

Timber structures — Strength graded structural timber with rectangular cross section

Part 4: Machine grading — Grading machine settings for machine controlled systems

ICS 79.040; 79.120.10

National foreword

This British Standard is the UK implementation of EN 14081-4:2009. It supersedes BS EN 14081-4:2005 which is withdrawn.

The UK participation in its preparation was entrusted to Technical Committee B/518, Structural timber.

A list of organizations represented on this committee can be obtained on request to its secretary.

This publication does not purport to include all the necessary provisions of a contract. Users are responsible for its correct application.

Compliance with a British Standard cannot confer immunity from legal obligations.

This British Standard was published under the authority of the Standards Policy and Strategy Committee on 31 July 2009

© BSI 2009

ISBN 978 0 580 64314 9

Amendments/corrigenda issued since publication

Date	Comments

EUROPEAN STANDARD
NORME EUROPÉENNE
EUROPÄISCHE NORM

EN 14081-4

May 2009

ICS 79.040; 79.120.10

Supersedes EN 14081-4:2005+A4:2008

English Version

**Timber structures - Strength graded structural timber with
rectangular cross section - Part 4: Machine grading - Grading
machine settings for machine controlled systems**

Structures en bois - Bois de structure de section
rectangulaire classé selon la résistance - Partie 4:
Classement par machine - Réglages pour les systèmes de
contrôle par machine

Holzbauwerke - Nach Festigkeit sortiertes Bauholz für
tragende Zwecke mit rechteckigem Querschnitt - Teil 4:
Maschinelle Sortierung - Einstellungen von
Sortiermaschinen für maschinenkontrollierte Systeme

This European Standard was approved by CEN on 7 April 2009.

CEN members are bound to comply with the CEN/CENELEC Internal Regulations which stipulate the conditions for giving this European Standard the status of a national standard without any alteration. Up-to-date lists and bibliographical references concerning such national standards may be obtained on application to the CEN Management Centre or to any CEN member.

This European Standard exists in three official versions (English, French, German). A version in any other language made by translation under the responsibility of a CEN member into its own language and notified to the CEN Management Centre has the same status as the official versions.

CEN members are the national standards bodies of Austria, Belgium, Bulgaria, Cyprus, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Norway, Poland, Portugal, Romania, Slovakia, Slovenia, Spain, Sweden, Switzerland and United Kingdom.



EUROPEAN COMMITTEE FOR STANDARDIZATION
COMITÉ EUROPÉEN DE NORMALISATION
EUROPÄISCHES KOMITEE FÜR NORMUNG

Management Centre: Avenue Marnix 17, B-1000 Brussels

© 2009 CEN All rights of exploitation in any form and by any means reserved
worldwide for CEN national Members.

Ref. No. EN 14081-4:2009: E

Contents

Page

Foreword	3
1 Scope	4
2 Normative references	4
3 Terms and definitions	4
4 Symbols	4
5 Settings for timber strength grading machines	5
Table 1 - Settings for Cook Bolinder (Tecmach) machine types SG-AR, SG-AF and SG-TF	6
Table 2 - Settings for Computermatic and Micromatic machines	9
Table 3 - Settings for Raute Timgrader machines (Model given in TG1/1007/06)	13
Table 4 - Settings for Euro-GreComat 702 (Model given in TG1/0107/08)	14
Table 5 - Settings for GoldenEye 702 (Model given in TG1/1005/08 for GB & IE; TG1/1005/09Rev for DE, AT & CZ)	15
Table 6 - Settings for Euro-GreComat 704 (Model given in TG2/0103/02)	25
Table 7 - Settings for Dynagrade machine (including HC and XHC)	27
Table 8 - Settings for ViSCAN machine (Model given in TG1/1005/03)	35
Table 9 - Settings for EuroGreComat 706 (Model given in TG1/0107/09)	45
Table 10 - Settings for GoldenEye 706 (Model given in TG1/1005/04Rev2)	46
Table 11 - Settings for Timber Grader MTG with connected balance (Model given in TG1/0307/05)	57
Table 12 - Settings for Precigrader machine	60
Table 13 - Settings for Grademaster (Model given in TG1/1007/13Rev)	64
Table 14 - Settings for E-scan machine (Model given in TG1/0508/17Rev)	65
Table 15 - Settings for Triomatic machine (Model given in TG1/0508/14Rev)	66
Bibliography	69

Foreword

This document (EN 14081-4:2009) has been prepared by Technical Committee CEN/TC 124 “Timber structures”, the secretariat of which is held by SFS.

This European Standard shall be given the status of a national standard, either by publication of an identical text or by endorsement, at the latest by November 2009, and conflicting national standards shall be withdrawn at the latest by November 2009.

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. CEN [and/or CENELEC] shall not be held responsible for identifying any or all such patent rights.

This document supersedes EN 14081-4:2005+A4:2008.

Other parts of this European Standard are

EN 14081-1, *Timber structures - Strength graded structural timber with rectangular cross section - Part 1: General requirements*

EN 14081-2, *Timber structures - Strength graded structural timber with rectangular cross section - Part 2: Machine Grading; additional requirements for initial type testing*

EN 14081-3, *Timber structures - Strength graded structural timber with rectangular cross section - Part 3: Machine Grading; additional requirements for factory production control*

According to the CEN/CENELEC Internal Regulations, the national standards organizations of the following countries are bound to implement this European Standard: Austria, Belgium, Bulgaria, Cyprus, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Norway, Poland, Portugal, Romania, Slovakia, Slovenia, Spain, Sweden, Switzerland and the United Kingdom.

