Guide to Complete Regulations and Sap Calculator

Version 3.21 released 21/10/08
These instructions require Edition 34 of the CD ROM (not applicable to the free version)

Overview

Sap Calculator 3.21 is a comprehensive program for assessing heat loss in domestic buildings. The program is be used at the design stage to demonstrate compliance with the energy conservation requirements of Building Regulations Approved Document L1A 2006 and Technical Standards Section 6.

Sap Calculator 3.21 has been approved by the BRE on behalf of DEFRA for SAP calculations in compliance with the SAP 2005 specification. The approval covers use in England, Wales and Scotland.

Getting Started

The SAP Calculator comes in three versions.

- **Free version** to check compliance with part L1 includes the Building Regulations database.
- **SAP Designer** version as above but including production of sap reports for submission to building control. Just £85 per year.
- **SAP Energy Performance Certificates** for use with NAPIT www.napit.org.uk

Register your software

The functionality of the software is dependent upon registration. To register your software from the start menu where you have the gold logo

The first time the program is run please goes to "File Preferences" on the menu you will see the screen below. Please enter your username password at the bottom of the preferences screen. You can find this in the order confirmation e-mail. Then press the "check subscription".

Your computer will contact our server and your subscription will be updated.
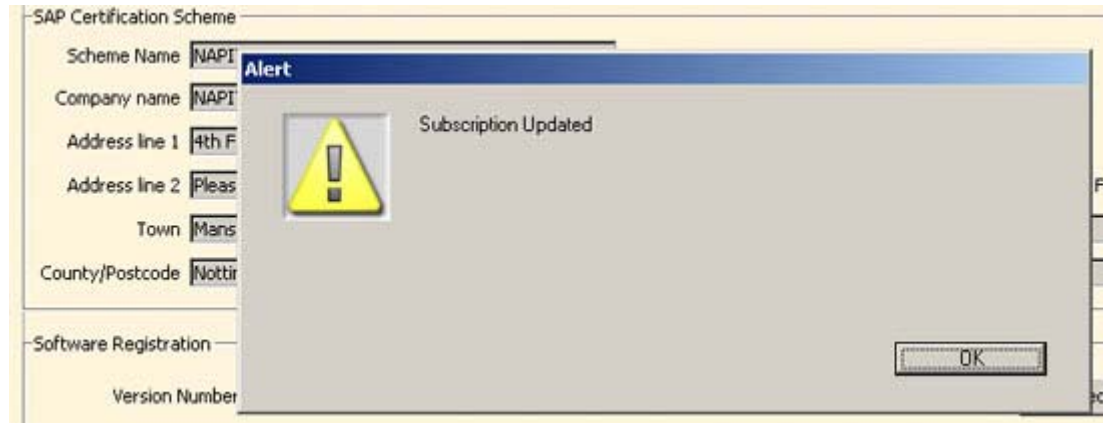
When your subscription has been updated you will see the renewal date and subscription type in the preferences window. If you are a NAPIT accredited energy sector the user type should be SAP Napit. This is important only SAP Napit users can lodge certificates with the government database.
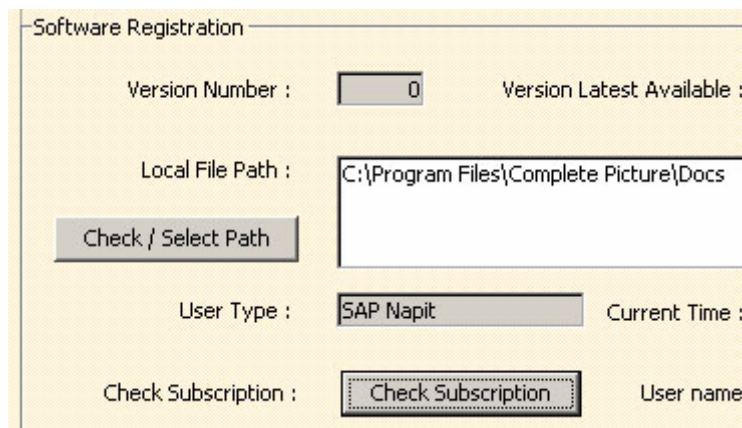
Three user type options are as follows:

- Regulations - this is for users of the free version of the software
- Sap Designer - the designer version to produce compliance reports
- Sap Napit - for accredited energy assessors

Set the path to your local documents folder

When you use the document manager the PDF files are stored on your local computer. By default this path is c:\program files\complete picture\docs.

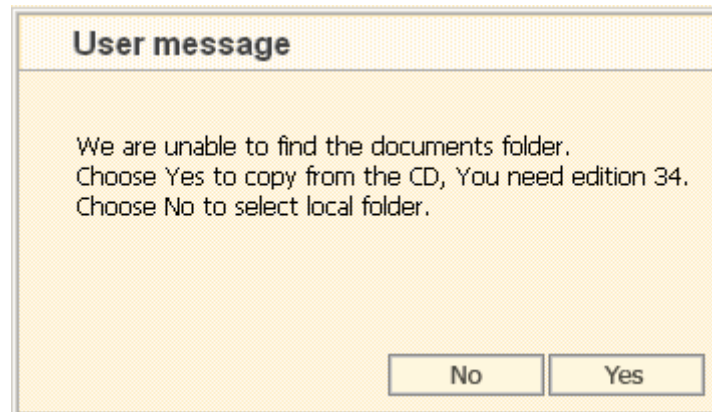When you first start the program it checks your system. If the program cannot find a reference to the Docs folder you'll be prompted to select this manually. The program will then check your machine to synchronise the documents on your computer with those available from our server on the Internet. Please see the image below.

If you are installing the software for the first time and you have disk number 34 choose "yes" to copy the files from the sea date your local computer. Once you have created a master copy of the documents on your machine all new documents will be updated from the Internet.

If you are updating your software and you already have the documents on your system choose "no" and select the path to your "docs" folder. The program will then index the documents on your system and compare this with the index on our server.
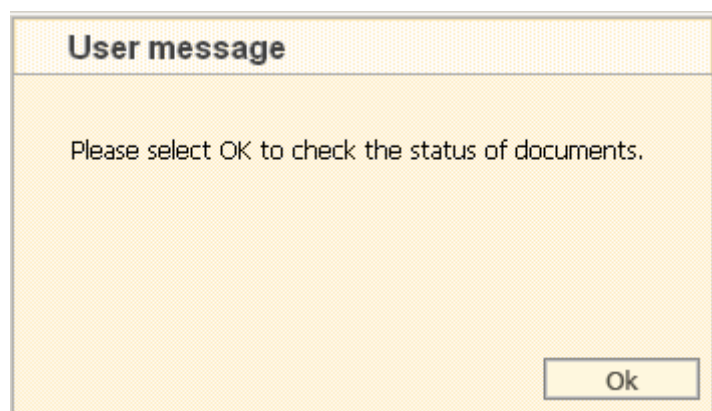
To install a fresh copy of the documents from the CD onto your system simply delete the "docs" folder from your system and then choose the path again.

Sap Calculator Help

The SAP rating is based on the energy costs associated with space heating, water heating, ventilation and lighting, less cost savings from energy generation technologies. It is adjusted for floor area so that it is essentially independent of dwelling size for a given built form. The SAP rating is expressed on a scale of 1 to 100, the higher the number the lower the running costs.

- Important note, this guide should be read in conjunction with the SAP specification document which contains the default values used in the software.

For further information on related issues, please visit http://www.boilers.org.uk

Each Project can be completed and a final worksheet obtained by following the sections in conjunction with these guidelines and SAP 2005 manual.

Start the program and from the projects menu choose " all projects" this will show the project window with a list of the worked examples provided by the BRE. It may be useful to look through this list to see if any projects a similar to the one you're planning if so you can choose to duplicate which considerably speed up the process of producing a sap calculation.

