

# SUORITUSTASOILMOITUS

## DECLARATION OF PERFORMANCE



Rakennustuotedirektiivi CPD 89/106/EEC

### Tämä suoritusasoilmoitus koskee seuraavia tuotteita:

4573AG, 4573BSG, 4574AG, 4574BSG, 4576AG, 4576ASG, 4566BR, 4567BR, 4569BR, 4573BR, 4574BR, 4576BR, 4576AR, 4572BR, 4599BR, 4582BR, 4584BR, 4570BR, 4612BS, 4613BS, 4615BS, 4616BS, 4625BS, 4628BS, 4629BS, 4631BS, 4632BS, 4634BS, 4631BR, 4629BR, 4634BS

### Käyttötarkoitus:

H&H konenaulat on tarkoitettu puun kiinnittämiseen puuhun.

### Sovellettava standardi:

EN 14592:2008+A1:2012

### Eränumero:

Eränumero on pakkauksessa.

### Suoritustaso:

Tuote Ø /mm	Myötömomentti My,k/Nmm	Ulosvetolujuus fax,k/N/mm <sup>2</sup>	Ulosveto kannan läpi fhead,k/N/mm <sup>2</sup>
2,1 kampa	818	9,88	35,85
2,1 sileä	727	6,04	38,87
2,5 kampa	1979	9,02	47,62
2,5 sileä	2214	5,55	44,33
2,8 kampa	2794	8,86	31,09
2,8 sileä	2955	7,27	31,76
3,1 kampa	3919	8,25	50,97
3,1 sileä	3921	5,44	54,69

### Espoo

Lanttikatu 1  
02770 Espoo  
puh. (09) 5259 030  
fax. (09) 5259 0320



myynti@hhtuonti.fi - www.hhtuonti.fi

### Oulu

Myyntimiehenkuja 10 C 4  
90420 Oulu  
puh. (09) 5259 0328  
fax. (04) 211 550 4561

# SUORITUSTASOILMOITUS

## DECLARATION OF PERFORMANCE



### **Korroosionkestävyys:**

Kirkkaat ja sähkösinkityt naulat, suojausluokka 1. Kuumasinkityt ja ruostumattomat naulat, suojausluokka 1,2,3.

### **Valmistaja:**

Valmistajan numero 21.

### **ITT (Initial type testing) alkutestauspaikka:**

Szutest Engineering Test Institute  
Hudcova 56b  
62100 Brno  
Czech Republic

### **Raporttinumerot:**

J-30-20394-11, J-30-20392-11, J-30-20393-11 ja J-30-20396-11

Espoo 03.02.2014

Martti Laaksonen

### **Espoo**

Lanttikatu 1  
02770 Espoo  
puh. (09) 5259 030  
fax. (09) 5259 0320



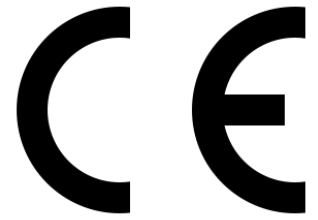
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### **Oulu**

Myyntimiehenkuja 10 C 4  
90420 Oulu  
puh. (09) 5259 0328  
fax. (04) 211 550 4561

# SUORITUSTASOILMOITUS

## DECLARATION OF PERFORMANCE



### Tämä suoritusasoilmoitus koskee seuraavia tuotteita:

4564N, 4564L, 4564C, 4563C, 4563E, 4563D, 4563F, 4561N, 4561L, 4576BR, 4576AR, 4562C, 4562E, 4561H, 4574BR, 4561C, 4561D, 4561E, 4573BR, 4559D, 4561B, 4566EB

### Käyttötarkoitus:

H&H konenaulat on tarkoitettu puun kiinnittämiseen puuhun ja 4566EB metallilevyn kiinnittämiseen puuhun.

### Sovellettava standardi:

EN 14592:2008+A1:2012

### Eränumero:

Eränumero on pakkauksessa.

### Suoritusaso:

Myötömomentin, ulosvetolujuuden, ulosveto kannan läpi mittausarvot ja käyttöluokitukset erillisessä liitteessä. No VTT-S-00582-12.