1 Scope

This European Standard gives settings, derived according to the requirements given in EN 14081-2, for various combinations of strength classes or grades, grading machines and species from particular sources of growth. These settings are only applicable to timber from the sources indicated in the tables.

2 Normative references

The following referenced documents are indispensable for the application of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

EN 336, *Structural timber – Sizes, permitted deviations*

EN 14081-1:2005, *Timber structures - Strength graded structural timber with rectangular cross section - Part 1: General requirements*

EN 14081-2:2005, *Timber structures - Strength graded structural timber with rectangular cross section - Part 2: Machine Grading; additional requirements for initial type testing*

3 Terms and definitions

For the purposes of this document, the terms and definitions given in EN 14081-1:2005, EN 14081-2:2005 and the following apply.

3.1 Speed range

maximum and minimum throughput speeds appropriate to the critical speed for the derived settings (see 6.2.2 of EN 14081-2:2005).

4 Symbols

a	deflection (in mm)
b	width of timber cross section (in mm)
$E_{t,mean}$	characteristic mean tensile modulus of elasticity parallel to grain (in N/mm ²)
$E_{0,mean}$	characteristic mean bending modulus of elasticity parallel to grain (in N/mm ²)
E_{dyn}	value of dynamic modulus of elasticity (in N/mm ²)
E_{mod}	model value of modulus of elasticity (units as stated)
F	force (units as stated)
$f_{t,k}$	characteristic tensile strength (in N/mm ²)

$f_{m,k}$	characteristic bending strength (in N/mm^2)
f_{mod}	model value of strength (in N/mm^2)
I	indicating property (units as stated)
P	pressure (units as stated)
t	thickness of timber cross section (in mm)
v_c	conveyer speed (in m/sec)
ρ_k	characteristic value of density (in kg/m^3)
ρ_{mod}	model value of density (in kg/m^3)
subscripts	
n	for setting being calculated
a	actual size measured as the average dimension of a batch

5 Settings for timber strength grading machines

Tables 1 to 15 give settings for certain grades, timber species and types of grading machine.

The accepted grading machines and settings in this European Standard are based on initial type testing (ITT) and initial type calculation (ITC). When additional ITT and ITC documentation from the manufacturers has been evaluated by CEN/TC124/TG1, the accepted values are given in an ITT report, which is the basis for certification by the Notified Bodies overseeing the producers' factory production control (FPC). Those ITT reports may be used as ITT documentation before the information they contain becomes available in an amendment or revision of this European Standard, EN 14081-4.

Table 1-1 - Settings for Cook Bolinder (Tecmach) machine types SG-AR, SG-AF and SG-TF

Source country or countries	Source mark ^{a)}	Species	Permitted timber sizes ^{b)} (mm)	Grade ^{c)} or grade combination	Model value Force <i>F</i> (kN)	Comments and additional requirements
UK Ireland	GB IE	Spruce	$35 \leq t_n \leq 75$	C24	2,68	Requirements for grading: - Air temperature between +10°C and +35°C - Relative humidity in the air: <= 85 % - Timber temperature: >= -10 °C - Timber mean moisture content: > 10 % - Maximum feed speed: 150 m/min The following equations shall be used to calculate settings for the target size <i>b_n</i> x <i>t_n</i> . (Note. For timber with a thickness to tolerance class 1, i.e. sawn, <i>t_n</i> in the following equations is the target <i>t_n</i> + 1 mm).
		<i>Picea abies</i>	$60 \leq b_n \leq 300$	C16	2,27	
		<i>Picea sitchensis</i>		C16	1,24	
		Pine	$35 \leq t_n \leq 75$	C24	2,79	
Chile	CL	<i>Pinus nigra</i>	$60 \leq b_n \leq 300$	C16	1,91	$a_n = 830,7 t_n^{-1,299}$ (mm) $P_n = 4,412 F_n / t_n^{0,61}$ (bar) $F_n = \frac{F b_n t_n^{1,701}}{(413,9 t_n + 57273)}$ (kN)
		<i>Pinus sylvestris</i>		C16	1,34	
		Radiata pine	$35 \leq t_n \leq 50$	C27	3,03	
		<i>Pinus radiata</i>	$60 \leq b_n \leq 300$	C16	1,43	
		C24		2,32		
				C16	2,09	
				C16	0,92	

^{a)} See Clause 7.3 in EN 14081-1:2005

^{b)} Timber sizes shall be to EN 336

^{c)} Grades prefixed by C are strength classes given in EN 338

Table 1-2 - Settings for Cook Bolinder (Tecmach) machine types SG-AR, SG-AF and SG-TF (continued)