Use the 'Projects' list to create a new project. Alternatively, you can edit or copy one of the worked examples provided. You can use the duplicate button to copy a project

Double-click any project to go to the project details this is divided into 11 different areas. Use the tabs at the top of the window to switch between sections. The program has to check for compatibility between sections. You must complete all sections before moving to another page otherwise errors will be generated as the program checks your entries. The sections are:

- Project summary
- Dwelling
- Ventilation
- Construction
- Windows & doors
- Overheating
- Primary Heating
- Secondary Heating
- Water Heating
- Renewables
- Reports

Project summary

Within the Project summary you must complete the following information.

- Project region
- Applicable regulations
- Smoke control zone
- Project type " as designed" or "as built"
- application date
- region

You will also need to assign an architect or sap assessor and building control contact to this project. Use the contacts menu to add new contacts. Use the + item button to assign these to the project.

Address look up EPC Only

If you're generating an energy performance certificate EPC you need to get the unique property number. To do this enter the postcode and address the search button. Important note only the postcode should be entered.

The search results are displayed choose the correct address from the list.

The correct address and UPRN are updated.

In the event the building is not on the address database you can request the addition of a new address from the sap projects menu. This information is transmitted directly to the communities and local government CLG database who will contact you directly once the address has been updated.

Dwelling

Use the +item button to add a floor record. The ground floor is floor number zero. This applies to flats as well as houses. The first floor is floor number one and so on. In addition to the floor dimensions please include the living area fraction (eg. 0.3) and the percentage of low-energy lighting as counted by the number of lights (whole numbers only).

Dimensions

Floor dimensions are obtained by measuring between the inner surfaces of the external or party walls, disregarding the presence of any internal walls

Storey height

Is the total height between the ceiling surface of a given storey and the ceiling surface of the storey below. For a single-storey dwelling ground floor of a dwelling with more than one storey, the measurement should be from floor surface to ceiling surface.

Floor area

Should be measured as the actual floor area, ie if the height of a room extends to two storeys or more, only the actual accessible floor area should be entered. However, as an exception to this rule in the case the floor area should be measured as if there were no stairs, but a floor in their place at each level. In general, rooms and other spaces, such as built-in cupboards, should be included in the calculation of the floor area where these are directly accessible from the occupied area of the dwelling. However, unheated spaces clearly divided from the dwelling should not be included.

Room height

Is taken as floor to ceiling height for the ground floor and ceiling to ceiling height to upper floors.

Living area fraction

Should be between 0 and 1. The living area is the room marked on a plan as the lounge or living room, or the largest public room (irrespective of usage by particular occupants),together with any rooms not separated from the lounge or living room by doors, and including any cupboards directly accessed from the lounge or living room. Living area does not, however, extend over more than one storey, even when stairs enter the living area directly.

Low-energy lighting

Enter the total number of lights and the number of low-energy lights. A minimum of 30% of the total number should be low-energy to meet the compliance.