### Korroosionkestävyys:

Kirkkaat ja sähkösinkityt naulat, suojausluokka 1. Kuumasinkityt ja ruostumattomat naulat, suojausluokka 1,2,3.

### Valmistaja:

Valmistajan numero 13

### ITT (Initial type testing) alkutestauspaikka ja raporttinumero:

VTT Expert Services Ltd  
Kemistintie 3, Espoo  
P.O. BOX 1001, 02044 VTT  
VTT-S-00582-12  
VTT-S-03992-14

Espoo 27.11.2015

Martti Laaksonen

#### Espoo

Lanttikatu 1  
02770 Espoo  
puh. (09) 5259 030  
fax. (09) 5259 0320



myynti@hhtuonti.fi - www.hhtuonti.fi

#### Oulu

Myyntimiehenkuja 10 C 4  
90420 Oulu  
puh. (09) 5259 0328  
fax. (04) 211 550 4561

## Summary

Values shown in Table 21 may be given as declared values for the tested nails. Nails 4564L, 4563E, 4563F and 4561L may be classified as threaded nails ( $f_{ax} \geq 4,5 \text{ N/mm}^2$ ).

**Table 21** Declared values.

Nail	$l \times d$ [mm]	$A_h$ [mm <sup>2</sup> ]	$l_g$ [mm]	$f_{u,k}$ [N/mm <sup>2</sup> ]	$M_{y,k}$ [Nmm]	$f_{ax,k}$ With $\rho_k = 350$ [N/mm <sup>2</sup> ]	$f_{head,k}$ With $\rho_k = 350$ [N/mm <sup>2</sup> ]	$f_{tens,k}$	Service class according to EN 1995-1-1
4564N	100 x 3,15	31,2	-	800	4740	2,45	11,7	NDP	3
4564L	100 x 3,15	31,2	65	800	3560	5,39	11,7	NDP	3
4564C	100 x 3,15	31,2	-	800	4740	2,45	11,7	NDP	1
4563C	90 x 3,1	31,2	-	710	4030	2,45	13,0	NDP	1
4563E	90 x 3,1	31,2	64	710	3330	4,66	14,0	NDP	1
4563D	90 x 3,1	31,2	-	710	4030	2,45	13,0	NDP	1
4563F	90 x 3,1	31,2	64	710	3330	4,66	13,0	NDP	1
4561N	90 x 3,1	31,2	-	710	4030	2,45	12,4	NDP	3
4561L	90 x 3,1	31,2	64	710	3160	5,13	12,4	NDP	3
4576BR	90 x 3,1	31,2	64	680	3800	3,34	13,0	NDP	3
4576AR	90 x 3,1	31,2	-	680	3865	2,45	13,0	NDP	3
4562C	75 x 2,9	30,2	-	740	3530	2,45	10,6	NDP	1
4562E	75 x 2,9	30,2	49	740	3000	3,75	10,6	NDP	1
4561H	75 x 2,9	30,2	49	740	2740	2,35	10,9	NDP	3
4574BR	75 x 2,9	30,2	49	690	3110	3,89	15,5	NDP	3
4561C	64 x 2,9	30,2	-	740	3530	2,45	10,6	NDP	1
4561D	64 x 2,9	30,2	38	740	3000	3,07	10,6	NDP	1
4561E	64 x 2,9	30,2	38	740	2740	2,65	10,9	NDP	3
4573BR	64 x 2,9	30,2	38	690	3110	3,84	15,5	NDP	3
4559D	50 x 2,9	30,2	24	740	3000	2,61	10,6	NDP	1
4561B	50 x 2,9	30,2	24	740	2740	3,09	10,9	NDP	3

Espoo, 23.1.2012

*Ari Kevarinmäki*  
Ari Kevarinmäki  
Senior Expert



*Tero Sundström*  
Tero Sundström  
Expert

## Appendices

- Appendix 1: Results of nail dimension measurements
- Appendix 2: Results of zinc coating thickness tests
- Appendix 3: Results of yield moment tests
- Appendix 4: Withdrawal test results
- Appendix 5: Pull through test results

## Distribution

H&H Tuonti Oy  
VTT Expert Services Ltd / Archive

Original, 2 pieces  
Original

The test results relate only to the sample tested.