Source country or countries	Source mark ^{a)}	Species	Permitted timber sizes ^{b)} (mm)	Grade ^{c)} or grade combination	Model value f_{mod}	Comments and adjustments for size
Estonia Finland Latvia Norway Russia ^{d)} Sweden Poland	EE FI LV NO RU SE PL	Spruce <i>Picea abies</i>	$30 \leq t_n \leq 75$ $60 \leq b_n \leq 300$	C18 C24 C27 C30 C35 C24	20,8 20,8 21,8 28,5 46,5 20,0	Requirements for grading: - Air temperature between +10°C and +35°C - Relative humidity in the air: <= 85 % - Timber temperature: >= -10 °C - Timber mean moisture content: > 10 % - Maximum feed speed: 150 m/min
Finland Norway Sweden Latvia	FI NO SE LV	Pine <i>Pinus sylvestris</i>		C40 C30 C18	54,5 30,6 23,8	The following equations shall be used to calculate settings for the target size $b_n \times t_n$. (Note. For timber with a thickness to tolerance class 1, i.e. sawn, t_n in the following equations is the target $t_n + 1$ mm). $P_n = 4,412 F_n / t_n^{0,61}$ (bar) $F_n = (5,5 I_n a_n b_n t_n^3) 10^{-12}$ (kN) $a_n = 830,7 t_n^{-1,299}$ (mm) $I_n = \left[\frac{4228}{t_n^{0,22} b_n^{0,24}} \right] f_{\text{mod}}^{0,79}$

^{a)} See Clause 7.3 in EN 14081-1:2005

^{b)} Timber sizes shall be to EN 336

^{c)} Grades prefixed by C are strength classes given in EN 338

^{d)} Settings apply only to timber grown west of the Ural mountain range and north of the 55^o line of latitude in Russia

Table 1-3 - Settings for Cook Bolinder (Tecmach) machine types SG-AR, SG-AF and SG-TF (continued)

Source country or countries	Source mark ^{a)}	Species	Permitted timber sizes ^{b)} (mm)	Grade ^{c)} or grade combination	Model value Force F (kN)	Comments and adjustments for size
Spain	ES	Scots pine <i>Pinus sylvestris</i>	$35 \leq t_n \leq 75$ $60 \leq b_n \leq 300$	C27 C16	2,84 1,71	Requirements for grading: - Air temperature between +10°C and +35°C - Relative humidity in the air: $\leq 85\%$ - Timber temperature: $\geq -10\text{ °C}$ - Timber mean moisture content: $> 10\%$ - Maximum feed speed: 100 m/min The following equations shall be used to calculate settings for the target size $b_n \times t_n$. (Note. For timber with a thickness to tolerance class 1, i.e. sawn, t_n in the following equations is the target $t_n + 1$ mm). $a_n = 830,7 t_n^{-1,299} \quad (\text{mm})$ $P_n = 4,412 F_n / t_n^{0,61} \quad (\text{bar})$ $F_n = \frac{F b_n t_n^{1,701}}{(413,9 t_n + 57273)}$
Spain	ES	Corsican pine <i>Pinus nigra</i>	$40 \leq t_n \leq 70$ $100 \leq b_n \leq 200$	C30 C18	Not relevant as all settings shall be calculated using equations in comments column	Requirements for grading: - Air temperature between +10°C and 35°C - Relative humidity in the air: $< 85\%$ - Timber temperature: $> -10\text{ °C}$ - Timber mean moisture content: $> 10\%$ - Maximum feed speed: 100 m/min The following equations shall be used to calculate settings for the target size $b_n \times t_n$. (Note. For timber with a thickness to tolerance class 1, i.e. sawn, t_n in the following equations is the target $t_n + 1$ mm). $a_n = 830,7 t_n^{-1,299} \quad (\text{mm})$ $P_n = 4,412 F_n / t_n^{0,61} \quad (\text{bar})$ $F_{n\text{C30}} = (96,2979 - 0,489321 t_n) a_n b_n t_n^3 / (1,3189433 \cdot 10^9)$ $F_{n\text{C18}} = (54,4979 - 0,489321 t_n) a_n b_n t_n^3 / (1,3189433 \cdot 10^9)$
^{a)} See Clause 7.3 in EN 14081-1:2005 ^{b)} Timber sizes shall be to EN 336 ^{c)} Grades prefixed by C are strength classes given in EN 338						

Table 2-1 -Settings for Computermatic and Micromatic machines

Source country or countries	Source mark ^{a)}	Species	Permitted timber sizes ^{b)} (mm)	Grade ^{c)} or grade combination	Model value Deflection a (mm)	Comments and additional requirements
UK Ireland	GB IE	Spruce <i>Picea abies</i> <i>Picea sitchensis</i>	$35 \leq t_n \leq 75$ $60 \leq b_n \leq 300$	C24	6,35	Requirements for grading: - Relative humidity in the air: $\leq 85\%$ - Timber temperature: $\geq -10\text{ °C}$ - Timber mean moisture content: $> 10\%$ - Maximum feed speed: 105 m/min The following equations shall be used to calculate settings for the target size $b_n \times t_n$. (Note. For timber with a thickness to tolerance class 1, i.e. sawn, t_n in the following equations is the target $t_n + 1$ mm). $F_n = 0,0101 b_n t_n^2 \quad (\text{N})$ $a_n = \frac{36,71a(0,00567t_n + 0,7846)}{t_n(0,9851 \times 10^{-5} t_n b_n + 0,91)} \quad (\text{Bits})$ Actual deflection settings are determined from $a_n/0,19$ rounded to the nearest whole number. Refer to calibration tables for machine to convert Force F_n to pressure setting
				C16	7,49	
		Pine <i>Pinus nigra</i> <i>Pinus sylvestris</i>	$35 \leq t_n \leq 75$ $60 \leq b_n \leq 300$	C24	6,10	
				C16	8,90	
Chile	CL	Radiata pine <i>Pinus radiata</i>	$35 \leq t_n \leq 50$ $60 \leq b_n \leq 300$	C27	5,62	
				C16	11,86	
				C24 C16	7,35 8,13	
				C16	18,52	
^{a)} See Clause 7.3 in EN 14081-1:2005 ^{b)} Timber sizes shall be to EN 336 ^{c)} Grades prefixed by C are strength classes given in EN 338						

