

Operating Manual

Resistive Material Moisture Measuring Instrument

ab Version 2.2

GMH 3810



-  Please carefully read these instructions before use!
-  Please consider the safety instructions!
-  Please keep for future reference!



WEEE-Reg.-Nr. DE 93889386

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1 General advice

Read through this document attentively and make yourself familiar to the operation of the device before you use it. Keep this document in a ready-to-hand way in order to be able to look up in the case of doubt.

2 Safety

2.1 Intended use

The device is suitable for the measurement of moisture content and temperature.

The measurement is performed by drawing the 2 screwed needles on the face side of the device into the material to be measured.

Personnel which starts up, operates and maintains the device has to have sufficient knowledge of the measuring procedure and the meaning of the resulting measured values, this manual delivers a valuable help for this. The instructions of the manual have to be understood, regarded and followed.

To be sure that there's no risk arising due to misinterpretation of measured values, the operator must have further knowledge in case of doubt - the user is liable for any harm/damage resulting from misinterpretation due to insufficient knowledge.

The manufacturer will assume no liability or warranty in case of usage for other purpose than the intended one, ignoring this manual, operating by unqualified staff as well as unauthorized modifications to the device.

2.2 Safety signs and symbols

Warning notices are marked in this manual as shown below:



Caution! This symbol warns of imminent danger, death, serious injuries and significant damage to property at non-observance.



Attention! This symbol warns of possible dangers or dangerous situations which can provoke damage to the device or environment at non-observance.



Note! This symbol point out processes which can indirectly influence operation, possibly cause incorrect measurement or provoke unforeseen reactions at non-observance.

2.3 Safety instructions

This device has been designed and tested in accordance to the safety regulations for electronic devices. However, its trouble-free operation and reliability cannot be guaranteed unless the standard safety measures and special safety advises given in this manual will be adhered to when using it.

1. Trouble-free operation and reliability of the device can only be guaranteed if it is not subjected to any other climatic conditions than those stated under "Specification".
Transporting the device from a cold to a warm environment condensation may result in a failure of the function. In such a case make sure the device temperature has adjusted to the ambient temperature before trying a new start-up.

2.  Whenever there may be a risk whatsoever involved in running it, the device has to be switched off immediately and to be marked accordingly to avoid re-starting. Operator safety may be a risk if:
 - there is visible damage to the device
 - the device is not working as specified
 - the device has been stored under unsuitable conditions for a longer timeIn case of doubt, please return device to manufacturer for repair or maintenance.

3.  Do not use this product as safety or emergency stop device or in any other application where failure of the product could result in personal injury or material damage. Failure to comply with these instructions could result in death or serious injury and material damage.

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4.  This device must not be used at potentially explosive areas! The usage of this device at potentially explosive areas increases danger of deflagration, explosion or fire due to sparking.
5.  Risk of injury due to sharp measuring needles! Please protect needles while not used with suitable means of protection, like the protection caps of the scope of supply.

3 Product description

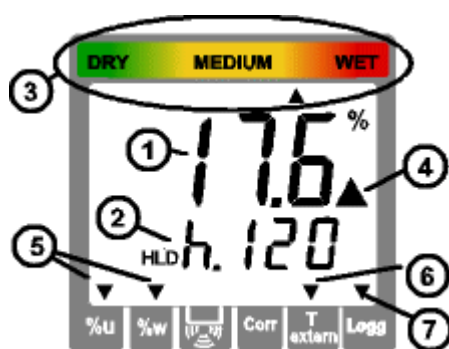
3.1 Scope of supply

Handheld instrument incl. 9V battery
Operating manual
2 protection caps

3.2 Operating and maintenance

1. Battery Operation
The battery has been used up and needs to be replaced, if 'bAt' is shown in lower display. The device will, however, continue operating correctly for a certain time.
The battery has been completely used up, if 'bAt' is shown in the upper display.
2.  The battery has to be removed, when storing device above 50°C.
We recommend to remove the battery if device is not used for a longer period of time!
Risk of leakage!
3. Treat device and probes carefully. Use only in accordance with above specification. (do not throw, hit against etc.). Protect plugs and sockets from soiling.
4. Cable break or not connected / too dry / highly insulating material:
 **There may be still corresponding %-values displayed.**
- This shall not constitute a valid test result!
5. Maintenance: The device does not contain serviceable parts inside.
Regular inspection of contacts and cable is suggested, the precision of the measuring chain can be checked with the optional testing adapter GPAD 38
The measuring needles have to be fixed very well e.g. by means of pliers. Loose needles can disturb the measuring.

3.3 Display elements



- 1: **Main display:** Currently measured material moisture [percent moisture content]
HLD: Measure value is 'frozen' (key 6)
 - 2: **Auxiliary display:** Currently selected material (temperature when pressing key 3) Blinking display: Displayed value is out of specified range (wood 8..40 % u)
-
- Special display elements:**
-
- 3: **Moisture evaluation:** Evaluation of the material condition: via top arrows: DRY - MEDIUM - WET
 - 4: **Warning triangle:** Indicates low battery
 - 5: **"%u" or "%w":** Displays unit: moisture content u or wet basis moisture content w

All remaining arrows have no function in this version.

3.4 Keypad



1: **ON/Off key**



3: **During measurement:** shortly displaying temperature or changing to temperature input.



4: **Set/Menu:** press (Menu) for 2 s: configuration will activated



2 and 5:



During measurement: select a material
p.r.t.: 6.2 Pre-selection of favourite materials ('Sort')

List of selectable materials:

Appendix A; Appendix B



With manual temperature compensation:

When displaying temperature (call via button ,Temp'): Input of temperature up/down for configuration:
to enter values or change settings

6:



During measurement:

- with **Auto-Hold off:** Hold current measuring value ('HLD' in display)
- with **Auto-Hold on:** Start a new measure, which is ready when 'HLD' appears in the display. refer to chapter 5.4 Auto-Hold function

Set/Menu or temperature input:

confirming of selected input, return to measure

4 Device configuration

For configuration of the device press "Menu"-key (key 4) for 2 seconds, the first menu will be shown. Choose between the individual values that can be set by pressing the "Menu"-key (key 4) again.

The individual values are changed by pressing the keys "▲" (key 2) or "▼" (key 5).

Use key "Store/↵" (key 6) to leave configuration and to store settings.

Parameter	Values	Meaning	
	or		p.r.t.
Limitation of the material selection			
Sort	oFF	Unrestricted material selection via key 2 and 5	
	1...8:	Material selection in-between 1 up to 8 selectable materials	
Sor.1 ... Sor.8		selectable materials (not available if Sort = off) Select the desired material that should be available during the measure via key 2 and 5.	6.2
Generic settings			
Unit %	Arrow bottom left points to "%u"	Moisture display = moisture content [%u]	
	Arrow bottom left points to "%w"	Moisture display = wet-basis moisture content [%u]	
Unit °C / °F	°C	All temperature values are in degrees Celsius	
	°F	All temperature values are in degrees Fahrenheit	
Atc	oFF	Atc off: temperature input for compensation via keys	5.4
	on	Atc on: temperature compensation via internally measured temperature	
Auto HLD oFF	oFF	Auto HLD off: continuous measuring.	5.4
	on	Auto-HLD on: when reaching a stable measuring result, this will be frozen with-HLD. When pressing the store-key a new measure will be initiated.	
P.oFF	1...120	Power-off delay in minutes. Device will be automatically switched off as soon as this time has elapsed if no key is pressed takes place	
	oFF	Power-off function inactive (continuous operation, e.g. mains operation)	

5 Some basics of precision material moisture measuring

5.1 Measuring method

The electrical resistance depends on the material moisture in many cases. Therefore the device measures the (possibly extremely high) values of resistance and converts them to the displayed value by means of integrated characteristic curves. The temperature has to be compensated especially at the measurement of wood –please refer to chapter 5.5.