### Tensile capacity

The characteristic tensile capacity derived from the tests for the anchor nail is shown in Table 29.

**Table 29** The characteristic tensile capacity of the anchor nail.

Nail	$f_{\text{tens,k}}$ [kN]
40sk	11,02

### Summary

Values shown in Table 30 may be given as declared values for the tested nails. All the profiled nails may be classified as threaded nails ( $f_{\text{ax}} \geq 4,5 \text{ N/mm}^2$ ).

**Table 30** Acceptable values for the declared properties.  
NPD = No Performance Determined

Nail	$d$ [mm]	$l$ [mm]	$A_n$ [mm <sup>2</sup> ]	$l_g$ [mm]	$l_p$ [mm]	$f_u$ [N/mm <sup>2</sup> ]	$M_{y,k}$ [Nmm]	$f_{\text{ax,k}}$ $\rho_k = 350$ [N/mm <sup>2</sup> ]	$f_{\text{head,k}}$ $\rho_k = 350$ [N/mm <sup>2</sup> ]	$f_{\text{tens,k}}$ [kN]	Service class EN 1995-1-1
50kkD	2,76	50,2	29,6	30,0	3,9	680	2730	7,35	19,8	NPD	3
50kkO	2,76	50,2	31,1	30,0	4,0	680	2730	7,35	25,4	NPD	3
64kkD	2,76	64,2	29,6	45,0	3,7	680	2730	7,35	19,8	NPD	3
64kkO	2,76	64,2	31,1	45,0	4,3	680	2730	7,35	25,4	NPD	3
64kk	2,76	64,2	36,3	45,0	4,2	680	2730	7,35	8,55	NPD	3
75kkD	2,76	75,2	29,6	55,0	3,9	680	2730	7,35	19,8	NPD	3
75kkO	2,76	75,2	31,1	55,0	4,2	680	2730	7,35	25,4	NPD	3
75kk	2,76	75,2	36,3	55,0	4,0	680	2730	7,35	8,55	NPD	3
90kkD	2,85	90,4	30,7	70,0	4,2	670	3065	9,50	21,9	NPD	3
90kkO	3,09	90,4	32,1	70,0	4,0	670	3285	9,50	24,7	NPD	3
90kk	3,09	90,4	37,0	70,0	3,8	670	3065	9,50	8,55	NPD	3
90kD	3,09	90,4	30,7	-	4,2	670	3780	2,45	21,9	NPD	3
90kO	3,09	90,4	32,1	-	4,6	670	3780	2,45	24,7	NPD	3
90k	3,09	90,4	37,0	-	4,3	670	3780	2,45	8,55	NPD	3
40sk	3,95	39,8	48,3	27,0	5,4	930	9935	8,25	NPD	11,0	1

Espoo, 2.9.2014



Ari Kevarinmäki  
Leading Expert



### Appendices

- Appendix 1: Dimensional drawings of the nails
- Appendix 2: Results of nail dimension measurements
- Appendix 3: Results of zinc coating thickness tests

The test results relate only to the sample tested.

# SUORITUSTASOILMOITUS

## DECLARATION OF PERFORMANCE



### Tämä suoritusasoilmoitus koskee seuraavia tuotteita:

4561UR, 4561UAR, 4561UBR, 4561UDR, 4712AS, 4713AS, 4561V, 4561Y, 4561Z, 4561COF, 4561EOF, 4561HOF, 4561LOF, 4561NOF, 4563COF, 4582B, 4583A, 4583B, 4584A, 4584B, 4585A, 4585B, 4586B, 4572A, 4572B, 4582A, 4572BS, 4572BR, 4599BR, 4582BS, 4584BS, 4585BS, 4582BR, 4584BR, 4592BS, 4599BS, 4599AS, 4613BS, 4615BS, 4616BS, 4629BS, 4631BS, 4632BS, 4634BS, 4631BR, 4629BR ja 4634BS

### Käyttötarkoitus:

H&H konenaulat on tarkoitettu puun kiinnittämiseen puuhun.