Table 2-2 - Settings for Computermatic and Micromatic machines (*continued*)

Source country or countries	Source mark ^{a)}	Species	Permitted timber sizes ^{b)} (mm)	Grade ^{c)} or grade combination	Model value IP = f_{mod}	Comments and additional requirements
Norway	NO	Sitka spruce <i>Picea Sitchensis</i>	$33 \leq t_n \leq 53$ $88 \leq b_n \leq 218$	C30 C18	38,8 27,9	Requirements for grading: - Relative humidity in the air: $\leq 85 \%$ - Timber temperature: $\geq -10 \text{ }^{\circ}\text{C}$ - Timber mean moisture content: $> 10 \%$ - Maximum feed speed: 105 m/min The following equations shall be used to calculate settings for the target size $b_n \times t_n$ where b_n and t_n are target dimensions. Refer to calibration tables for machine to convert F_n to pressure setting. $F_n = 0,0101 \cdot b_n \cdot t_n^2 \quad (\text{N})$ $a_n = \frac{8063 \cdot t_n^{-0,814} \cdot b_n^{0,152}}{f_{\text{mod}} \cdot \left(1 - \frac{2,14 \cdot t_n^{0,186} \cdot b_n^{0,152}}{f_{\text{mod}}} \right)} \quad (\text{Bits})$ Actual deflection setting a_n shall be rounded to the nearest whole number of Bits (Bits are units of 0,19mm). If the actual thickness t_a exceeds the target thickness t_n by more than 1 mm then the pressure shall be increased by $\left(\frac{t_a}{t_n} \right)^3$
^{a)} See Clause 7.3 in EN 14081-1:2005 ^{b)} Timber sizes shall be to EN 336 ^{c)} Grades specified by C are strength classes given in EN 338						

Table 2-3 - Settings for Computermatic and Micromatic machines (continued)

Source country or countries	Source mark ^{a)}	Species	Permitted timber sizes ^{b)} (mm)	Grade ^{c)} or grade combination	Model value Deflection a (mm)	Comments and additional requirements
Finland Norway Sweden Estonia Latvia Russia ^{d)} Poland	FI NO SE ES LV RU PL	Spruce <i>Picea</i> <i>Abies</i>	$30 \leq t_n \leq 75$ $60 \leq b_n \leq 300$	C24 C27 C30 C35 C27 C16 C30 C18	9,82 6,21 4,75 3,40 5,85 8,92 4,75 9,82	Requirements for grading: - Relative humidity in the air: $\leq 85 \%$ - Timber temperature: $\geq -10 \text{ }^\circ\text{C}$ - Timber mean moisture content: $> 10 \%$ - Maximum feed speed: 105 m/min The following equations shall be used to calculate settings for the target size $b_n \times t_n$ where b_n and t_n are target dimensions. Refer to calibration tables for machine to convert F_n to pressure setting. $F_n = 0,0101 b_n t_n^2 \quad (\text{N})$ $a_n = \frac{50a}{t_n} \left(\frac{t_n}{50} \right)^{0,186} \left(\frac{b_n}{150} \right)^{-0,0901} / 0,19 \quad (\text{Bits})$ Actual deflection settings a_n shall be rounded to the nearest whole number of Bits (Bits are units of 0,19 mm). If the actual thickness t_a exceeds the target thickness t_n more than 1 mm then the pressure shall be increased by $\left(\frac{t_a}{t_n} \right)^3$
Finland Norway Sweden Latvia	FI NO SE LV	Pine <i>Pinus</i> <i>Sylvestris</i>		C30 C24 C18 C35 C24 C18 C40 C27	4,46 5,49 8,92 3,40 4,94 7,96 2,83 5,49	

^{a)} See Clause 7.3 in EN 14081-1:2005
^{b)} Timber sizes shall be to EN 336
^{c)} Grades specified by C are strength classes given in EN 338
^{d)} Settings apply only to timber grown west of the Ural mountain range and north of the 55° line of latitude in Russia

Table 2-4 - Settings for Computermatic and Micromatic machines (*continued*)