Ventilation

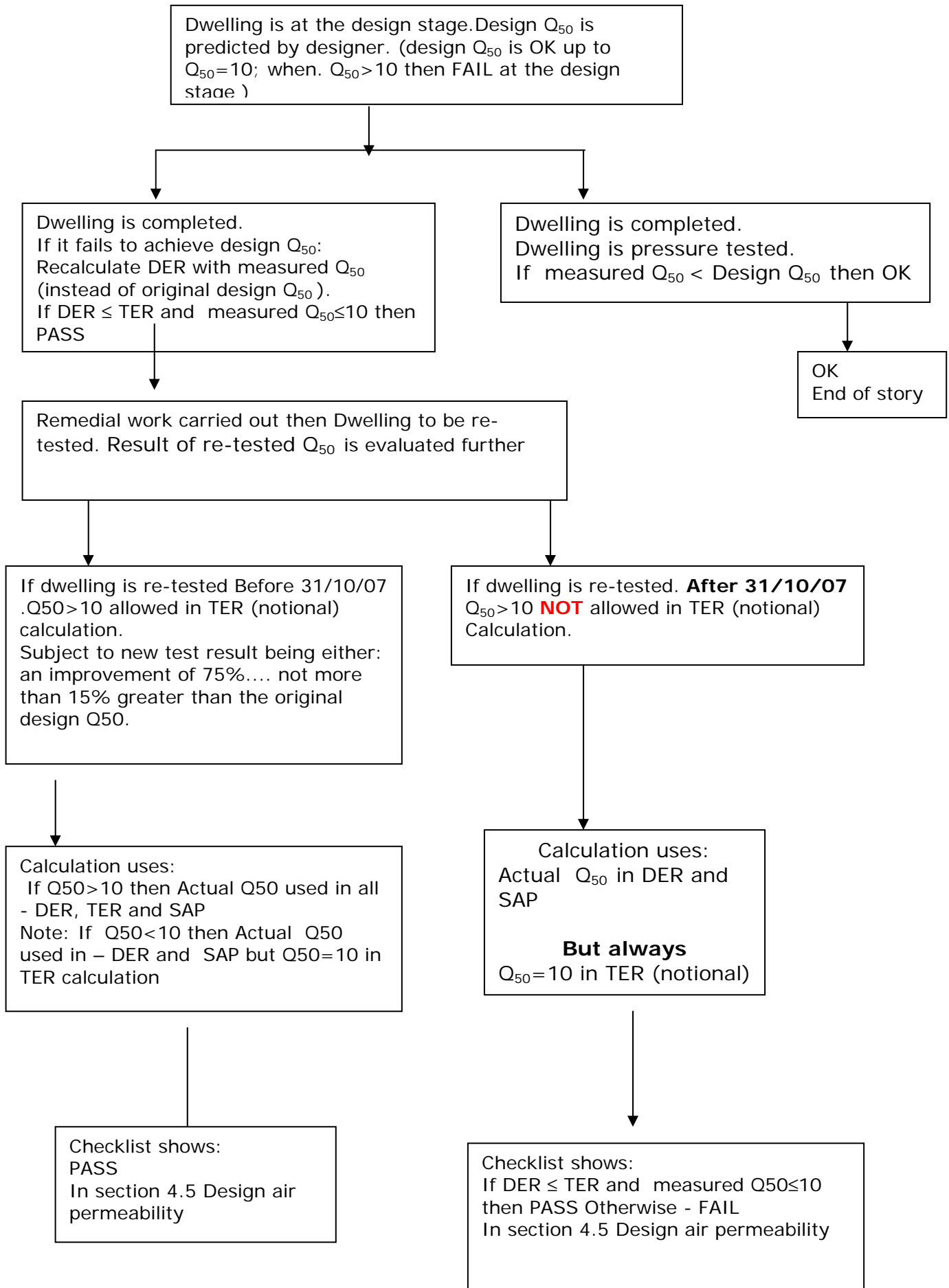### Pressurisation test

Where the sap calculation is "as designed" enter a design air permeability q50 this is the target of building must meet when tested.
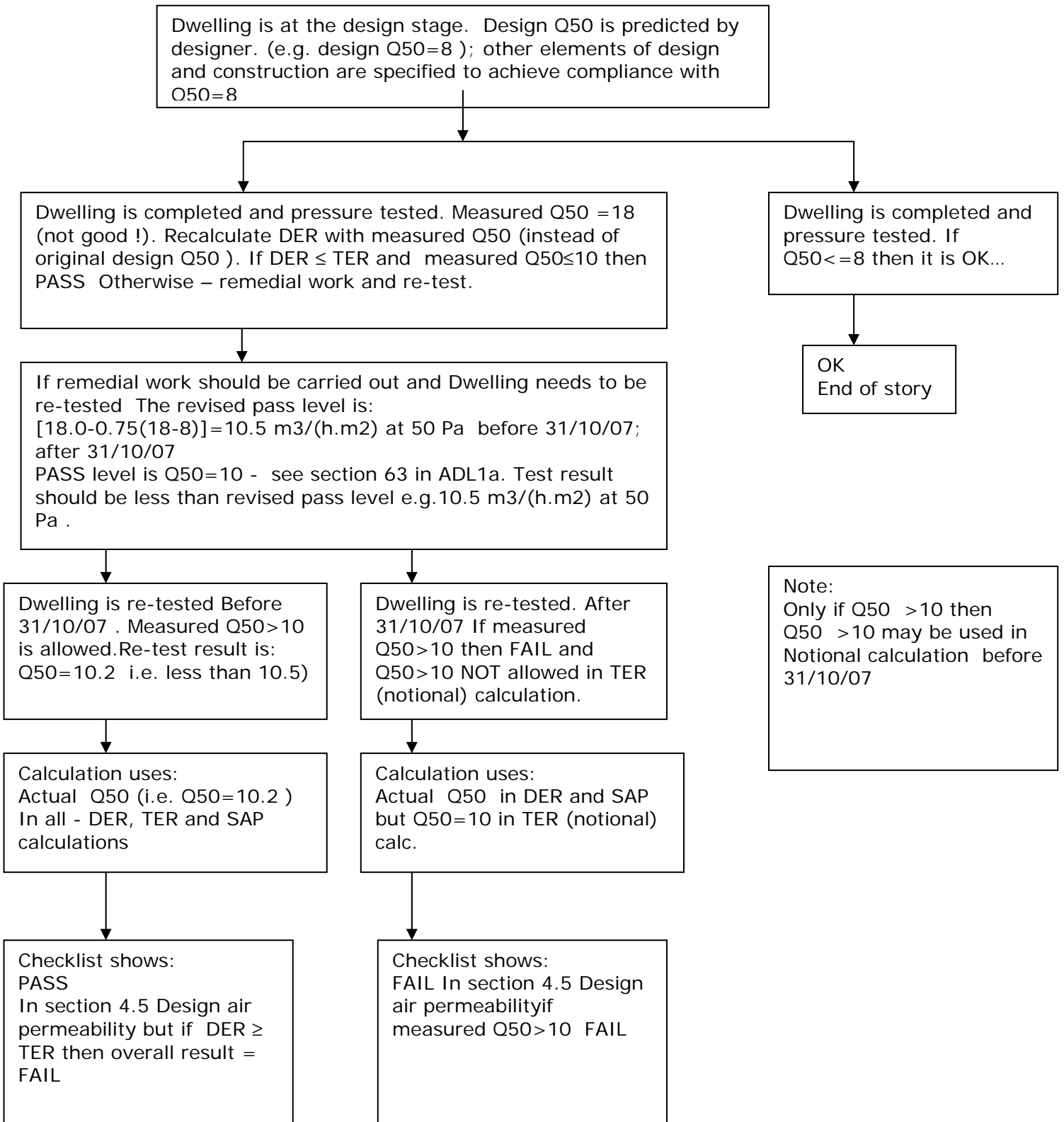
If the building has already been constructed then the sap calculation is "as built". Enter the result of pressure test.

Alternatively you can use the compliance figure if you do not have a target design air permeability.
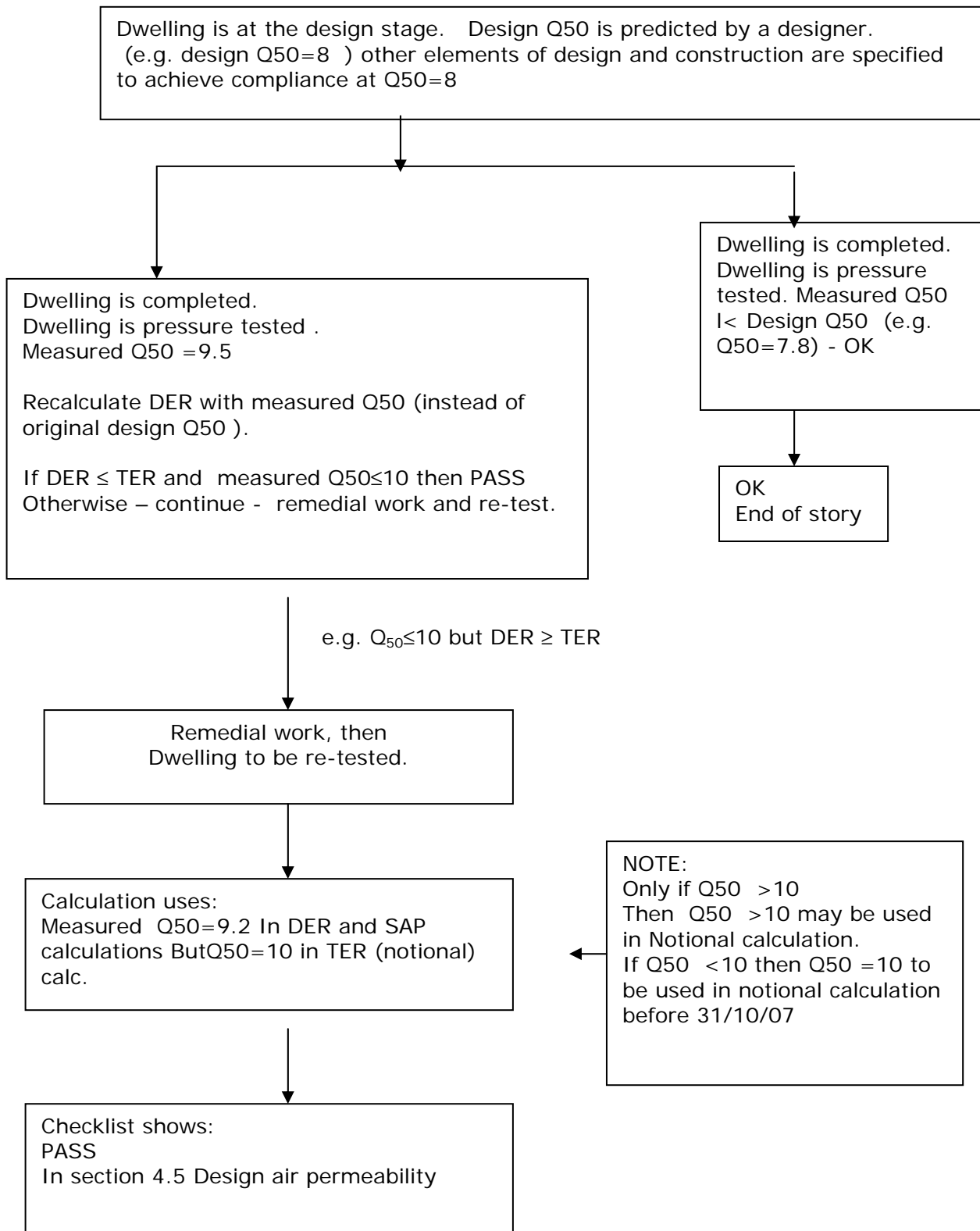
The approach in ADL1a

Dwelling is at the design stage. Design Q_{50} is predicted by designer. (design Q_{50} is OK up to $Q_{50}=10$; when. $Q_{50}>10$ then FAIL at the design stage.)

Dwelling is completed.
If it fails to achieve design Q_{50}:
Recalculate DER with measured Q_{50} (instead of original design Q_{50}).
If DER ≤ TER and measured $Q_{50}≤10$ then PASS

Dwelling is completed.
Dwelling is pressure tested.
If measured Q_{50} < Design Q_{50} then OK

OK
End of story

Remedial work carried out then Dwelling to be re-tested. Result of re-tested Q_{50} is evaluated further

If dwelling is re-tested Before 31/10/07 .Q50>10 allowed in TER (notional) calculation.
Subject to new test result being either: an improvement of 75%…. not more than 15% greater than the original design Q50.