### Sovellettava standardi:

EN 14592:2008+A1:2012

### Eränumero:

Eränumero on pakkauksessa.

### Suoritustaso:

Myötömomentin, ulosvetolujuuden, veto kannan läpi mittausarvot ja käyttöluokitukset erillisissä liitteissä.

### Valmistaja:

Valmistajan numero 13

### ITT (Initial type testing) alkutestauspaikka ja raporttinerot:

Karlsruhe Institute of Technology  
Kaiserstrasse 12  
76131 Karlsruhe  
Germany

**Raporttinerot:** 136250/1-10, 20-32

Espoo 03.02.2014

Martti Laaksonen

#### Espoo

Lanttikatu 1  
02770 Espoo  
puh. (09) 5259 030  
fax. (09) 5259 0320



myynti@hhtuonti.fi - www.hhtuonti.fi

#### Oulu

Myyntimiehenkuja 10 C 4  
90420 Oulu  
puh. (09) 5259 0328  
fax. (04) 211 550 4561

Report No. 136250/1  
Initial Type Test (ITT)



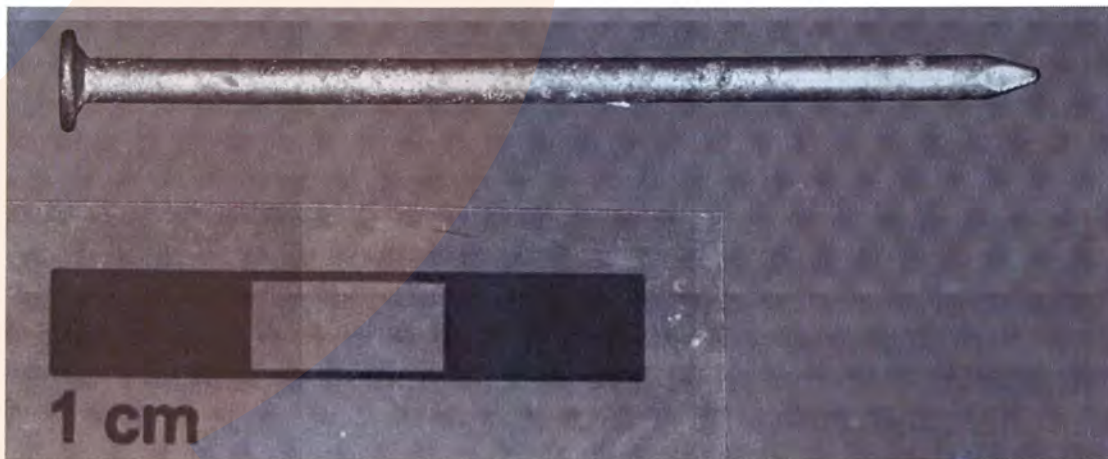
**Client:** H&H Tuonti Oy

**Base:** EN 14592:2008+A1:2012 (D)  
nails for structural timber products

**Dimensions:** diameter 2,10 mm

**Coating:** type 1 – HDG  $\geq 50\mu\text{m}$

**Material:** HPB 235 (Q235) in accordance to GB1499.1-2008



tested nail 2,10 x 50 mm smooth HDG

Dimen- sions	measured values in mm					mean value in mm	measured values related to mean value in %	
	1	2	3	4	5			
$d_h$	5,20	5,22	5,28	5,24	5,29	5,25	+ 0,90	- 0,91
$d$	2,21	2,23	2,23	2,21	2,20	2,22	+ 0,82	- 0,69
$l$	50,0	50,0	50,1	50,1	50,0	50,0	+ 0,17	- 0,14
$h_t$	1,12	1,12	1,11	1,10	1,09	1,11	+ 1,08	- 1,62
$l_p$	2,70	2,78	2,79	2,66	2,67	2,72	+ 2,57	- 2,21
$A_h$	21,2	21,4	21,9	21,6	22,0	21,6	+ 1,79	- 1,82