Source country or countries	Source mark ^{a)}	Species	Permitted timber sizes ^{b)} (mm)	Grade or grade combination	Model value Deflection a (mm)	Comments and additional requirements
Finland Norway Sweden Estonia Latvia Russia ^{c)} Poland	FI NO SE ES LV RU PL	Spruce <i>Picea</i> <i>Abies</i>	$30 \leq t_n \leq 75$ $60 \leq b_n \leq 300$	TR26	6,21	Requirements for grading: - Relative humidity in the air: $\leq 85\%$ - Timber temperature: $\geq -10\text{ °C}$ - Timber mean moisture content: $> 10\%$ - Maximum feed speed: 105 m/min The following equations shall be used to calculate settings for the target size $b_n \times t_n$ where b_n and t_n are target dimensions. Refer to calibration tables for machine to convert F_n to pressure setting. $F_n = 0,0101b_n t_n^2 \quad (\text{N})$ $a_n = \frac{50a}{t_n} \left(\frac{t_n}{50} \right)^{0,186} \left(\frac{b_n}{150} \right)^{-0,0901} / 0,19 \quad (\text{Bits})$ Actual deflection settings a_n shall be rounded to the nearest whole number of Bits (Bits are units of 0,19 mm). If the actual thickness t_a exceeds the target thickness t_n more than 1 mm then the pressure shall be increased by $\left(\frac{t_a}{t_n} \right)^3.$ TR26 is a UK grade for trussed rafters. Its primary characteristic values are: $f_{m,k} = 28,3 \text{ N/mm}^2, E_{0,mean} = 11,0 \text{ kN/mm}^2, \rho_k = 370 \text{ kg/m}^3$ Other characteristic values can be calculated from the equations given in EN 384.
Finland Norway Sweden Latvia	FI NO SE LV	Pine <i>Pinus</i> <i>Sylvestris</i>				

^{a)} See Clause 7.3 in EN 14081-1:2005
^{b)} Timber sizes shall be to EN 336
^{c)} Settings apply only to timber grown west of the Ural mountain range and north of the 55⁰ line of latitude in Russia

Table 3-1 - Settings for Raute Timgrader machines (Model given in TG1/1007/06)

Source country or countries	Source mark ^{a)}	Species	Permitted timber sizes ^{b)} (mm)	Grade ^{c)} or grade combination	Model value f_{mod}	Comments and additional requirements
Finland Norway Sweden Estonia. Latvia Russia ^{d)} Poland	FI NO SE ES LV RU PL	Spruce <i>Picea abies</i>	$30 \leq t_n \leq 50$ $60 \leq b_n \leq 225$	C45 C30 C18 C40 C30 C18 C35 TR26 C18	56,5 34,1 22,0 53,4 34,3 22,0 44,6 34,1 22,0	Requirements for grading: - Air temperature between +10°C and +50°C - Relative humidity in the air: ≤ 85 % - Timber temperature: ≥ -10 °C - Timber mean moisture content: > 10 % - Feed speed between 48 m/min and 124 m/min - Cupped timber shall not be graded The following equation shall be used to calculate settings $F_n = 0,002792 t_n^{2,093} b_n^{0,740} f_{\text{mod}}^{0,630} a$ where F_n is the indicating property in N (to obtain the indicating property in kilopond F_n shall be divided by 9,81), t_n is the target thickness in mm, b_n is the target width in mm (Note: For timber with a thickness to tolerance class 1, i.e. sawn, t_n in the above equation is the target $t_n + 1$ mm) and f_{mod} is given in the 6th column of this table for each grade. a is the pre-set deflection in mm and shall be: $a = 1,6 \text{ mm}$ for $47 \leq t_n \leq 50 \text{ mm}$ $a = 2,0 \text{ mm}$ for $36 \leq t_n \leq 37 \text{ mm}$ $a = 1,7 \text{ mm}$ for $44 \leq t_n \leq 46 \text{ mm}$ $a = 2,1 \text{ mm}$ for $34 \leq t_n \leq 35 \text{ mm}$ $a = 1,8 \text{ mm}$ for $41 \leq t_n \leq 43 \text{ mm}$ $a = 2,2 \text{ mm}$ for $32 \leq t_n \leq 33 \text{ mm}$ $a = 1,9 \text{ mm}$ for $38 \leq t_n \leq 40 \text{ mm}$ $a = 2,3 \text{ mm}$ for $30 \leq t_n \leq 31 \text{ mm}$ The pre-set pressure shall be 23 Bar The settings for C35-TR26-C18 can also be used for C35-C24-C18 The characteristic values for the TR26 grade are: $f_{\text{m,k}} = 28,3 \text{ N/mm}^2$, $E_{0,\text{mean}} = 11,0 \text{ kN/mm}^2$, $\rho_k = 370 \text{ kg/m}^3$ Other characteristic values can be calculated from the equations given in EN 384.
Finland Norway Sweden Latvia Russia ^{d)}	FI NO SE LV RU	Pine <i>Pinus sylvestris</i>	$30 \leq t_n \leq 50$ $60 \leq b_n \leq 225$	C45 C30 C18 C40 C30 C18 C35 TR26 C18	56,5 34,1 22,0 53,4 34,3 22,0 44,6 34,1 22,0	

^{a)} See Clause 7.3 in EN 14081-1:2005

^{b)} Timber sizes shall be to EN 336

^{c)} Grades prefixed by C are strength classes given in EN 338

^{d)} Settings apply only to timber grown west of the Urals and north of the 55 degree line of latitude

Table 4-1 - Settings for Euro-GreComat 702 (Model given in TG1/0107/08)