The contact is realised by nails that are driven into the material or by injection probes. With optional adapter GMK 3810 other external electrodes can be connected.

Frozen material cannot be measured!

5.2 Moisture content u and wet-basis moisture content w

Depending on the Application one of the two units is necessary.

Carpenters, joiners and the like commonly use the moisture content u (sometimes referred to as MC).

When evaluating firewood, wood chips etc., the wet basis moisture content w is needed.

The instrument can be configured to both of the values. Please refer to chapter “configuration”.

Moisture content u or MC (relative to dry weight) = dry basis moisture content (mind the arrow at left bottom!)

The unit is %, sometimes used: % MC.

The unit expresses the moisture content like calculated below:

$$\text{Moisture content } u [\%] = (\text{weight}_{\text{wet}} - \text{weight}_{\text{dry}}) / \text{weight}_{\text{dry}} * 100$$

Or: $\text{Moisture content } u [\%] = (\text{weight}_{\text{water}}) / (\text{weight}_{\text{dry}}) * 100$

$\text{weight}_{\text{wet}}$: weight of the wet material

$\text{weight}_{\text{water}}$: weight of water in the wet material

$\text{weight}_{\text{dry}}$: oven-dry weight of material

Example: 1kg of wet wood, which contains 500g of water has a moisture content u of 100%

Wet-Basis Moisture Content w (relative to total weight, mind the arrow at left bottom!)

The wet-basis moisture content expresses the ratio of the mass of water to the total mass of the substance. The ratio is represented by the following equation (the unit is % as well):

$$\text{wet-basis moisture } w [\%] = (\text{weight}_{\text{wet}} - \text{weight}_{\text{dry}}) / \text{weight}_{\text{wet}} * 100$$

Or: $\text{wet-basis moisture } w [\%] = (\text{weight}_{\text{water}}) / \text{weight}_{\text{wet}} * 100$

Example: 1kg of wet wood, which contains 500g of water has a moisture content w of 50%

5.3 Special features of the device

466 wood specimens and 28 building materials are stored directly in the memory of the device:

Thus more exact measurements could be reached than with common devices with group selections would ever reach. Even the usage of complex conversion tables for building materials won't be necessary any more!

Example: Common wood-moisture-measuring-devices use one single group for spruce and oak, in reality the deviation of these characteristic curves is more than 3%! (Base for this statement are complex statistical surveys, considered measuring range 7-25%). This random error will not occur for the whole GMH38xx series, with the help of individual characteristic curves highest resolution is achieved.

Extreme wide measuring range: 0-100% (depending on characteristic curve) percent moisture content in wood.

Moisture estimation: Additionally to the measuring value, an individual moisture estimation will be displayed simultaneously.

5.4 Auto-Hold function

Particularly when measuring dry wood, electrostatic charges and other similar noise could dither the measuring value. With activated auto-hold function the device will acquire an exact measuring value automatically. During that, the device could be put down to avoid noise through discharge of the clothing etc. After having acquired the measuring value, the display will change to 'HLD': The value will be frozen as long as a new measuring is initiated by pressing button 6 (store).

5.5 Automatic temperature-compensation ('Atc')

An exact temperature compensation is important for a reliable wood-moisture-measuring. These devices feature a integrated temperature measuring and a manual input of the temperature.

The used temperature value therefore is:

Menu	Used temperature-value
Atc on	Device-internal temperature-measuring
Atc off	Manual input of temperature: shortly press Temp-Button then use $\blacktriangle$ (button 2) or $\blacktriangledown$ (button 5) to input the temperature confirm selection with 'Store'(button 6)

5.6 Measuring in wood: Measuring with two measuring-pikes

For measuring wood, punch in the measuring-pikes across to the wood-grain, having a good contact between the pikes and the wood (measuring along wood-grain deviates minimal).

DO NOT HIT ONTO THE DEVICE OR PUNCH THE NEEDLES IN WITH FORCE!

The device may be damaged.

Select **correct wood-sort** (see Appendix A).

Ensure measuring the **correct temperature** (see chapter 5.5).

Now read the measuring-value or when having activated the auto-hold-function initiate a new measuring by pressing **Store/↵** (button 6) .

The measured resistance will be extremely high when measuring dry wood (<15%) thus the measuring will need more time to achieve its terminal value among other things static discharge could momentarily falsify the measuring.

Therefore beware of static discharge and wait long enough until a stable measuring value is displayed (unstable: “%“ blinking) or use the auto-hold-function (see chapter 5.4 Auto-Hold function).

Extreme accurate measures can be carried out within the range of **6 to 30%**.

Beyond this range the acquirable accuracy will lessen, but the device will deliver reference values still sufficient for the practitioner.

It is measured between the measuring-pikes insulated among each other. Requirements for an exact measurement:

- choose correct place to measure: place should be free of irregularities like resin-clusters, knurls, rifts, etc.
- choose correct measure depth: Recommendation: for trimmed timber: press in the pikes up to 1/3 of the material thickness.
- Perform multiple measurements: the more measurements will be averaged, the more exact the result will be.
- Pay attention to temperature-compensation: let the device adapt to the temperature of the wood (Atc on) or enter the exact temperature manually (Atc off).

Frequent sources of errors:

- Attention with oven-dried wood: the moisture dispersion may be irregular, often in the core is more moisture than on the edge.
- Surface-moisture: The wood-edge could be more humid than the core if the wood had been stored outside and e.g. was in rain.
- Wood preservative and other treatment could falsify the measuring.
- Fouling at the connections and round the pikes could result in erroneous measurement, especially with dry wood.

5.7 Measuring other materials

5.7.1 ‘Hard’ materials (concrete or similar): Measuring with brush-type probes (GBSL91 or GBSK91)



Measuring with brush probe GBSL91

Drill two holes with Ø6mm (GBSK91) or Ø 8mm (GBSL91) at intervals of 8 to 10cm into the material to be measured. Do not use edgeless drills: the resulting heat will evaporate the moisture which will result in faulty measures. Wait for at least 10min, blow out the holes to clean them from dust. Apply conductivity compound on the brush-type probes and stick them into the holes. Choose correct material (see Appendix B: Additional materials), read the measuring value. Observe that the holes dry out by-and-by, and the device will measure a value too low, if you want to use them several times.

This effect can be compensated by using conductivity compound: insert profuse conductivity compound between the holes and the brush-type probe, and let the electrode stick in the hole for about 30min before measuring (with the device switched off). Temperature-compensation plays no role when using the building material measuring.

5.7.2 ‘Soft’ Materials (polystyrene or similar): Measuring with measuring-pikes or -pins (GMS 300/91)

The most important thing is a good contact between the materials and the measuring needles. Whenever this is not possible because of the material texture, we suggest you to use the adapter cable GMK3810 with appropriate electrodes, such as impact electrode GSE91 or GSG91, reciprocating piston electrode GHE91.

Unscrew the needle holder and mount the adapters for the banana jacks. The red jack has to be connected to the right-hand socket, this decreases susceptibility of electromagnetic interference.

Procedure as described in chapter measuring in wood.

5.7.3 Measuring bulk cargo, bales and other special measures

Usable probes: measuring pins GMS 300/91 mounted on GSE91 or GSG91 with adapter cable GMK 3810 (red connector to the right-hand socket).

Measuring of splints, wood chips, insulating material and similar:

When using measuring pins oscillating movements have to be avoided when pushing in the probes. Otherwise hollows between the probes and the material may falsify the measuring. The material should be sufficiently compressed. When in doubt repeat the measuring a few times: the highest measuring value is the most exact one.