tensile capacity	tensile strength of wire	yield moment		withdrawal parameter		head pull-through parameter	
		$M_y$ Nm	crack ---	$d$ = --- $\rho$ kg/m <sup>3</sup>	$l_{ef}$ = --- $R_{ax}$ kN	$d_H$ = --- $\rho$ kg/m <sup>3</sup>	$R_{ax}^*$ kN
---	$\varnothing 2,1$	---	---	---	---	---	---
$f_{tens}$ kN	$f_u$ N/mm <sup>2</sup>	---	---	---	---	---	---
---	855	---	---	---	---	---	---
---	869	---	---	---	---	---	---
---	863	---	---	---	---	---	---
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---	$f_u > 600$ N/mm <sup>2</sup>	---	---	---	---	---	---

Karlsruhe 26.04.2013

Head of Notified Body NB 0769



*R. Görlicher*  
 Dr.-Ing. R. Görlicher

**Espoo**  
 Lanttikatu 1  
 02770 Espoo  
 puh. (09) 5259 030  
 fax. (09) 5259 0320



myynti@hhtuonti.fi - www.hhtuonti.fi

**Oulu**  
 Myyntimiehenkuja 10 C 4  
 90420 Oulu  
 puh. (09) 5259 0328  
 fax. (04) 211 550 4561



**Report No. 136250/2**  
**Initial Type Test (ITT)**



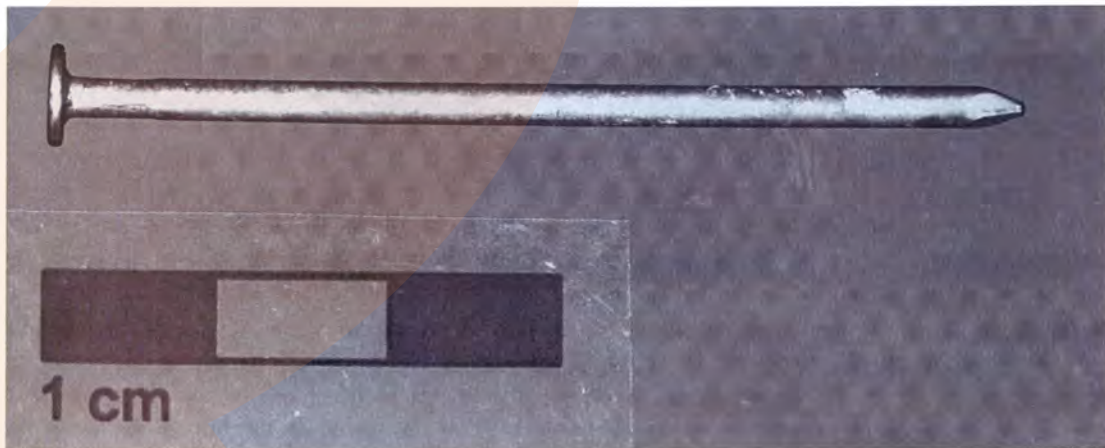
**Client:** H&H Tuonti Oy

**Base:** EN 14592:2008+A1:2012 (D)  
nails for structural timber products

**Dimensions:** diameter 2,30 mm

**Coating:** type 1 – HDG  $\geq 50\mu\text{m}$

**Material:** HPB 235 (Q235) in accordance to GB1499.1-2008



tested nail 2,30 x 57 mm smooth HDG

Dimen- sions	measured values in mm					mean value in mm	measured values related to mean value in %	
	1	2	3	4	5			
$d_h$	5,69	5,63	5,64	5,55	5,59	5,62	+ 1,24	- 1,24
$d$	2,34	2,35	2,35	2,35	2,35	2,35	+ 0,22	- 0,25
$l$	56,8	56,7	56,9	56,7	56,8	56,8	+ 0,23	- 0,15
$h_t$	1,05	1,04	1,08	1,06	1,09	1,06	+ 2,44	- 2,26
$l_p$	3,19	3,22	3,14	3,23	3,28	3,21	+ 2,12	- 2,24
$A_h$	25,4	24,9	25,0	24,2	24,5	24,8	+ 2,49	- 2,47