If dwelling is re-tested. **After 31/10/07** $Q_{50}>10$ **NOT** allowed in TER (notional) Calculation.

Calculation uses:
If Q50>10 then Actual Q50 used in all - DER, TER and SAP
Note: If Q50<10 then Actual Q50 used in – DER and SAP but Q50=10 in TER calculation

Calculation uses:
Actual Q_{50} in DER and SAP

But always
$Q_{50}=10$ in TER (notional)

Checklist shows:
PASS
In section 4.5 Design air permeability

Checklist shows:
If DER ≤ TER and measured Q50≤10 then PASS Otherwise - FAIL
In section 4.5 Design air permeability

Example 1 (illustration of example given in ADL1a)

Dwelling is at the design stage. Design Q50 is predicted by designer. (e.g. design Q50=8); other elements of design and construction are specified to achieve compliance with Q50=8

Dwelling is completed and pressure tested. Measured Q50 =18 (not good !). Recalculate DER with measured Q50 (instead of original design Q50). If DER ≤ TER and measured Q50≤10 then PASS Otherwise – remedial work and re-test.

Dwelling is completed and pressure tested. If Q50<=8 then it is OK...

OK
End of story

If remedial work should be carried out and Dwelling needs to be re-tested The revised pass level is:
[18.0-0.75(18-8)]=10.5 m3/(h.m2) at 50 Pa before 31/10/07; after 31/10/07
PASS level is Q50=10 - see section 63 in ADL1a. Test result should be less than revised pass level e.g.10.5 m3/(h.m2) at 50 Pa .

Dwelling is re-tested Before 31/10/07 . Measured Q50>10 is allowed.Re-test result is: Q50=10.2 i.e. less than 10.5)

Dwelling is re-tested. After 31/10/07 If measured Q50>10 then FAIL and Q50>10 NOT allowed in TER (notional) calculation.

Note:
Only if Q50 >10 then Q50 >10 may be used in Notional calculation before 31/10/07

Calculation uses:
Actual Q50 (i.e. Q50=10.2)
In all - DER, TER and SAP calculations

Calculation uses:
Actual Q50 in DER and SAP but Q50=10 in TER (notional) calc.

Checklist shows:
PASS
In section 4.5 Design air permeability but if DER ≥ TER then overall result = FAIL

Checklist shows:
FAIL In section 4.5 Design air permeabilityif measured Q50>10 FAIL

Example 2

Dwelling is at the design stage.   Design Q50 is predicted by a designer. (e.g. design Q50=8) other elements of design and construction are specified to achieve compliance at Q50=8

Dwelling is completed.
Dwelling is pressure tested .
Measured Q50 =9.5

Recalculate DER with measured Q50 (instead of original design Q50).

If DER ≤ TER and measured Q50≤10 then PASS
Otherwise – continue - remedial work and re-test.

Dwelling is completed.
Dwelling is pressure tested. Measured Q50 I< Design Q50 (e.g. Q50=7.8) - OK

OK
End of story

e.g. Q_{50}≤10 but DER ≥ TER

Remedial work, then
Dwelling to be re-tested.

NOTE:
Only if Q50 >10
Then Q50 >10 may be used in Notional calculation.
If Q50 <10 then Q50 =10 to be used in notional calculation before 31/10/07

Calculation uses:
Measured Q50=9.2 In DER and SAP calculations ButQ50=10 in TER (notional) calc.

Checklist shows:
PASS
In section 4.5 Design air permeability

Example 3 (Small development) – no pressure testing carried out, pressure test result assumed 15 m³/(h.m²)

Dwelling at the design stage: (design Q50=15 - assumed)
other elements of design and construction are specified to achieve compliance
DER ≤ TER with Q50=15

When dwelling is completed
no pressure test needed.

Remedial work NOT TO BE carried out

Calculation uses:
Assumed Q50=15
In DER and SAP calculations
But Q50=10 in TER (notional) calc.
Before of after 31/10/07

Checklist shows:
PASS
In section 4.5 Design air
permeability
When Assumed Q50=15

Ventilation

1. Include chimneys and flues only if they are unrestricted and suitable for use
2. Include extract fans including those from cooker hoods.
3. Do not include balanced flues of boilers and wall hung heater units.
4. Do not include fans forming part of a whole dwelling mechanical ventilation system.
5. Extract fans, including cooker hoods hoods and other independent extractor fans, should be included in the 'number of fans' category, but those that form part of a whole-dwelling mechanical ventilation system should be excluded.

Compliance will be achieved as follows:

Design air permeability	OK if design air permeability does not exceed 10 m³/h.m² (except that up to 31 October 2007 it can be value permitted on re-test)

For further guidance see section 2 of the SAP document.

Construction

Each dwelling consists of wall, floor and roof elements. These are entered separately and the U-value of each element calculated. For reference the minimum requirement is shown.

For guidance on the U-values of construction elements see section 3 of the SAP document

Use the +item button to add a new construction record. Choose the construction record type, wall, floor, roof or thermal bridge

It is important to know that in order to achieve compliance you must calculate the thermal bridging.

There are three possibilities.
a) The use of a default factor, which is multiplied by the total exposed surface area, as described in Appendix K.
b) On the basis of the length of each junction and the default Ψ-values in Table K1.
c) On the basis of the length of each junction and user-supplied Ψ-values. It is not necessary to supply Ψ-value for each junction type – values from Table K1 can be mixed with user-supplied values.

For compliance the minimum u values are as follows

U-values of elements expressed in W/m²K	U-values should not exceed following values:
	Element Average U-value[1] Highest U-value[2]
	Wall 0.35 0.70
	Floor 0.25 0.70
	Roof 0.25 0.35
	Openings 2.2 3.3
	[1] area-weighted average of all elements of the type
	[2] limit for sub-elements of stated type

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[1] Area weighted dwelling average
[2] Worst individual element

Windows & doors

Window U-values and g-values (total solar energy transmittance) can be from a certified window energy rating operated by the British Fenestration Rating Council or manufacturers' declaration. Both values are needed. (Only the values in Table 6b are to be used for light transmittance.).

In the case of a window rated by the British Fenestration Rating Council see the SAP specification section 6.1.

Normally the frame factors in Table 6c and total solar energy transmittance (g-value) in Table 6b are used. However, manufacturer's values are permitted provided they are representative of the actual windows.

To enter the window data is all windows are of the same type you can group them together for any given orientation. For example add together and get the total area for all south facing windows and enter this is one record. If you have different window types these would need to be entered individually.

For roof windows you will need to know the pitch of the roof window. See section 3 of the SAP document. Section 6 of the SAP document covers the solar gains attributable to windows.

Overheating

In order to calculate the potential for overheating of the building you need to know the exchange rate and the thermal mass. The ventilation rate that applies here is different to the ventilation rate used to calculate heating loss. Choose something suitable from the drop-down list.

Assessment of risk of overheating, based on Appendix P of the SAP2005 specification	Risk of overheating: Compliance:
	High No Medium Yes Slight Yes Not significant Yes .