5.8 Measuring of materials, having no characteristic curves stored

Choose the representative universal material group "h.A", "h.b", "h.c" and "h.d" (for example corresponding to A,B,C and D of the GHH91) if a conversion table exists.

Attention: The moisture evaluation wet/dry of these material groups is only valid for wood!

Please keep in mind the following when using the temperature-compensation:

Automatic temperature-compensation should always be activated when measuring wood (Act on), with all other materials the automatic temperature-compensation should be switched off (Act off) and a manual temperature of 20°C should be entered.

Additionally at GMH3851: The GMH3851 can store up to 4 additional user characteristic curves. For this the corresponding reference point measurements for the respective material has to be carried out, from which the exact moisture content has to be dedicated with the Darr-Probe or the CM-Method. The Results can be stored in the device with the help of the GMHKonfig-Software, and can be accessed by the device directly.

6 Hints for the special function

6.1 Moisture estimation ('WET' - 'MEDIUM' - 'DRY')

Additionally to the measuring value, an individual moisture estimation will be displayed simultaneously. This moisture estimation is only a guidance value, the final evaluation is depending on the application of the material e.g:

Cement floor pavement ZE, ZFE without additives: Readiness without floor heating at 2,3% with floor heating 1,5%

Anhydrit floor pavement AE, AFE: Readiness without floor heating at 0,5% with floor heating 0,3%

Also firewood may be already usable while instrument still displays 'wet'!

Corresponding Standards and Instructions must be observed!

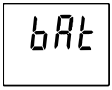
The Device can only complement the skill of a tradesman or investigator but cannot replace it!

6.2 Pre-selection of favourite materials ('Sort')

A pre-selection of different materials (up to 8) can be selected from the menu for an effective working with the device. For example you can set the Menu Sort to 4 and save the desired materials in Sor.1, Sor.2, Sor.3 and Sor.4 if you only measure 4 different materials. Please refer to chapter Device configuration.

Only the 4 desired materials can be selected via the buttons up and down, when exiting the menu, a changing during the measurement can be done comfortably. All materials will be available when setting Sort to off. Sor.1 to Sor.4 will still be available in the 'background', when setting the menu Sort to 4 the limited selection of the 4 entered materials will be active again. You only want to measure one material: set the menu Sort to 1 you cannot change to another material, thus a faulty operation is impossible.

7 Fault and system messages

Display	Meaning	Remedy
	Blinking curve display: Displayed value is out of specified range (Wood: 8..40%u)	Limited measuring precision! The display value is only usable as indication, not as measurement!
	low battery voltage, device will continue to work for a short time	replace battery
	If mains operation: wrong voltage	replace power supply, if fault continues to exist: device damaged
	low battery voltage	replace battery
	If mains operation: wrong voltage	Check/replace power supply, if fault continues to exist: device damaged
No display or weird display Device does not react on keypress	low battery voltage	replace battery
	If mains operation: wrong voltage	Check/replace power supply, if fault continues to exist: device damaged
	system error	Disconnect battery or power supply, wait some time, re-connect
	device defective	return to manufacturer for repair
----	Sensor error: no material connected (meas. Value below permissible range), no valid signal	Connect meas. material
	charge at the probe, device will discharge (resp. at dry wood)	Wait until probe has discharged
	Sensor broken or device defective	return to manufacturer for repair
Err.1	Value exceeding measuring range	Check: Is the value exceeding the measuring range specified? -> temperature too high!
	Wrong probe connected	Check probe
	Probe or device defective	return to manufacturer for repair
	Non-floating probe near the unshielded electrode	Insulate probe or measure at shielded electrode
Err.2	Value below display range	Check: Is the value below the measuring range specified? -> temperature too low!
	Wrong probe connected	Check probe
	Probe, cable or device defective	return to manufacturer for repair
Err.7	system error	return to manufacturer for repair

8 Inspection of the accuracy / Adjustment services

Accuracy can be inspected with the optional available testing adapter GPAD 38 (e.g. every year).

To check precision select material characteristic curve ".rEF", choose as moisture display "%u" and connect the testing adapter to the needles. The device must display the printed value for the GMH 38xx

If the precision is no more corresponding to the imprint of the GPAD 38, we suggest to send the device to the manufacturer for a new adjustment.

9 Reshipment and disposal



All devices returned to the manufacturer have to be free of any residual of measuring media and other hazardous substances.

Measuring residuals at housing or sensor may be a risk for persons or environment



Use an adequate transport package for reshipment, especially for fully functional devices. Please make sure that the device is protected in the package by enough packing materials.

Add the completed reshipment form of the GHM website

<http://www.ghm-messtechnik.de/downloads/ghm-formulare.html>.



Dispense exhausted batteries at destined gathering places.

The device must not be disposed in the unsorted municipal waste! Send the device directly to us (sufficiently stamped), considering the above if it should be disposed.

We will dispose the device appropriate and environmentally sound.

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10 Specification

Measuring	Channel 1	Channel 2
Principle	Resistive material-moisture-measuring via integrated needles matching DIN EN 13183-2: 2002	internal temperature-measuring
Char. curve	466 different kinds of wood 28 different building materials	
Meas. range	0,0...100,0 % u moisture content (depending on characteristic curve) equal to approx. 3kOhm ... 2TerraOhm	int. temp.-Meas: -30,0...+75,0 °C / -22,0...+167,0 °F
Spec. meas. range	Wood: 8 ... 40 % u	
Resolution	0,1 % moisture content	0,1 °C / 0,1 °F
Evaluation	Evaluation of the material condition in 9 steps from DRY to WET	
Accuracy device without probe	±1Digit (at nominal-temperature) Wood: ±0,2 % moisture content (deviation from characteristic curve, range 8..40 % u) building mat.: ±0,2 % moisture content (dev. from char. curve, range depending on char. curve)	int. t.-measuring: ± 0,3 °C (is type K reference junction)
overall accuracy	depending on used measuring equipment, measured material and the correct execution.	
Temperature drift	< 0,005 % moisture content per 1 K	0,005 % per 1 K
Nominal temperature	25°C	
Ambient condition	Temperature -25 ... +50 °C / -13 ... +122 °F (frozen material cannot be measured) Relative humidity 0 ... 95 %RH (non condensing)	
Storage temperature	-25 ... +70 °C / -13 ... +158 °F	
Power supply	9V-Battery (included)	
Power consumption	approx. 2.3 mA	
Display	Two 4 digits LCD's (12.4 mm high and 7 mm high) for material moisture temperature or characteristic curve, hold function, etc. as well as additional pointing arrows.	
Pushbuttons	6 membrane keys for on/off switch, menu operation, characteristic curve, hold-function etc.	
Housing	Dimension: 142 x 71 x 26 mm (L x B x D) impact resistant ABS, membrane keyboard, transparent panel, integrated pop-up-clip for table top or suspended use	
Weight	approx. 175 g	
Hold function	Press button to store current value.	
Automatic-Off-Function	Device will be automatically switched off if no key is pressed/no interface communication takes place for the time of the power-off delay. The power-off delay can be set to values between 1 and 120 min.; it can be completely deactivated.	
Directives / standards:	The instruments confirm to following European Directives: 2014/30/EU EMC Directive 2011/65/EU RoHS Applied harmonized standards: EN 61326-1 : 2013 emissions level: class B emi immunity according to A.1 Additional fault: <1 %	

11 Appendix A: Sorts of wood

Select kind of wood you want to measure, enter number on the device, e.g. birch = h. 60