KIT – Universität des Landes Baden-Württemberg und nationales Forschungszentrum in der Helmholtz-Gemeinschaft

**Espoo**  
Lanttikatu 1  
02770 Espoo  
puh. (09) 5259 030  
fax. (09) 5259 0320



**Oulu**  
Myyntimiehenkuja 10 C 4  
90420 Oulu  
puh. (09) 5259 0328  
fax. (04) 211 550 4561

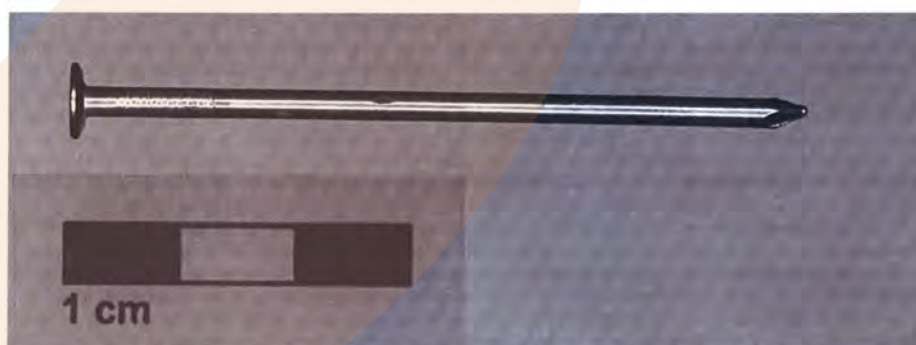
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Report No. 136250/3  
Initial Type Test (ITT)



**Client:** H&H Tuonti Oy  
**Base:** EN 14592:2008+A1:2012 (D)  
nails for structural timber products  
**Dimensions:** diameter 2,50 mm  
**Coating:** no  
**Material:** HPB 235 (Q235) in accordance to GB1499.1-2008



tested nail 2,50 x 65 smooth

Dimen- sions	measured values mm					mean value mm	measured values related to mean value %	
	1	2	3	4	5			
$d_h$	6,14	6,27	6,15	6,32	6,40	6,26	+ 2,29	- 1,81
$d$	2,45	2,45	2,46	2,46	2,47	2,46	+ 0,48	- 0,49
$l$	63,9	63,6	63,7	63,5	63,7	63,7	+ 0,38	- 0,20
$h_t$	1,14	1,13	1,08	1,08	1,13	1,11	+ 2,52	- 2,88
$l_p$	3,87	4,00	4,04	4,01	3,90	3,96	+ 1,92	- 2,37
$A_h$	29,6	30,9	29,7	31,3	32,1	30,7	+ 4,61	- 3,61

KIT – Universität des Landes Baden-Württemberg und nationales Forschungszentrum in der Helmholtz-Gemeinschaft

**Espoo**  
Lanttikatu 1  
02770 Espoo  
puh. (09) 5259 030  
fax. (09) 5259 0320



myynti@hhtuonti.fi - www.hhtuonti.fi

**Oulu**  
Myyntimiehenkuja 10 C 4  
90420 Oulu  
puh. (09) 5259 0328  
fax. (04) 211 550 4561



Report No. 136250/4  
Initial Type Test (ITT)



**Client:** H&H Tuonti Oy

**Base:** EN 14592:2008+A1:2012 (D)  
nails for structural timber products

**Dimensions:** diameter 2,90 mm

**Coating:** type 1 – HDG  $\geq 50\mu\text{m}$

**Material:** HPB 235 (Q235) in accordance to GB1499.1-2008



tested nail 2,90 x 75 mm smooth HDG

Dimen- sions	measured values in mm					mean value in mm	measured values related to mean value in %	
	1	2	3	4	5			
$d_h$	7,00	6,96	7,01	6,79	6,73	6,90	+ 1,60	- 2,41
$d$	2,95	2,92	2,93	2,93	2,93	2,93	+ 0,33	- 0,22
$l$	74,8	74,9	74,5	74,5	74,7	74,7	+ 0,53	- 0,35
$h_t$	1,77	1,69	1,76	1,76	1,68	1,73	+ 2,19	- 3,00
$l_p$	4,64	4,40	4,39	4,64	4,46	4,51	+ 2,97	- 2,57
$A_h$	38,5	38,0	38,6	36,2	35,6	37,4	+ 3,19	- 4,78