Calculation of the thermal mass is explained in appendix P4 of the sap specification. There are three options
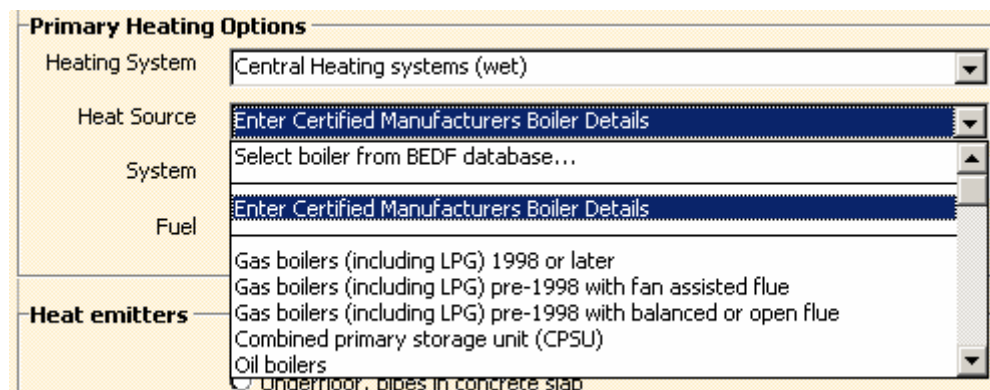
- User-defined thermal mass
- Calculate the thermal mass using user-defined individual elements
- Calculate the thermal mass using SAP table P7

If the building reaches the compliance level the overheating threshold is shown with a green tick.

Primary Heating

The primary heating system can be defined in three ways.
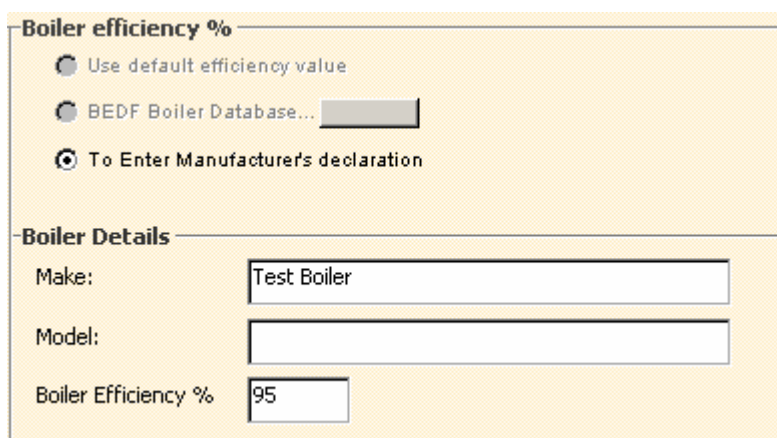
1. Using the default values for the sap specification
2. Choosing a boiler from the BEDF database
3. Manufacturers supplied information

Choosing the BEDF or manufactured options will enable you to select the correct boiler or enter the manufactures information.

Use the small button to bring out the boiler search facility.

Please note that wherever possible the boiler database should be used to select the boiler type. Any unusual features or very high boiler efficiency are noted and appear on the compliance report.

In order to achieve compliance with boiler needs to meet the minimum efficiency and controls need to comply with us and the domestic heating guide.

Please are also for the purposes of compliance a micro CHP units is considered be a boiler.

Hot water system

The hot water heating system will be either from the main heating or an independent system. The option is displayed are dependant upon the heating options chosen. Please make sure you have set up the primary heating before the water heating.

Compliance is achieved if the following conditions are met:

Hot water cylinder	Hot water storage vessels should comply with the heat loss requirements of BS 1566:2002. If cylinder is labelled take Cylinder loss = Standing heat loss on label. If the cylinder is not labelled than the software will calculate the loss using the cylinder volume and the installation thickness. This will be compared to the minimum requirement
Control for hot-water cylinders	Compliance achieved when the following conditions apply: Boiler interlock (for boiler systems) Yes Cylinder thermostat Yes Independent time clock (for boiler systems) Yes
Primary pipework insulation	Primary pipes – should be insulated over their full length
Solar hot water cylinder	Dedicated solar volume (V_s) to be at least the smaller of: - 25 litres per m² of solar panel - 0.8 * V_d (V_d is hot water usage in litres/day from SAP 2005 Table 1)

Compliance checklist

The following key features are reported in the compliance checklist. This is useful to establish possible reasons for compliance failure or whether you need to prepare action extra documentation for building control.

Key features of the design	List any of the following:
	a. A wall U-value less than 0.28 W/m²K
	b. A floor U-value less than 0.20 W/m²K
	c. A roof U-value less than 0.15 W/m²K
	d. A window or door U-value less than 1.8 W/m²K
	e. Thermal bridging less than 0.08 * exposed area
	f. Design air permeability less than 7 m³/h.m²
	g. Main heating efficiency more than 4 percentage points greater than the compliance minimum in 2.3 above
	h. Use of any low carbon or renewable energy technology:
	   - bio-fuel for main heating (including multi-fuel)
	   - CHP or community heating
	   - heat pump
	   - solar panel
	   - photovoltaic array
	i. Any item involving the application of Appendix Q (including specific fan power and MVHR efficiency other than the default values)

Reports

When all date has been correctly entered please go to the report page to generate the relevant reports. As follows:
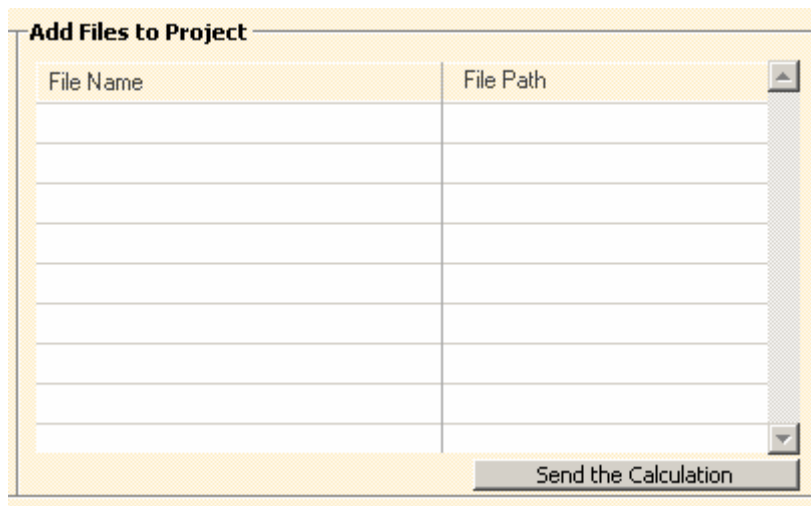

You might find it useful to check your progress when creating a project to go and run the compliance checklist to see where you stand. If there are missing data items from your project you will be prompted with alerts to ensure all data is entered before you can run the report

Software version	Reports available
Regulations - this is for users of the free version of the software	You cannot print reports from the free version of the software
Sap Designer - the designer version to produce compliance reports	All reports excluding EPC and lodge certificate. Users of the Scottish version can produce an EPC
Sap Napit - for accredited energy assessors	All reports excluding Scotland EPC

Add files

Under the NAPIT accreditation scheme the sap calculations are subject to quality control procedure. We have included a feature to enable users to allocate the relevant CAD drawings used for the project for future reference. If requested under the quality control procedure you can upload the drawings and the project file to our server.

This feature can also be used for technical support where you have a problem with a project.


To add a file use "New" button in the toolbar and select the files to be included with the project. To upload a file choose "send calculation" this will export the project file and create a zip archive including the CAD drawings and upload the archive to our server.

Note. Please e-mail info@completepicture.co.uk to notify if you have uploaded a project.