Identification	Number	Comment	Range
Group A	h. A	Wood-group A (equal to GHH91 selector "A")	0..100%
Group B	h. B	Wood-group B (equal to GHH91 selector "B")	1..100%
Group C	h. C	Wood-group C (equal to GHH91 selector "C")	2..100%
Group D	h. D	Wood-group D (equal to GHH91 selector "D")	3..100%
AS/NZS 1080.1	h. AS	Australian reference characteristic curve	4..100%
Group Birch Oak Ash Beech	h.401	Hardwood-Group	6..100%
Group Spruce-Pine-Fir	h.402	Softwood-Group	6..100%
GMH 38 reference	.REF	Internal reference for determining additional characteristic curves / calculation tables (without temperature-compensation)	

Abura	Hallea ciliata	h.2	7..60%
Afrormosia	Pericopsis elata	h.3	6..55%
Afzelia	Afzelia spp.	h.4	8..47%
Agba	Gossweilerodendron balsamiferum	h.426	6..82%
Albizia / latandza, New Guinea	Albizia falcata	h.8	5..100%
Albizia / latandza, Solomon Island	Albizia falcata	h.9	4..93%
Alder, Blush	Solanea australis	h.10	5..82%
Alder, Brown	Caldcluvia paniculosa	h.11	7..89%
Alder, Common	Alnus glutinosa	h.131	2..100%
Alder, Rose	Caldcluvia australiensis	h.12	6..91%
Alerce	Fitzroya cupressoides	h.13	7..77%
Amberoi	Pterocymbium beccarii	h.14	5..85%
Amoora, New Guinea	Amoora cucullata	h.15	3..100%
Andiroba	Carapa guianensis	h.16	5..73%
Antiaris, New Guinea	Antiaris toxicaria	h.7	6..100%
Apple, Black	Planachonella australis	h.17	7..78%
Ash Silvertop	Eucalyptus sieberi	h.27	2..100%
Ash, American	Fraxinus americana	h.132	5..100%
Ash, Bennet's	Flindersia bennettiana	h.18	6..99%
Ash, Crow's	Flindersia australis	h.19	7..88%
Ash, European	Fraxinus excelsior	h.133	7..69%
Ash, Hickory	Flindersia ifflaiana	h.20	6..92%
Ash, Japanese	Fraxinus mandshurica	h.134	4..100%
Ash, Red	Flindersia excelsa	h.21	5..86%
Ash, Scaly	Ganophyllum falcatum	h.22	5..100%
Ash, Silver (Northern)	Flindersia schottina	h.23	7..89%
Ash, Silver (Queensland)	Flindersia bourjotiana	h.24	6..100%
Ash, Silver (Southern)	Flindersia schottina	h.25	7..100%
Ash, Silver, New Guinea	Flindersia amboinensis	h.26	5..100%
Aspen, Hard	Acronychia laevis	h.28	5..84%
Ayan	Distemonanthus benthamianus	h.285	7..67%
Balau	Shorea laevis	h.31	4..65%
Balau, red	Shorea guiso	h.32	4..88%
Balsa	Ochroma pyramidale	h.33	4..100%
Basralocus / Angelique	Dicorynia guianensis	h.34	6..67%
Basswood	Tilia americana	h.228	4..100%
Basswood, Fijian	Endospermum macrophyllum	h.35	4..79%
Basswood, Malaysian	Endospermum malacense	h.36	5..100%
Basswood, New Guinea	Endospermum medullosum	h.37	5..98%

Basswood, Silver	Polyscias elegans	h.38	7..93%
Basswood, Solomon Island	Polyscias elegans	h.39	4..83%
Bean, Black	Castanospermum australe	h.40	6..100%
beech, damped	Fagus sylvatica	h.87	6..68%
beech, european -	Fagus sylvatica	h.86	5..100%
Beech, Myrtle	Nothofagus cunninghamii	h.41	6..98%
Beech, New Zealand Red (hearted untreated)	Nothofagus fusca	h.42	7..100%
Beech, New Zealand Red (sapwood boron)	Nothofagus fusca	h.43	2..100%
Beech, New Zealand Red (sapwood untreated)	Nothofagus fusca	h.44	5..100%
Beech, Silky	Citronella moorei	h.45	8..85%
Beech, Silver	Nothofagus menziesii	h.46	8..73%
Beech, Silver (sapwood tanalith)	Nothofagus menziesii	h.47	6..99%
Beech, Silver (sapwood untreated)	Nothofagus menziesii	h.48	4..100%
Beech, Wau	Elmerrilla papuana	h.49	7..100%
Beech, White (Fiji)	Gmelina vitiensis	h.50	5..100%
Beech, White (Queensland)	Gmelina leichardtii	h.51	6..100%
Bintangor / Calophyllum, Fijian	Calophyllum leucocarpum	h.53	5..100%
Bintangor / Calophyllum, Malaysian	Calophyllum curtisii	h.54	6..99%
Bintangor / Calophyllum, New Guinea	Calophyllum papuanum	h.55	4..100%
Bintangor / Calophyllum, Phillipines	Calophyllum inophyllum	h.56	6..100%
Bintangor / Calophyllum, Solomon Islands	Calophyllum kajewskii	h.57	6..100%
Binuang	Octomeles sumatrana	h.130	5..95%
Birch, American	Betula lutea	h.59	7..94%
Birch, European	Betula pubescens	h.60	5..100%
Birch, White	Schizomeria ovata	h.58	7..97%
Bishop Wood (Fiji)	Bischofia javanica	h.61	5..94%
Blackbutt	Eucalyptus pilularis	h.62	4..100%
Blackbutt, Western Australia	Eucalyptus patens	h.63	6..100%
Blackwood	Acacia melanoxylon	h.64	6..97%
Bloodwood, Red	Corymbia gunmifera	h.66	7..100%
Bollywood	Litsea reticulata	h.67	5..100%
Bossime	Drypetes spp.	h.70	7..78%
Box Grey	Eucalyptus moluccana	h.75	8..94%
Box Grey Coast	Eucalyptus bosistoana	h.76	7..98%
Box, Black	Eucalyptus lafgiflorens	h.71	5..100%
Box, Brush (Location Unknown)	Lophostemon confertus	h.74	5..63%