Source country or countries	Source mark ^{a)}	Species	Permitted timber size ^{b)} (mm)	Grade or grade combination	Model value f _{mod}	Comments and additional requirements																								
Germany Austria Czech Republic	DE	Spruce	30 ≤ t _n ≤ 50	L36	34,5	Requirements for grading: - Timber temperature: > 0°C - Mean moisture content of each piece between 8% and 20% - Feed speed between 80 and 300 m/min - Timber surface planed or sawn These grades apply to timber where tensile strength controls the design. The characteristic values for the grades are: <table><tr><td></td><td></td><td>L36</td><td>L35</td><td>L25</td><td>L24</td></tr><tr><td>f_{t,k}</td><td>(N/mm²)</td><td>22,0</td><td>21,0</td><td>14,5</td><td>14,0</td></tr><tr><td>E_{t,mean}</td><td>(kN/mm²)</td><td>13,0</td><td>13,0</td><td>11,0</td><td>11,0</td></tr><tr><td>ρ_k</td><td>(kg/m³)</td><td>400</td><td>400</td><td>350</td><td>350</td></tr></table>			L36	L35	L25	L24	f _{t,k}	(N/mm ²)	22,0	21,0	14,5	14,0	E _{t,mean}	(kN/mm ²)	13,0	13,0	11,0	11,0	ρ _k	(kg/m ³)	400	400	350	350
			L36	L35	L25		L24																							
f _{t,k}	(N/mm ²)	22,0	21,0	14,5	14,0																									
E _{t,mean}	(kN/mm ²)	13,0	13,0	11,0	11,0																									
ρ _k	(kg/m ³)	400	400	350	350																									
	AT CZ	<i>Picea abies</i> Fir <i>Abies alba</i>	95 ≤ b _n ≤ 280 30 ≤ t _n ≤ 55 80 ≤ b _n ≤ 280	L25 L35 L24	22,3 34,0 21,0																									

^{a)} See Clause 7.3 in EN 14081-1:2005
^{b)} Timber size shall be to EN 336

Table 5-1 - Settings for GoldenEye 702 (Model given in TG1/1005/08 for GB & IE; TG1/1005/09Rev for DE, AT & CZ)

Source country or countries	Source mark ^{b)}	Species	Permitted timber size ^{a) c)} (mm)	Grade ^{d)} or grade combination	Model value <i>I</i>	Comments and additional requirements
UK Ireland	GB IE	Sitka spruce <i>Picea sitchensis</i>	35 ≤ t _n ≤ 80 70 ≤ b _n ≤ 260	C24 C16	<i>E</i> _{mod} = 10 800 <i>E</i> _{mod} = 6 000	Requirements for grading: - Timber temperature: > 0°C - Mean moisture content of each piece between 10% and 30% - Maximum feed speed: 450 m/min - Timber surface planed or sawn The moisture content shall be measured for each piece by an In-line system.
				C16	<i>E</i> _{mod} = 5 200	
Germany Austria Czech Republic	DE AT CZ	Spruce <i>Picea abies</i>	38 ≤ t _n ≤ 100 89 ≤ b _n ≤ 250	C27 C16	<i>f</i> _{mod} = 36,0 <i>f</i> _{mod} = 21,4	Requirements for grading: - Timber temperature: > 0°C - Mean moisture content of each piece between 8% and 18% - Maximum feed speed: 450 m/min - Timber surface planed or sawn
				C24 C18	<i>f</i> _{mod} = 34,4 <i>f</i> _{mod} = 30,8	
		Fir <i>Abies alba</i>		C24 C16	<i>f</i> _{mod} = 34,4 <i>f</i> _{mod} = 29,8	

^{a)} These settings are approved to permit each piece of timber to be graded as if it is two pieces of timber of smaller widths. The timber is subsequently cut lengthwise into two pieces with the correct grade marked on each piece. This requires the machine to have the appropriate software, and the timber sizes before and after grading, to be as required by that software. The sizes of the two pieces after splitting must be within the permitted timber size. This note is valid for all approved source countries and species for this machine.

^{b)} See Clause 7.3 in EN 14081-1:2005

^{c)} Timber size shall be to EN 336

^{d)} Grades prefixed by C are strength classes given in EN 338

Table 5-2 - Settings for GoldenEye 702 (Model given in TG1/0506/05a) (continued)

Source country or countries	Source mark ^{b)}	Species	Permitted timber size ^{a) c)} (mm)	Grade or grade combination	Model value <i>f</i> _{mod}	Comments and additional requirements																								
Germany Austria Czech Republic	DE	Spruce <i>Picea abies</i> Fir <i>Abies alba</i>	30 ≤ t _n ≤ 50 95 ≤ b _n ≤ 280	L25	21,6	Requirements for grading: - Timber temperature: > 0°C - Mean moisture content of each piece between 7% and 15% - Maximum feed speed: 450 m/min - Timber surface planed or sawn These grades apply to timber where tensile strength controls the design. The characteristic values for the grades are: <table><tr><td></td><td></td><td>L40</td><td>L36</td><td>L25</td><td>L17</td></tr><tr><td><i>f</i>_{t,k}</td><td>(N/mm²)</td><td>26,0</td><td>22,0</td><td>14,5</td><td>11,0</td></tr><tr><td><i>E</i>_{t,mean}</td><td>(kN/mm²)</td><td>14,0</td><td>13,0</td><td>11,0</td><td>9,0</td></tr><tr><td>ρ_k</td><td>(kg/m³)</td><td>420</td><td>400</td><td>350</td><td>320</td></tr></table>			L40	L36	L25	L17	<i>f</i> _{t,k}	(N/mm ²)	26,0	22,0	14,5	11,0	<i>E</i> _{t,mean}	(kN/mm ²)	14,0	13,0	11,0	9,0	ρ _k	(kg/m ³)	420	400	350	320
					L40		L36	L25	L17																					
	<i>f</i> _{t,k}			(N/mm ²)	26,0		22,0	14,5	11,0																					
	<i>E</i> _{t,mean}			(kN/mm ²)	14,0		13,0	11,0	9,0																					
	ρ _k			(kg/m ³)	420		400	350	320																					
	AT			L17	16,9																									
	CZ			L36	32,9																									
				L25	26,8																									
				L17	14,7																									
				L40	39,6																									
L25		20,8																												
	L17	19,1																												

^{a)} These settings are approved to permit each piece of timber to be graded as if it is two pieces of timber of smaller widths. The timber is subsequently cut lengthwise into two pieces with the correct grade marked on each piece. This requires the machine to have the appropriate software, and the timber sizes before and after grading, to be as required by that software. The sizes of the two pieces after splitting must be within the permitted timber size. This note is valid for all approved source countries and species for this machine.