Lodging a certificate

If you're satisfied a report is correct you can preview the energy performance certificate before lodging however this preview certificate will not be valid until it is assigned a reference number from the CLG database. The reference number can only be assigned when the certificate is lodged.
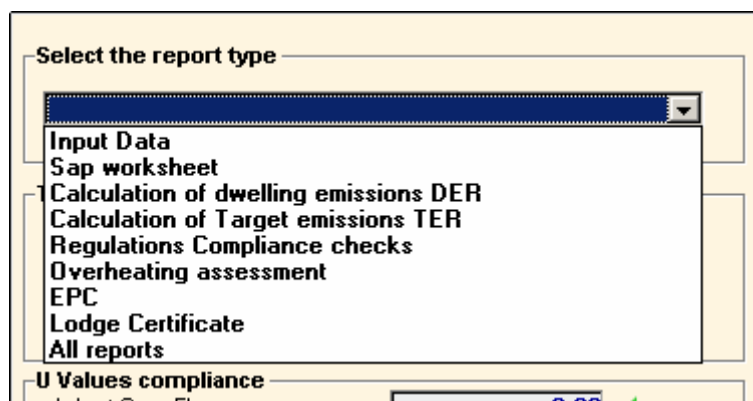
To lodge a certificate choose the "lodge and certificate" option from the drop-down list on the reports page. A confirmation screen will be shown before proceeding with the lodgement process. Lodging a certificate is chargeable by the accreditation scheme which in turn is charged by the government.
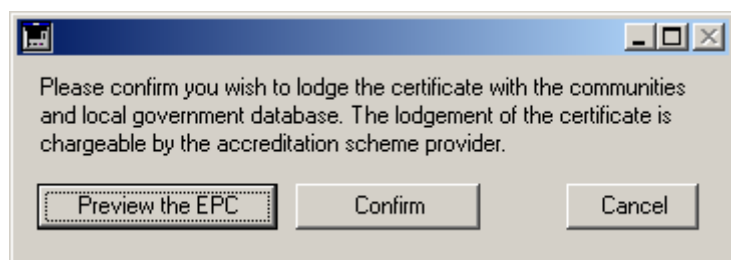
When the certificate has been successfully lodged with the database the software records the report reference number in the event that you need to retrieve or update the certificate at a later date. The RRN can also be passed clients who can retrieve the certificate from the government website
https://www.hcrregister.com/searchReport.html
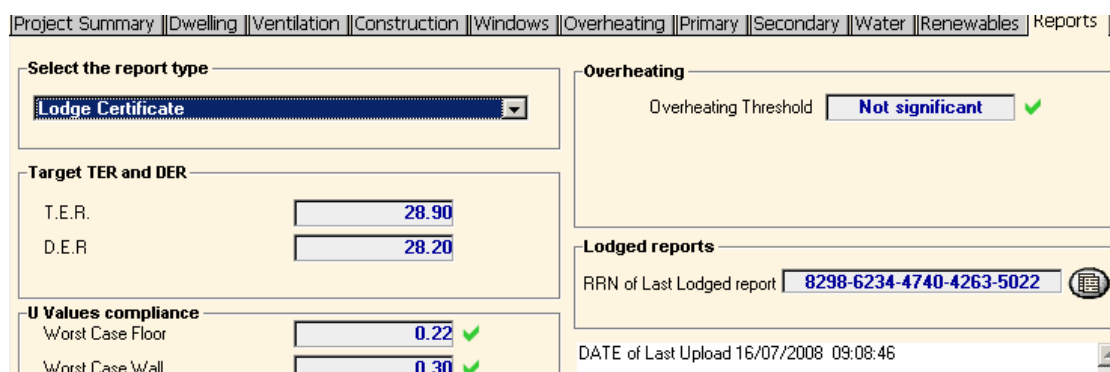
Please note you cannot amend a report once it is lodged. If you find there is an error please contact the accreditation scheme who update the CLG database to enable you to resubmit the EPC.

Energy Assessors Accreditation Scheme

What is it?

On 1st February 2008 NAPIT were formally approved by the Department of Communities and Local Government (CLG) to operate a Competent Person Scheme for "Energy Assessors" under the Energy Performance of Buildings (Certificates and Inspections) Regulations 2007.
Confirmation of the approval is posted on the CLG web site at:

http://www.communities.gov.uk/

NAPIT are operating the EA Scheme in partnership with Complete Picture, whose SAP software is already approved under Part L of the Building Regulations and is being adjusted to meet the new requirements. The software is intuitive and self-checking and runs on both PC and MAC platforms and has proved highly popular. See www.napit.org.uk for more information.

Members of the NAPIT EA Scheme will be able to assess and certificate energy performance Newly Constructed Dwellings. The requirement for certification is being introduced from 6 April 2008.

How does it Work?

In general terms the following applies:

   * Energy Assessors (EA) will be able to apply for individual accreditation on the basis of qualifications or prior experience (as no formal qualification are yet offered the experience route known as the APEL process will be the primary route in the short term).

   * An EA joining the NAPIT EA Scheme will be required to follow a Code of Conduct and follow formal procedures which will subject their work to quality control processes.

   * Once accredited, an EA will be able to use approved software to convert data (from design or survey information) into appropriate certificates and reports.
   * NAPIT will validate the data submitted electronically before a certificate/report is lodged on a national database.

# NAPIT Accreditation

What is the APEL Process?

They key issue for gaining membership is likely to be the APEL process and CLG are aiming to complete finalisation of these processes during February 2008. APEL (which standards for the accreditation of prior experiential learning) will involve a number of steps:

* Completion of a standard application form with evidence of related qualifications, professional memberships, relevant experience, ongoing professional development and other key information

* The completion of training on the software to be used (or update training if an existing user of the software)

* In some circumstances the completion of a knowledge and understanding test (expected to be on-line)

* The submission of sample certificates/reports using the approved software

* Possible further action if the above steps leave any gaps in evidence

While this all sounds very involved it should prove relatively straightforward to anyone who is actively experienced in the field already. Anyone coming new to this area of work will be better advised to undergo training and qualifications that are being developed to come on stream during 2008.

Document Manager

The document manager is an indexing program to manage all of the regulations and compliance documents installed on your computer. When you launch the program it connects to our server to check if any new documents are available
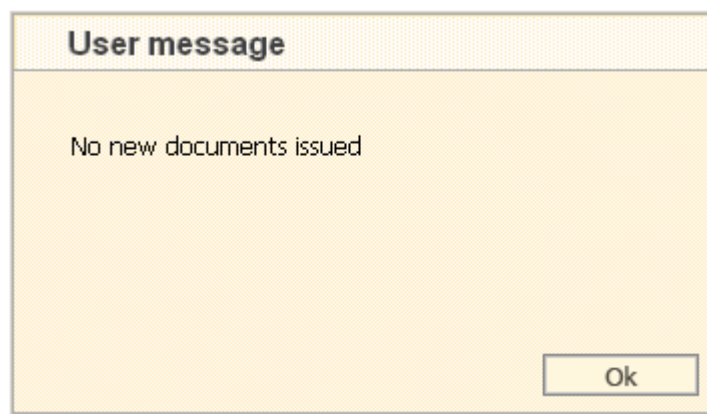

New documents

All new documents which are not on your system are displayed in the left-hand window. This is for information only they have not been downloaded onto your computer.
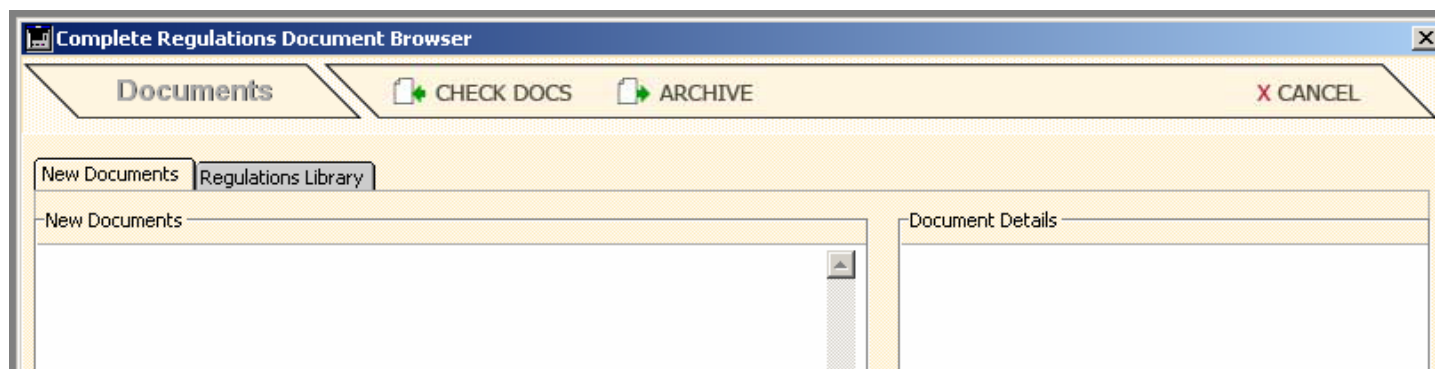
To view the library please click on the regulations library tab.