Box, Brush (N.S.W.)	Lophostemon confertus	h.72	4..68%
Box, Brush (Queensland)	Lophostemon confertus	h.73	7..52%
Box, Kanuka	Tristania laurina	h.77	6..100%
Boxwood, New Guinea	Xanthophyllum papuanum	h.78	5..88%
Boxwood, Yellow	Planchonella pholmaniana	h.79	7..78%
Brachychiton	Brachychiton carthersii	h.80	5..67%
Bridelia	Bridelia minutiflora	h.81	5..100%
Brigalow	Acacia harpophylla	h.82	5..100%
Brownbarrel	Eucalyptus fastigata	h.83	5..100%
Bubinga	Guibourtia demeusii	h.84	7..90%
Buchanania	Buchanania arborescens	h.85	4..99%
Burckella, Solomon Island	Burckella obovata	h.88	4..73%
Butternut, Rose	Blepharocarya involucrigeria	h.89	5..88%
Camphorwood, New Guinea	Cinnamomum spp,	h.90	6..96%
Camptosperma (Malaysia)	Camptosperma curtisii	h.91	8..100%
Camptosperma (Solomon Island)	Camptosperma kajewskii	h.92	3..100%
Cananga (Phillipines)	Canarium odoratum	h.93	7..78%
Canarium Solomon Island	Canarium salomonense	h.97	4..82%
Canarium, African	Canarium Scheinfurthii	h.94	7..100%
Canarium, Fijian	Canarium oleosum	h.95	5..100%
Canarium, New Guinea	Canarium vitiense	h.96	5..97%
Candlenut	Aleurites moluccana	h.98	0..100%
Carabeen, Yellow	Sloanea woollsii	h.99	6..85%
Cathormion, New Guinea	Cathormion umbellatum	h.100	4..68%
Cedar , American	Cedrela odorata	h.102	8..86%
Cedar, incense	Calocedrus decurrens	h.65	5..100%
Cedar, White	Melia azedarach	h.101	7..100%
Cedar, Yellow	Chamaecyparis nootkatensis	h.457	4..100%
Celtis, New Guinea	Celtis spp,	h.103	5..86%
Celtis, Solomon Island	Celtis philippinesis	h.104	4..69%
Cheesewood, White (Queensland) /Asian Alstonia	Alstonia scholaris	h.105	5..100%
Chengal (Malaysia)	Neobalanocarpus heimii	h.106	4..99%
Cherry, American	Prunus serotina	h.216	5..100%
Cherry, European	Prunus avium	h.217	7..86%
Cleistocalyx	Cleistocalyx mirtoides	h.107	5..100%
Coachwood	Ceratopetalum apetalum	h.108	4..100%
Coondoo, Blush	Planchonella laurifolia	h.109	6..75%
Cordia, New Guinea	Cordia dichotoma	h.110	5..61%
Corkwood, Grey	Erythrina vespertillio	h.111	6..70%
Courbaril	Hymenaea coubaril	h.112	7..64%
Cudgerie, Brown	Canarium australasicum	h.113	7..85%
Cupiuba	Goupia glabra	h.147	6..69%
Curupixá	Micropholis	h.114	6..63%
Cypress	Cupressus spp,	h.456	5..100%
Cypress, Northern	Callitris intratropica	h.115	6..100%
Cypress, Rottneest Island	Callitris preisii	h.116	7..100%
Cypress, White	Callitris glaucophylla	h.117	6..100%
Dakua, Salusalu (Fiji)	Decussocarpus vitiensis	h.118	6..100%
Dibetou/African walnut	Lovoa trichilioides	h.119	7..87%
Dillenia (Solomon Island)	Dillenia salomonense	h.120	4..82%
Doi (Fiji)	Alphitonia zizphoides	h.121	5..92%
Duabanga, New Guinea	Duabanga moluccana	h.124	4..93%

Ebony, african	Diospyros spp,	h.125	6..68%
Ekki	Lophira alata	h.29	4..95%
Elm, European	Ulmus spp,	h.374	7..61%
Elm, White	Ulmus americana	h.373	5..88%
Evodia, White	Melicope micrococca	h.135	5..75%
Figwood (Moreton Bay)	Ficus macrophylla	h.139	7..69%
fir, alpine	Abies lasiocarpa	h.410	6..100%
fir, amabilis	Abies amabilis	h.411	4..100%
Fir, Douglas	Pseudotsuga menziesii	h.122	5..100%
Fir, Douglas (New Zealand) (sapwood treated)	Pseudotsuga menziesii	h.140	6..95%
Fir, Douglas (New Zealand) (sapwood untreated)	Pseudotsuga menziesii	h.141	5..100%
Fir, Douglas (New Zealand) (truewood untreated)	Pseudotsuga menziesii	h.142	3..100%
Fir, europ., MPA	Picea abies Karst.	h.460	6..100%
fir, grand	Abies grandis	h.412	4..100%
Fir, Spruce	Abies magnifica	h.413	5..100%
fir, white / fir, silver	Abies alba	h.414	5..100%
Galip	Canarium indicum	h.143	5..81%
Garo-Garo	Matrixiodendron pschyclados	h.144	5..86%
Garuga	Garuga floribunda	h.145	6..65%
Goncalo Alvez	Astronium spp,	h.146	6..51%
Greenheart	Ocotea rodiaei	h.148	6..100%
Greenheart, Queensland	Endiandra compressa	h.149	7..100%
Group Spruce-Pine-Fir	Weichhölzergruppe / Softwood-Group	h.402	6..100%
Guarea, black	Guarea cedrata	h.68	7..100%
Guarea, white	Guarea cedrata	h.69	9..85%
Guariuba	Clarisia racemosa	h.150	8..70%
Gum, Black	Nyssa sylvatica	h.162	7..100%
Gum, Blue, Sidney	Eucalyptus saligna	h.152	7..100%
Gum, Blue, Southern	Eucalyptus globulus	h.151	6..100%
Gum, Grey	Eucalyptus punctata	h.153	5..100%
Gum, Grey, Mountain	Eucalyptus cytellocarpa	h.154	6..100%
Gum, Maiden's	Eucalyptus maidenii	h.155	7..100%
Gum, Manna	Eucalyptus viminalis	h.156	4..100%
Gum, Mountain	Eucalyptus dalrympleana	h.157	3..100%
Gum, Pink	Eucalyptus fasciculosa	h.158	6..100%
Gum, Red, American	Liquidambar styraciflua	h.166	5..100%
Gum, Red, Forest	Eucalyptus tereticomis	h.159	7..100%
Gum, Red, River	Eucalyptus camaldulensis	h.160	7..100%
Gum, Rose / Gum, Saligna	Eucalyptus grandis	h.161	7..100%
Gum, Shining	Eucalyptus nitens	h.163	5..100%
Gum, Spotted (Victoria) (Lemon-Scented)	Corymbia spp,	h.164	4..94%
Gum, Sugar	Eucalyptus cladocalyx	h.165	6..100%
Gum, White Dunn's	Eucalyptus dunnii	h.167	4..93%
Gum, Yellow	Eucalyptus leucoxylon	h.168	7..94%
Handlewood, Grey	Aphanante phillipinensis	h.169	5..84%
Handlewood, White	Strobilulus pendulinus	h.170	7..72%
Hardwood, Johnstone River	Bakhouisia bancroftii	h.171	5..78%
Hemlock / Hemlock, Western	Tsuga heterophylla	h.172	8..67%
Hemlock, Chinesische	Tsuga chinensis	h.173	5..98%
Hevea	Hevea Brasiliensis	h.174	7..92%
Hickory	Carya spp.	h.175	6..89%
Hollywood, Yellow	Premna lignum-vitae	h.176	7..86%
Horizontal	Anodopetalum biglandulosum	h.177	7..100%
Incensewood	Pseudocarapa nitidula	h.178	8..73%