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**Espoo**  
Lanttikatu 1  
02770 Espoo  
puh. (09) 5259 030  
fax. (09) 5259 0320



**Oulu**  
Myyntimiehenkuja 10 C 4  
90420 Oulu  
puh. (09) 5259 0328  
fax. (04) 211 550 4561

myynti@hhtuonti.fi - www.hhtuonti.fi



Report No. 136250/5  
Initial Type Test (ITT)



**Client:** H&H Tuonti Oy

**Base:** EN 14592:2008+A1:2012 (D)  
nails for structural timber products

**Dimensions:** diameter 2,90 mm

**Coating:** type 1 – HDG  $\geq 50\mu\text{m}$

**Material:** HPB 235 (Q235) in accordance to GB1499.1-2008



tested nail 2,90 x 65 mm smooth HDG

Dimen- sions	measured values in mm					mean value in mm	measured values related to mean value in %	
	1	2	3	4	5			
$d_{h, \max}$	7,05	7,06	7,16	7,06	7,11	7,09	+ 1,01	- 0,54
$d_{h, \min}$	5,37	5,35	5,30	5,28	5,32	5,32	+ 0,86	- 0,83
$d$	2,95	2,94	2,95	2,93	2,93	2,94	+ 0,38	- 0,42
$l$	64,0	64,2	64,1	63,7	64,2	64,1	+ 0,27	- 0,49
$h_t$	2,09	2,15	2,10	2,13	2,10	2,11	+ 1,70	- 1,14
$l_p$	4,34	4,40	4,40	4,43	4,46	4,34	+ 1,23	- 1,50
$A_h$	31,7	31,8	31,9	31,4	31,8	31,7	+ 0,63	- 1,09

KIT – Universität des Landes Baden-Württemberg und nationales Forschungszentrum in der Helmholtz-Gemeinschaft

**Espoo**  
Lanttikatu 1  
02770 Espoo  
puh. (09) 5259 030  
fax. (09) 5259 0320



**Oulu**  
Myyntimiehenkuja 10 C 4  
90420 Oulu  
puh. (09) 5259 0328  
fax. (04) 211 550 4561

myynti@hhtuonti.fi - www.hhtuonti.fi

tensile capacity	$f_{tens}$ kN	tensile strength of wire		yield moment		withdrawal parameter		head pull-through parameter		
		$f_u$ N/mm <sup>2</sup>	$M_y$ Nm	crack	$d = \dots$	$l_{ef} = \dots$	$\rho$ kg/m <sup>3</sup>	$R_{ax}$ kN	$\rho$ kg/m <sup>3</sup>	$R_{ax}^*$ kN
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*R. Görlacher*

Dr.-Ing. R. Görlacher

**Espoo**  
 Lanttikatu 1  
 02770 Espoo  
 puh. (09) 5259 030  
 fax. (09) 5259 0320



**Oulu**  
 Myyntimiehenkuja 10 C 4  
 90420 Oulu  
 puh. (09) 5259 0328  
 fax. (04) 211 550 4561



Report No. 136250/6  
Initial Type Test (ITT)