^{b)} See Clause 7.3 in EN 14081-1:2005

^{c)} Timber size shall be to EN 336

Table 5-3 - Settings for GoldenEye 702 (Model given in TG1/0308/15Rev) (*continued*)

Source country or countries	Source mark ^{b)}	Species	Permitted timber size ^{a) c)} (mm)	Grade or grade combination	Model value			Comments and additional requirements
					f_{mod}	E_{mod}	ρ_{mod}	
Germany Austria	DE AT	Spruce <i>Picea abies</i>	$35 \leq t_n \leq 110$ $80 \leq b_n \leq 258$	C24	26,4	4 900	322	Requirements for grading: - Timber temperature: > 0°C - Mean moisture content of each piece between 10% and 18% - Maximum feed speed: 450 m/min - Timber surface planed or sawn
				C27	34,2	5 000	344	
				C16	22,1	4 900	322	
				C30	41,5	5 700	360	
				C16	16,2	4 900	322	
				C35	52,0	10 000	396	
		Fir <i>Abies alba</i>		C27	37,8	5 000	347	TR26 is a UK grade for trussed rafters. Its primary characteristic values are: $f_{m,k} = 28,3 \text{ N/mm}^2$, $E_{0,mean} = 11000 \text{ N/mm}^2$, $\rho_k = 370 \text{ kg/m}^3$ Other characteristic values can be calculated from the equations given in EN 384.
				C16	15,4	4 900	322	
				TR26	37,7	5 000	344	
				C16	17,4	4 900	322	

^{a)} These settings are approved to permit each piece of timber to be graded as if it is two pieces of timber of smaller widths. The timber is subsequently cut lengthwise into two pieces with the correct grade marked on each piece. This requires the machine to have the appropriate software, and the timber sizes before and after grading, to be as required by that software. The sizes of the two pieces after splitting must be within the permitted timber size. This note is valid for all approved source countries and species for this machine.

^{b)} See Clause 7.3 in EN 14081-1:2005

^{c)} Timber size shall be to EN 336

Table 5-4 - Settings for GoldenEye 702 (Model given in TG1/1007/15Rev) (continued)

Source country or countries	Source mark ^{b)}	Species	Permitted timber size ^{a) c)} (mm)	Grade or grade combination	Model value			Comments and additional requirements
					f_{mod}	E_{mod}	ρ_{mod}	
Germany	DE	Spruce	$26 \leq t_n \leq 66$	L22	6,8	5 200	305	Requirements for grading: - Timber temperature: > 0°C - Mean moisture content of each piece between 7% and 15% - Maximum feed speed: 450 m/min - Timber surface planed or sawn
Austria	AT	<i>Picea</i>	$63 \leq b_n \leq 319$	L25	16,9	3 900	334	
Czech Republic	CZ	<i>abies</i>		L27	21,0	4 000	377	
Switzerland	CH	Fir <i>Abies alba</i>		L17	12,4	6 800	305	These grades apply to timber where tensile strength controls the design.
Finland	FI		L30	25,4	7 900	390		
Norway	NO		L17	6,8	5 200	305		
Sweden	SE		L40	39,8	11 600	434	The characteristic values for the grades are: $f_{t,k}$ (N/mm ²) L40 L36 L30 L27 L25 $E_{t,mean}$ (kN/mm ²) 14,0 13,0 12,0 11,5 11,0 ρ_k (kg/m ³) 420 400 380 370 350 $f_{t,k}$ (N/mm ²) L22 L17 $E_{t,mean}$ (kN/mm ²) 13,0 11,0 ρ_k (kg/m ³) 10,0 9,0 340 320	
Estonia	ES		L25	19,1	8 600	322		
Latvia	LV		L36	32,3	10 100	412		
Russia ^{d)}	RU		L25	20,9	8 900	331		
Poland	PL		L17	16,4	7 900	305		
		L40	39,8	11 600	434			
		L30	31,2	9 400	385			
		L17	6,8	5 200	305			

^{a)} These settings are approved to permit each piece of timber to be graded as if it is two pieces of timber of smaller widths. The timber is subsequently cut lengthwise into two pieces with the correct grade marked on each piece. This requires the machine to have the appropriate software, and the timber sizes before and after grading, to be as required by that software. The sizes of the two pieces after splitting must be within the permitted timber size. This note is valid for all approved source countries and species for this machine.

^{b)} See Clause 7.3 in EN 14081-1:2005

^{c)} Timber size shall be to EN 336

^{d)} Settings apply only to timber grown west of the Ural mountain range in Russia and north of the 55° line of latitude.