Iroko	<i>Chlorophora excelsa</i>	h.179	7..54%
Ironbark, Grey	<i>Eucalyptus drepanophylla</i>	h.180	7..100%
Ironbark, Grey	<i>Eucalyptus paniculata</i>	h.181	5..100%
Ironbark, Red	<i>Eucalyptus sideroxylon</i>	h.182	8..100%
Ironbark, Red, Broad Leaved	<i>Eucalyptus fibrosa</i>	h.183	8..100%
Ironbark, Red, Narrow Leaved	<i>Eucalyptus cerbra</i>	h.184	5..100%
Jarrah	<i>Eucalyptus marginata</i>	h.185	5..100%
Jelutong	<i>Dyera costulata</i>	h.186	0..100%
Jequitiba	<i>Cariniana</i> spp,	h.187	5..81%
Kahikatea (New Zealand) (Boron)	<i>Dacrycarpus docrydioides</i>	h.188	7..80%
Kahikatea (New Zealand) (Thanalith)	<i>Dacrycarpus docrydioides</i>	h.189	6..94%
Kahikatea (New Zealand) (untreated)	<i>Dacrycarpus docrydioides</i>	h.190	6..96%
Kamarere (Fiji)	<i>Eucalyptus deglupta</i>	h.191	5..83%
Kamarere (New Guinea)	<i>Eucalyptus deglupta</i>	h.192	5..100%
Kapur	<i>Dryobalanops</i> spp,	h.193	7..94%
Karri	<i>Eucalyptus diversicolor</i>	h.194	5..100%
Kauceti	<i>Kermadecia vitiensis</i>	h.200	4..71%
Kauri	<i>Agathis australis</i> , <i>boroneensis</i>	h.201	5..100%
Keledang	<i>Artocarpus lanceifolius</i>	h.202	0..100%
Kempas	<i>Koomapassia excelsa</i>	h.203	4..100%
KerANJI (Malaysia)	<i>Dialium platysepalum</i>	h.204	5..60%
Keruing	<i>Dipterocarpus</i> spp,	h.205	6..81%
Kiso	<i>Chisocheton schumannii</i>	h.218	6..65%
Lacewood, Yellow	<i>Polyalthia oblongifolia</i>	h.219	5..87%
Laran	<i>Anthocephalus chinensis</i>	h.223	7..85%
Larch	<i>Larix decidua</i>	h.221	5..88%
Larch, American / Larch, Western	<i>Larix occidentalis</i>	h.220	5..100%
Larch, Japanese	<i>Larix kaempferi</i>	h.222	5..100%
Lauan, Red	<i>Shorea negrosensis</i>	h.224	5..78%
Leatherwood	<i>Eucryphia lucida</i>	h.225	6..100%
Lightwood	<i>Acacia implexa</i>	h.226	7..78%
Limba	<i>Terminalia superba</i>	h.227	6..70%
Lime, European	<i>Tilia vulgaris</i>	h.229	4..100%
Louro, Red	<i>Ocotea rubra</i>	h.231	5..99%
Macadamia	<i>Floyda praealta</i>	h.232	7..74%
Magnolia	<i>Magnolia acuminata/grandiflora</i>	h.233	6..100%
Mahogany, Brush	<i>Geissos benthamii</i>	h.242	7..70%
Mahogany, Miva	<i>Dysoxylum muelleri</i>	h.243	8..94%
Mahogany, New Guinea	<i>Dysoxylum</i> spp,	h.241	6..95%
Mahogany, Red	<i>Eucalyptus botryoides</i>	h.244	7..100%
Mahogany, Rose	<i>Dysoxylum fraserianum</i>	h.245	7..83%
Mahogany, Southern	<i>Eucalyptus botryoides</i>	h.246	5..100%
Mahogany, White	<i>Eucalyptus acmenoides</i>	h.247	6..100%
Mahogony Khaya	<i>Khaya</i> spp,	h.235	7..100%
Mahogony, American	<i>Swietenia</i> spp,	h.234	6..100%
Mahogony, Phillipines	<i>Parashorea plicata</i>	h.236	5..100%
Mahogony, Phillipines	<i>Shorea almon</i>	h.237	4..86%
Mahogony, Sapelli / Sapele	<i>Entandrophragma cylindricum</i>	h.238	5..100%
Mahogony, Sipo / Utile	<i>Entandrophragma utile</i>	h.239	6..100%
Mahogony, Tiama / gedu nohor	<i>Entandrophragma angolense</i>	h.240	10..66%
Mako	<i>Trischospermum richii</i>	h.248	3..87%
Makoré	<i>Thieghemmella africana</i>	h.123	6..100%

Makoré	<i>Thieghemella heckelii</i>	h.249	7..100%
Malas	<i>Homalium foetidum</i>	h.250	5..92%
Malletwood	<i>Rhodamnia argentea</i>	h.251	5..87%
Malletwood, Brown	<i>Rhodamnia rubescens</i>	h.252	5..91%
Manggachapui	<i>Hopea acuminata</i>	h.253	6..100%
Mango	<i>Mangifera minor</i>	h.254	4..87%
Mango, Phillipines	<i>Mangifera altissima</i>	h.255	7..100%
Mangosteen (Fiji)	<i>Garcinia myrtifolia</i>	h.256	5..87%
Mangrove, Cedar	<i>Xylocarpus australasicus</i>	h.257	6..100%
Maniltoa (Fiji)	<i>Maniltoa grandiflora</i>	h.258	6..72%
Maniltoa (New Guinea)	<i>Maniltoa pimenteliana</i>	h.259	6..72%
Mansonia	<i>Mansonia altissima</i>	h.260	7..100%
Maple, New Guinea	<i>Flindersia pimentelianan</i>	h.261	6..100%
Maple, Queensland	<i>Flindersia brayleyana</i>	h.262	5..100%
Maple, Rose	<i>Cryptocarya erythroxylon</i>	h.263	6..80%
Maple, Scented	<i>Flindersia laeviscarpa</i>	h.264	7..70%
Mararie	<i>Pseudoweinmannia lanchanocarpa</i>	h.265	8..97%
Marri	<i>Eucalyptus calophylla</i>	h.266	5..81%
Masiratu	<i>Degeneria vitiensis</i>	h.267	5..86%
Massandaruba	<i>Manilkara kanosiensis</i>	h.268	4..83%
Matai	<i>Podocarpus spicatus</i>	h.269	6..95%
Mengkulang	<i>Heritiera</i> spp,	h.270	5..85%
Meranti, Buik from 1999	<i>Shorea platyclados</i>	h.271	4..76%
Meranti, Dark Red	<i>Shorea</i> spp,	h.272	5..100%
Meranti, Nemesu from 1999	<i>Shorea pauciflora</i>	h.274	4..100%
Meranti, Seraya from 1999	<i>Shura curtisii</i>	h.275	5..78%
Meranti, Tembaga from 1999	<i>Shorea leprosula</i>	h.276	3..93%
Meranti, White	<i>Shorea hypochra</i>	h.277	4..100%
Meranti, Yellow	<i>Shorea multiflora</i>	h.273	0..100%
Merawan	<i>Hopea sulcala</i>	h.278	4..100%
Merbau	<i>Intsia</i> spp,	h.279	6..100%
Mersawa	<i>Anisoptera laevis</i>	h.280	4..100%
Messmate	<i>Eucalyptus obliqua</i>	h.281	8..97%
Moabi	<i>Baillonella toxisperma</i>	h.282	6..100%
Mora	<i>Mora excelsa</i>	h.283	5..73%
Moustiquaire	<i>Cryptocarya</i> spp,	h.284	4..100%
Musizi	<i>Maesopsis eminii</i>	h.286	7..100%
Neuburgia	<i>Neuburgia collina</i>	h.287	7..98%
Nutmeg (Fiji)	<i>Myrstica</i> spp,	h.290	5..95%
Nutmeg (New Guinea)	<i>Myrstica buchneriana</i>	h.291	5..100%
Nyatoh	<i>Palaquium</i> spp,	h.292	4..92%
Oak, European	<i>Quercus robur</i> L.,	h.126	4..100%
Oak, Japanese	<i>Quercus</i> spp,	h.127	4..100%
Oak, New Guinea	<i>Castanopsis acuminatissima</i>	h.293	4..100%
Oak, Red	<i>Quercus</i> spp,	h.128	5..100%
Oak, Silky, Fishtail	<i>Neorites kevediana</i>	h.294	3..74%
Oak, Silky, Northern	<i>Cardwellia sublimia</i>	h.295	5..100%
Oak, Silky, Red	<i>Stenocarpus salignus</i>	h.296	6..86%
Oak, Silky, Southern	<i>Grevillea robusta</i>	h.297	5..81%
Oak, Silky, White	<i>Stenocarpus sinuatus</i>	h.298	6..82%
Oak, Tasmanian	<i>Eucalyptus regnans</i>	h.299	7..100%
Oak, Tulip, Blush	<i>Argyrodendron actinophyllum</i>	h.300	6..75%
Oak, Tulip, Brown	<i>Argyrodendron trifoliolatum</i>	h.301	9..75%
Oak, Tulip, Red	<i>Argyrodendron peralatum</i>	h.302	9..100%
Oak, Tulip, White	<i>Petrygota horsfieldii</i>	h.303	5..88%
Oak, White-	<i>Quercus</i> spp,	h.129	5..100%
Obah	<i>Eugenia</i> spp,	h.304	5..84%

