce distribution system losses and save money, **ELLCalcs** could be a useful addition to your toolkit. Contact www.LeaksSuite.com to order a copy

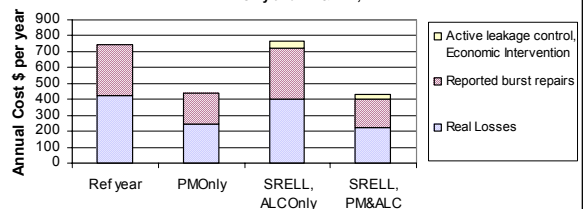
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Real Losses for Reference Year compared to PMOnly, and SRELLs for ALCOOnly & PM&ALC options



Annual Cost of Real Losses, Reported Burst Repairs and Economic ALC Intervention Policy for Reference Year and PMOnly, and SRELL for ALCOOnly and PM&ALC,



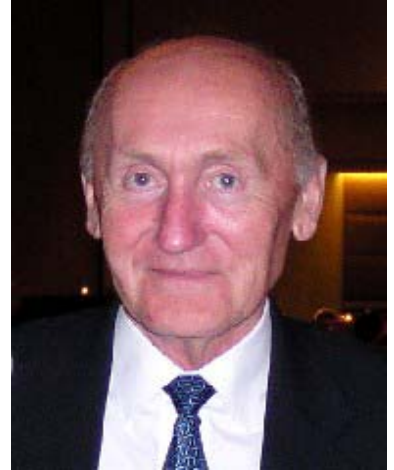
Note: above costs do not include costs of any current active leakage control, the costs of repairing unreported leaks and bursts, and the costs of pressure management

Note: users should be familiar with PIFastCalcs, PressCalcs and ALCCalcs before using ELLCalcs

Who's Who

Allan Lambert - United Kingdom

Allan has more than 40 years experience in the water industry and is recognised as a world leader in water demand management. He was the leader of the first International Water Association (IWA) Water Loss Task Force from 1996 to 2000, and has produced numerous international papers and publications on leakage management. Allan has held positions as: President, British Hydrological Society; Technical Secretary, UK National Leakage Control Initiative; Special Adviser, House of Commons Environment Committee; and consultant for World Bank and other international funding agencies. An independent consultant, he is also Managing Director of ILMSS Ltd: which provides training and leakage management software to facilitate introduction of IWA methodologies. He contributed considerably to the IWA water loss performance indicator initiative and last but not least, developed the BABE concept for Component Analysis of Real Losses, and the ILI (Infrastructure Leakage Index).



Marco Fantozzi - Italy

Marco Fantozzi leads an independent consulting firm specialising in the analysis and optimisation of water utilities and in training and leakage management software to facilitate introduction of IWA methodologies. Marco has 18 years experience in the water industry specialising in water demand management, and has been responsible for water, gas and wastewater networks in ASM BRESCIA SPA (Italy), one of the largest and most advanced public utility companies operating in Italy. Marco is an expert evaluator of the European Commission for the 5th and 6th Framework Research Program for the Key Action "Sustainable Management and Quality of Water". He is an active member of the IWA Water Loss Task Force and has been at the forefront to promote the IWA methodology in Italy and other EC countries.



Who are the International Water Association "Water Loss Task Force"?

The Water Loss Task Force is a special interest group established by the International Water Association to develop practical methodologies and share ideas on water loss issues and management. The Water Loss Task Force comprises more than 70 representatives from 19 countries, working on some of the largest and most diverse water loss contracts and projects in the world. The Task Force has developed a common water balance, terminology and best practice performance indicators, which can be successfully applied to water loss activities throughout the world.