Table 5-5 - Settings for GoldenEye 702 (Model given in TG1/1007/08a) (continued)

Source country or countries	Source mark ^{b)}	Species	Permitted timber size ^{a) c)} (mm)	Grade or grade combination	Model value			Comments and additional requirements																												
					f_{mod}	E_{mod}	ρ_{mod}																													
Finland Norway Sweden Estonia Latvia Russia ^{d)} Poland	FI NO SE ES LV RU PL	Spruce <i>Picea</i> <i>abies</i>	$34 \leq t_n \leq 55$ $90 \leq b_n \leq 220$	LD26	35,6	11800	407	Requirements for grading: - Timber temperature > 0°C - Timber mean moisture content between 8% and 20%. The moisture content of the individual timber pieces shall not deviate more than ±4 % from the mean value. - Maximum feed speed 450 m/min for X-ray part. - Timber surface planed or sawn These grades apply to timber where tensile strength controls the design. The characteristic values for the grades are: <table><tr><td></td><td></td><td>LD26</td><td>LD22</td><td>LD18</td><td>LD15</td><td>LD11</td></tr><tr><td>$f_{t,k}$</td><td>N/mm²</td><td>26,0</td><td>22,0</td><td>18,0</td><td>14,5</td><td>11,0</td></tr><tr><td>$E_{t,mean}$</td><td>kN/m²</td><td>14,0</td><td>13,0</td><td>12,0</td><td>11,0</td><td>9,0</td></tr><tr><td>ρ_k</td><td>kg/m³</td><td>410</td><td>390</td><td>370</td><td>350</td><td>320</td></tr></table>			LD26	LD22	LD18	LD15	LD11	$f_{t,k}$	N/mm ²	26,0	22,0	18,0	14,5	11,0	$E_{t,mean}$	kN/m ²	14,0	13,0	12,0	11,0	9,0	ρ_k	kg/m ³	410	390	370	350	320
						LD26	LD22		LD18	LD15	LD11																									
				$f_{t,k}$	N/mm ²	26,0	22,0		18,0	14,5	11,0																									
				$E_{t,mean}$	kN/m ²	14,0	13,0		12,0	11,0	9,0																									
				ρ_k	kg/m ³	410	390		370	350	320																									
				LD18	23,8	10300	365																													
				LD11	9,0	7000	315																													
				LD26	35,6	11800	426																													
				LD15	9,5	7500	325																													
				LD22	27,3	10800	385																													
				LD15	14,3	10000	353																													
				LD22	27,3	10800	385																													
LD11	9,0	7000	315																																	
LD18	10,0	8000	356																																	
LD15	9,5	7500	325																																	

^{a)} These settings are approved to permit each piece of timber to be graded as if it is two pieces of timber of smaller widths. The timber is subsequently cut lengthwise into two pieces with the correct grade marked on each piece. This requires the machine to have the appropriate software, and the timber sizes before and after grading, to be as required by that software. The sizes of the two pieces after splitting must be within the permitted timber size. This note is valid for all approved source countries and species for this machine.

^{b)} See Clause 7.3 in EN 14081-1:2005

^{c)} Timber size shall be to EN 336

^{d)} Settings apply only to timber grown west of the Urals and north of the 55 degree line of latitude

Table 5-6 - Settings for GoldenEye 702 (Model given in TG1/0307/07) (continued)

Source country or countries	Source mark ^{b)}	Species	Permitted timber size ^{a) c)} (mm)	Grade ^{d)} or grade combination	Model value f_{mod}	Comments and additional requirements
Finland Norway Sweden Estonia Latvia Russia ^{e)} Poland	FI NO SE ES LV RU PL	Spruce <i>Picea</i> <i>abies</i>	$32 \leq t_n \leq 82$ $68 \leq b_n \leq 305$	C40 C30 C18 C30 C18 C35 C27 C18 C35 C24 C27 C16 TR26 C16 C24	55,6 40,2 13,5 36,5 13,5 52,3 37,6 13,5 52,3 22,7 35,9 13,5 29,9 13,5 13,5	Requirements for grading: - Timber temperature: $> 0^\circ\text{C}$ - Timber mean moisture content between 8% and 20%. The moisture content of the individual timber pieces shall not deviate more than $\pm 4\%$ from the mean value. - Timber surface finish planed or sawn - Maximum feed speed: 450 m/min The settings for C30-C18 can also be used for TR26-C18 TR26 is a UK grade for trussed rafters. Its primary characteristic values are: $f_{m,k} = 28,3 \text{ N/mm}^2$, $E_{0,mean} = 11,0 \text{ kN/mm}^2$, $\rho_k = 370 \text{ kg/m}^3$ Other characteristic values can be calculated from the equations given in EN 384.

^{a)} These settings are approved to permit each piece of timber to be graded as if it is two pieces of timber of smaller widths. The timber is subsequently cut lengthwise into two pieces with the correct grade marked on each piece. This requires the machine to have the appropriate software, and the timber sizes before and after grading, to be as required by that software. The sizes of the two pieces after splitting must be within the permitted timber size. This note is valid for all approved source countries and species for this machine.

^{b)} See Clause 7.3 in EN 14081-1:2005

^{c)} Timber sizes shall be according to EN 336

^{d)} Grades prefixed by C are strength classes given in EN 338

^{e)} Settings apply only to timber grown west of the Urals and north of the 55 degree line of latitude