Regulations library

The regulations library consists of a hierarchical list on the left-hand side together with the information pane on the right hand side. By clicking on the top list you can navigate through the document groups. All documents in a group are then shown in the bottom list.
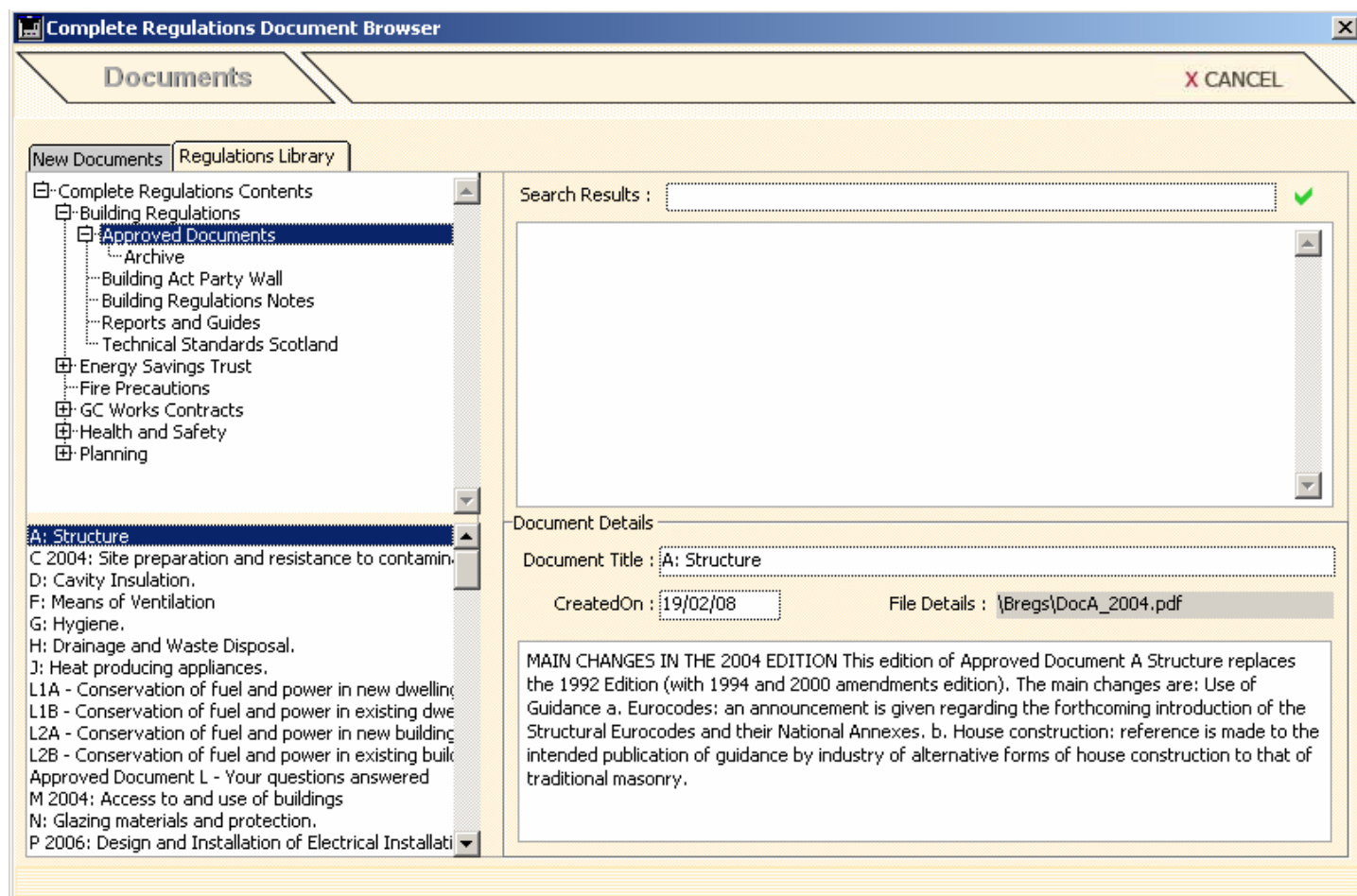

If you highlighted document in the bottom list the information about document is shown on the right hand side. Double-clicking a document will load the PDF and display the file in Adobe Acrobat.