Obeche	Triplochiton scleroxylon	h.1	5..60%
Odoko	Scottellila coriancea	h.305	6..93%
Olive	Olea hochstetteri	h.306	7..100%
Olivillo	Atextoxicon punctatum	h.307	5..90%
Opepe	Nauclea diderichii	h.52	7..95%
Padauk, African	Pterocarpus soyauxii	h.308	4..100%
Palachonella, Fijian	Planchonella vitiensis	h.347	6..77%
Palachonella, New Guinea	Planchonella kaernbachiana	h.348	4..92%
Palachonella, New Guinea	Planchonella thyrsoides	h.349	2..85%
Palachonella, Solomon Island	Planchonella papuana	h.350	4..70%
Paldao	Dracontomelum dao	h.309	4..100%
Panga Panga	Milletia stuhlmannii	h.312	6..52%
Papuacedrus	Papuacedrus papuana	h.314	6..100%
Parinari, Fijian	Oarinari insularum	h.315	4..100%
Penarahan	Myristica iners	h.316	6..100%
Peppermint, Broad-Leaved	Eucalyptus dives	h.317	6..100%
Peppermint, Narrow-Leaved	Eucalyptus australiana	h.318	8..98%
Peroba, White	Paratecoma peroba	h.319	7..75%
Persimmon	Diospyros pentamera	h.320	5..90%
Perupok (Malaysia)			
Perupok (Malaysia)	Lophopetalum subovatum		
Pillarwood	Cassipourea malosana		
Pine / Pine, Stone	Pinus pinea	h.345	6..100%
Pine, Aleppo	Pinus halepensis	h.324	8..98%
Pine, Austrian	Pinus nigra	h.212	5..100%
Pine, Beneguet	Pinus kesya	h.325	8..100%
Pine, Black	Prumnopitys amarus	h.326	5..98%
Pine, Bunya	Pinus bidwillii	h.327	8..88%
Pine, Canary Island	Pinus canariensis	h.328	6..100%
Pine, Celery-Top	Phyllocladus aspenifolius	h.329	7..92%
Pine, Hoop	Araucaria cunninghamii	h.330	7..100%
Pine, Huon	Dacrydium franklinii	h.331	8..90%
Pine, King William	Athrotaxis selaginoides	h.332	7..85%
Pine, Klinki	Araucaria hunsteinii	h.333	4..100%
Pine, Loblolly-	Pinus taeda	h.209	5..100%
Pine, Longpole-	Pinus contorta	h.207	5..100%
Pine, Maritime	Pinus pinaster	h.334	8..96%
Pine, Parana Red	Araucaria angustifolia	h.335	6..43%
Pine, Parana White	Araucaria angustifolia	h.336	7..72%
Pine, Pitch-, american	Pinus palustris	h.211	6..83%
Pine, Pitch-, caribbean	Pinus caribaea	h.210	6..100%
Pine, Radiata	Pinus radiata	h.337	5..100%
Pine, Radiata (New Zealand) (sapwood aac)	Pinus radiata	h.338	7..100%
Pine, Radiata (New Zealand) (sapwood boliden)	Pinus radiata	h.339	6..100%
Pine, Radiata (New Zealand) (sapwood boron)	Pinus radiata	h.340	6..89%
Pine, Radiata (New Zealand) (sapwood tanalith)	Pinus radiata	h.341	5..95%
Pine, Radiata (New Zealand) (sapwood untreated)	Pinus radiata	h.342	5..100%
Pine, Red	Pinus resinosa	h.343	2..100%
Pine, Scotts	Pinus sylvestris L.	h.206	6..100%
Pine, Shortleaf	Pinus echinata	h.213	5..100%
Pine, Slash (Queensland)	Pinus elliotii	h.344	6..100%
Pine, Southern	Pinus echinata	h.214	5..100%

Pine, Southern, yellow / Pine, Ponderosa	Pinus ponderosa	h.208	5..100%
Pine, Sugar	Pinus lambertiana	h.215	4..100%
Pine, western white	Pinus monticola	h.406	5..100%
Pittosporum (Tasmania)	Pittosporum bicolor	h.346	4..100%
Planchonia	Pleigynium timorense	h.351	5..95%
Pleigynium / Podo	Podocarpus neriifolia	h.352	7..71%
Podocarp, Fijian	Decussocarpus vitiensis	h.353	6..100%
Podocarp, Red	Euroschinus falcata	h.354	6..100%
Poplar, Black	Populus nigra	h.313	4..100%
Poplar, Pink	Euroschinus falcata	h.355	6..85%
Quandong, Brown	Eurocarpus coorangooloo	h.356	5..97%
Quandong, Silver	Elaeocarpus angustifolius	h.357	5..82%
Quandong, Solomon Island	Elaeocarpus spaericus	h.358	3..85%
Qumu	Acacia Richii	h.359	5..86%
Raintree (Fiji)	Samanea saman	h.360	5..57%
Ramin	Gonystylus spp.	h.361	6..67%
Redwood / Sequoia	Sequoia sempervirens	h.362	5..100%
Rengas	Gluta spp.	h.363	4..100%
Resak (Malaysia)	Cotylelobium melanoxylon	h.364	3..100%
Rimu (non-truewood boron)	Dacrydium cupresinum	h.365	7..82%
	Dacrydium cupresinum	h.366	7..82%
Rimu (non-truewood untreated)	Dacrydium cupresinum	h.367	8..88%
Rimu (truewood untreated)	Dacrydium cupresinum	h.368	8..50%
Robinia	Robinia pseudoacacia	h.369	2..92%
Roble Pellin	Nothofagus obliqua	h.370	6..93%
Rock maple	Acer saccharum	h.6	5..100%
Rosewood, Brazilian	Dalbergia nigra	h.311	5..72%
Rosewood, Indian	Dalbergia latifolia	h.310	4..100%
Rosewood, New Guinea	Pterocarpus indicus	h.371	5..84%
Rosewood, Phillippines	Pterocarpus indicus	h.372	10..66%
Sapupira	Hymenolobium excelsum	h.375	5..87%
Sasauria (Fiji)	Dysoxylum quercifolium	h.376	4..89%
Sassafras	Doryphora sassafras	h.377	6..90%
Sassafras, Southern	Atherosperma moschatum	h.378	7..84%
Satinash, Blush	Acmena Hemilampra	h.379	3..100%
Satinash, Grey	Syzygium gustavioides	h.380	5..100%
Satinash, New Guinea	Syzygium butternanum	h.381	5..87%
Satinash, Rose	Syzygium francisii	h.382	5..73%
Satinay	Syncarpia hillei	h.383	4..100%
Satinbox	Phenbalium saquameum	h.384	5..100%
Satinheart, Green	Geijera salicifolia	h.385	8..62%
Satinwood, Tulip	Rhodospaera rhodanthema	h.386	6..100%
Scentbark	Eucalyptus aromapholia	h.387	5..90%
Schizomeria, New Guinea	Schizomeria serrata	h.388	5..100%
Schizomeria, Solomon Island	Schizomeria serrata	h.389	4..74%
Sepetir	Sindora coriacea	h.390	1..100%
Sheoak, Fijian Beach	Casuarina nodiflora	h.391	6..91%
Sheoak, River	Casuarina cunninghamiana	h.392	7..74%
Sheoak, Rose	Casuarina torulosa	h.393	8..72%
Sheoak, Western Australia	Allocasuarina fraserana	h.394	7..80%
Silkwood, Bolly	Cryptocarya ablata	h.395	8..64%
Silkwood, Silver	Flindersia acuminata	h.396	7..92%