Screen resolution

the screen resolution of your monitor governs the size of the window for displaying the Acrobat documents. By default will documents are displayed with the bookmarks showing to allow easy navigation through the document.
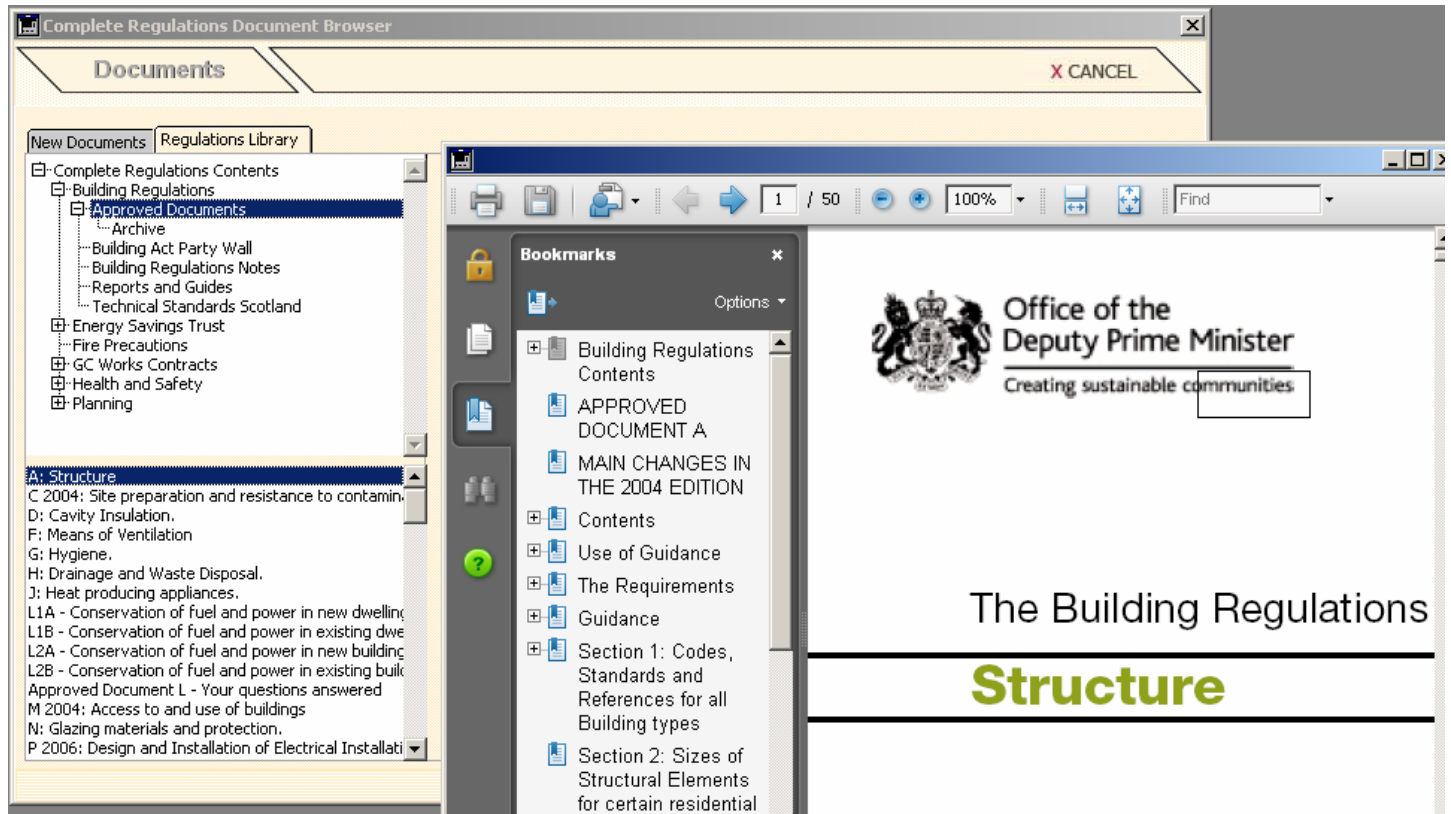
If the document is not available in your local computer you will be prompted to download the file from our server. You only need to download each document once.
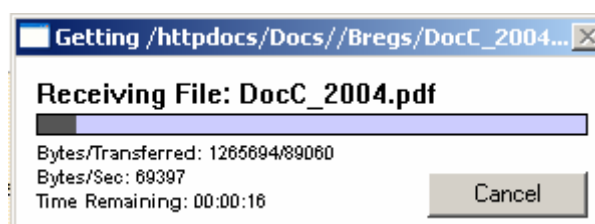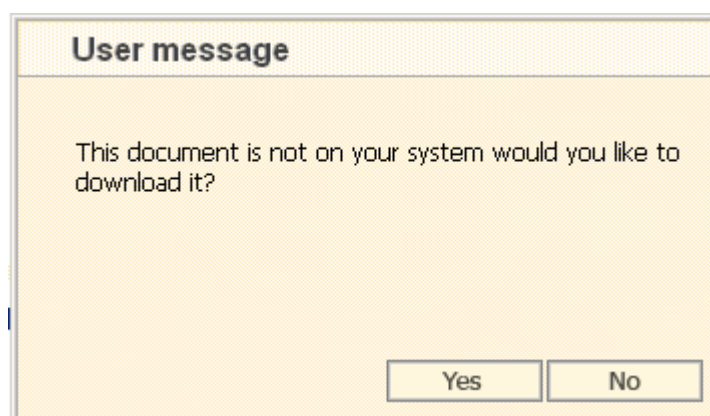
# Uninstalling completepicture software.

All of our software is installed as a complete package we do not install or updates any files that relate to your Windows or Macintosh system.

This makes manual removal very straightforward. If you would like to delete files from your system please do as follows.

Firstly open Windows Explorer. To do this click on your start button, right click the "my computer" icon and from the small menu choose explore. You will then see the Windows Explorer
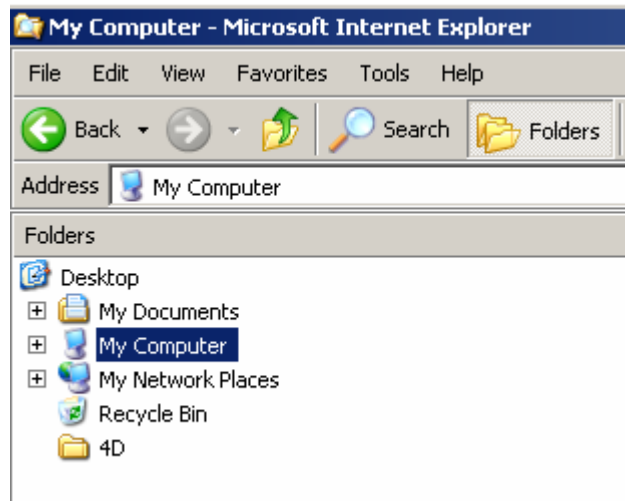
Expand my computer until you can see the complete picture folder.
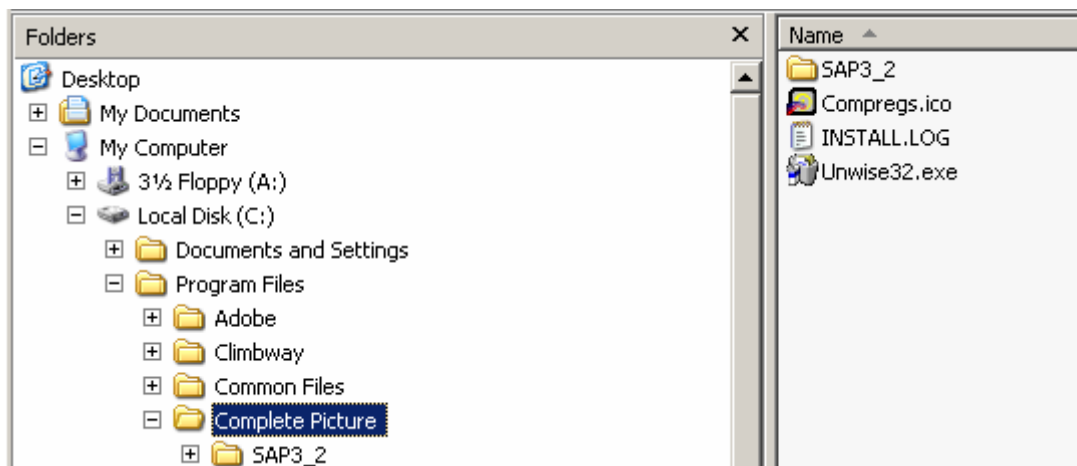

To remove the files simply delete the folders you no longer require.

The current folders in use as of 01/10/08 are as follows.

C:\Program Files\Complete Picture\Docs
C:\Program Files\Complete Picture\Sap3_2
C:\Program Files\Complete Picture\Sap3
C:\Program Files\Complete Picture\ Contract Admin
If you have any folders other than these on your system you can delete them. For example
C:\Program Files\Complete Picture\CPICTURE was the old folder for storing the documents.

To delete a folder simply right click and choose delete from the pop-up menu.
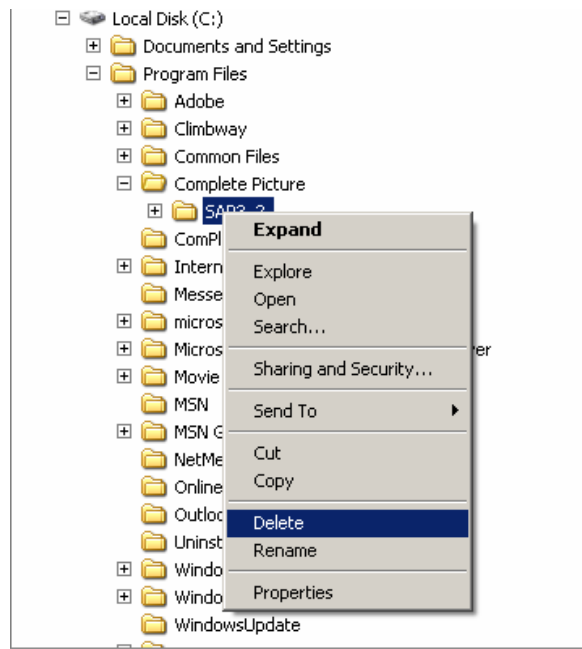
To remove unwanted shortcuts from your system you can delete them using a right click and choosing delete. For example is image below.