Simpoh (Phillippines)	Dillenia philippinensis	h.397	5..100%
Sirus, White	Ailanthus peekelii	h.398	5..97%
Sirus, White	Ailanthus triphysa	h.399	7..90%
Sloanea	Sloanea spp,	h.400	5..100%
Soft wood chips		h.461	4..100%
Spondias	Spondias mariana	h.401	4..93%
Spruce, European	Picea abies Karst.	h.136	6..100%
Spruce, Norway /Norway Spruce	Picea abies	h.137	6..100%
Spruce, Sitka	Picea sitchensis	h.138	5..100%
Sterculia, Brown	Sterculia spp,	h.230	4..100%
Stringybark, Brown	Eucalyptus capitellata	h.403	6..100%
Stringybark, Darwin	Eucalyptus tetrodonta	h.404	5..100%
Stringybark, Yellow	Eucalyptus muelleriana	h.405	9..100%
Suren	Toona cilata	h.407	6..100%
Sweet chestnut	Castanea sativa	h.199	2..100%
Sycamore	Acer pseudoplatanus	h.5	7..70%
Sycamore, Satin	Ceratopetalum succirubrum	h.408	7..80%
Tallowwood	Eucalyptus microcoris	h.409	4..100%
Tatajuba	Bagassa guianensis	h.30	7..50%
Taun Maleisien	Pometia pinnata	h.195	0..100%
Taun New Guinea	Pometia pinnata	h.196	6..100%
Taun Phillipines	Pometia pinnata	h.197	7..100%
Taun Solomon Island	Pometia pinnata	h.198	4..90%
Tawa	Beilschmiedia tawa	h.415	8..62%
Tawa (sap & heart boron)	Beilschmiedia tawa	h.416	6..77%
Tawa (sap & heart untreated)	Beilschmiedia tawa	h.417	7..82%
Teak	Tectona grandis	h.418	6..100%
Terap	Artocarpus elasticus	h.419	2..100%
Terentang	Camposperma brevipetiolata	h.420	5..100%
Terminalia Braun	Terminalia microcarpa	h.421	3..91%
Terminalia Gelb	Terminalia complanata	h.422	3..100%
Tetrameles	Tetrameles nudiflora	h.423	5..91%
Tingle, Red	Eucalyptus jacksonii	h.424	5..100%
Tingle, Yellow	Eucalyptus guilfolei	h.425	5..100%
Tomillo	Cedrelinga catenaeformis	h.427	5..92%
Totara	Podocarpus totara	h.428	7..80%
Touriga, Red	Calophyllum constatum	h.429	8..95%
Tristiropsis, New Guinea	Tristiropsis canarioides	h.430	6..90%
Tulipwood	Harpullia pendula	h.432	7..99%
Turat	Eucalyptus gomophocephala	h.431	7..91%
Turpentine	Syncarpia glomulifera	h.433	5..100%
Vaivai-Ni-Veikau	Serianthes myriadenia	h.434	5..77%
Vatica, Phillipines	Vatica, manggachopi	h.435	7..79%
Vitex, New Guinea	Vitex cofassus	h.436	5..100%
Vuga	Metrosideros collina	h.437	6..68%
Vutu	Barringtonia edulis	h.438	4..67%
Walnut, American	Juglans nigra	h.288	5..100%
Walnut, Blush	Beilschmiedia obtusifolia	h.439	8..81%
Walnut, European	Juglans regia	h.289	7..74%

Walnut, Queensland	Endiandra palmerstonii	h.440	6..100%
Walnut, Rose	Endiandra muelleri	h.441	3..100%
Walnut, White	Cryptocarya obovata	h.442	7..79%
Walnut, Yellow	Beilschmiedia bancroftii	h.443	5..84%
Wandoo	Eucalyptus wandoo	h.444	7..100%
Wattle, Hickory	Acacia penninervis	h.445	7..81%
Wattle, Silver	Acacia dealbata	h.446	7..95%
Wengé	Millettia laurentii	h.448	7..67%
Western Red Cedar	Thuja plicata	h.449	6..69%
Whitewood, American	Liriodendron tulipifera	h.447	5..100%
Woolybutt	Eucalyptus longifolia	h.450	7..100%
Yaka	Dacrydium nausoriensis/nidilum	h.451	6..88%
Yasi-Yasi I (Fiji)	Syzygium effusum	h.452	4..92%
Yasi-Yasi II (Fiji)	Syzygium spp,	h.453	5..100%
Yate	Eucalyptus cornuta	h.454	6..94%
Yertschuk	Eucalyptus considenia	h.455	7..100%

12 Appendix B: Additional materials

Select material you want to measure, enter number on the device, e.g. concrete b25 = b. 6

12.1 Measuring of building materials

Material	Number	Range
Concrete		
Concrete 200kg/m ³ B15 (200 kg concrete per 1m ³ sand)	b. 5	0,7..3,3%
Concrete 350kg/m ³ B25 (350 kg concrete per 1m ³ sand)	b. 6	1,1..3,9%
Concrete 500kg/m ³ B35 (500 kg concrete per 1m ³ sand)	b. 7	1,4..3,7%
gas-aerated concrete (Hebel)	b. 9	1,6..100,0%
gas-aerated concrete (Ytong PPW4, gross density 0,55)	b. 27	1,6..53,6%
Screed		
Anhydrite screed AE, AFE	b. 1	0,0..30,3%
Ardurapid screed-concrete	b. 2	0,6..3,4%
Elastizell screed	b. 8	1,0..24,5%
Screed-plaster	b. 11	0,4..9,4%
Wood-concrete screed	b. 13	5,3..20,0%
Screed-concrete ZE, ZFE without additives	b. 21	0,8..4,6%
Screed-concrete ZE, ZFE with bitumen additives	b. 22	2,8..5,5%
Screed-concrete ZE, ZFE with synthetic additives	b. 23	2,4..11,8%
Miscellaneous		
Asbestous cement panels	b. 3	4,7..34,9%
Bricks clay bricks	b. 4	0,0..40,4%
Plaster	b. 10	0,3..77,7%
Plaster synthetic	b. 12	18,2..60,8%
On-wall plaster	b. 20	0,0..38,8%
Lime mortar KM 1:3	b. 14	0,4..40,4%
Lime sand bricks (14 DF (200), gross density 1,9)	b. 28	0,1..12,5%
Limestone	b. 15	0,4..29,5%
MDF	b. 16	3,3..52,1%
Cardboard	b. 17	9,8..100,0%
Stone-timber	b. 18	10,5..18,3%
Polystyrene	b. 25	3,9..50,3%
soft-fibre-panel-wood, bitumen	b. 26	0,0..71,1%
Concrete mortar ZM 1:3	b. 19	1,0..10,6%
Concrete bounded fake boards	b. 24	3,3..33,2%

The accuracy of measuring building materials depends on manufacturing and using. The used additives may vary from manufacturer to manufacturer, therefore deviating measure results may occur. The given measuring-range is the theoretically measurable range.

12.2 Estimation of additional materials

Following materials may be well estimated with the help of the device, but you won't reach such high accuracy than with materials listed in appendix A and B.

Material	Number	Comment
Cork	h. A	
Fibre board	h. C	
Wood fibre insulating wall panel	h. C	
Wood fibre hard disks	h. C	
Kauramin-fake boards	h. C	
Melamine-fake boards	h. A	
Paper	h. C	
Phenolic resin-fake boards	h. A	
Textiles	h. C (D)	