**Client:** H&H Tuonti Oy

**Base:** EN 14592:2008+A1:2012 (D)  
nails for structural timber products

**Dimensions:** diameter 3,10 mm

**Coating:** type 1 – HDG  $\geq 50\mu\text{m}$

**Material:** HPB 235 (Q235) in accordance to GB1499.1-2008



tested nail 3,10 x 83 mm smooth HDG

Dimen- sions	measured values in mm					mean value in mm	measured values related to mean value in %	
	1	2	3	4	5			
$d_h$	7,01	7,13	7,03	7,08	7,10	7,07	+ 0,80	- 0,86
$d$	3,12	3,13	3,16	3,12	3,12	3,13	+ 0,88	- 0,40
$l$	82,7	82,9	82,7	82,9	83,0	82,8	+ 0,16	- 0,22
$h_t$	1,87	1,88	1,94	1,95	1,98	1,92	+ 2,91	- 2,81
$l_p$	5,08	4,81	5,09	4,83	4,95	4,95	+ 2,79	- 2,87
$A_h$	38,6	39,9	38,8	39,4	39,6	39,2	+ 1,61	- 1,71



**Report No. 136250/7**  
**Initial Type Test (ITT)**



**Client:** H&H Tuonti Oy

**Base:** EN 14592:2008+A1:2012 (D)  
nails for structural timber products

**Dimensions:** diameter 3,10 mm

**Coating:** type 1 – HDG  $\geq 50\mu\text{m}$

**Material:** HPB 235 (Q235) in accordance to GB1499.1-2008



tested nail 3,10 x 90 mm smooth HDG

Dimen- sions	measured values in mm					mean value in mm	measured values related to mean value in %	
	1	2	3	4	5			
$d_{h, \max}$	7,24	7,25	7,32	7,18	7,26	7,25	+ 0,91	- 0,97
$d_{h, \min}$	5,28	5,26	5,23	5,25	5,26	5,26	+ 0,46	- 0,49
d	3,11	3,14	3,14	3,12	3,13	3,13	+ 0,31	- 0,42
l	88,6	88,6	88,5	88,6	88,4	88,6	+ 0,10	- 0,16
$h_t$	2,09	2,10	2,15	2,10	2,13	2,11	+ 1,70	- 1,14
$l_p$	4,36	4,37	4,41	4,38	4,44	4,39	+ 1,09	- 0,73
$A_h$	32,1	32,1	32,1	31,7	32,1	32,0	+ 0,38	- 0,97

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**Espoo**  
Lanttikatu 1  
02770 Espoo  
puh. (09) 5259 030  
fax. (09) 5259 0320



**Oulu**  
Myyntimiehenkuja 10 C 4  
90420 Oulu  
puh. (09) 5259 0328  
fax. (04) 211 550 4561

myynti@hhtuonti.fi - www.hhtuonti.fi



Report No. 136250/8  
Initial Type Test (ITT)



**Client:** H&H Tuonti Oy

**Base:** EN 14592:2008+A1:2012 (D)  
nails for structural timber products

**Dimensions:** diameter 3,40 mm

**Coating:** type 1 – HDG  $\geq 50\mu\text{m}$

**Material:** HPB 235 (Q235) in accordance to GB1499.1-2008



tested nail 3,40 x 90 mm smooth HDG

Dimen- sions	measured values in mm					mean value in mm	measured values related to mean value in %	
	1	2	3	4	5			
$d_h$	7,16	7,16	7,10	7,25	7,20	7,16	+ 1,25	- 1,72
$d$	3,43	3,43	3,43	3,44	3,44	3,43	+ 0,25	- 0,18
$l$	88,6	88,3	88,5	88,5	89,0	88,6	+ 0,43	- 0,28
$h_t$	1,94	1,97	1,96	2,03	2,04	1,99	+ 2,62	- 2,41
$l_p$	5,50	5,44	5,36	5,48	5,40	5,44	+ 1,18	- 1,40
$A_h$	40,3	40,3	38,9	41,3	40,7	40,3	+ 2,51	- 3,42

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**Espoo**  
Lanttikatu 1  
02770 Espoo  
puh. (09) 5259 030  
fax. (09) 5259 0320



**Oulu**  
Myyntimiehenkuja 10 C 4  
90420 Oulu  
puh. (09) 5259 0328  
fax. (04) 211 550 4561

myynti@hhtuonti.fi - www.hhtuonti.fi

tensile capacity	tensile strength of wire	yield moment		withdrawal parameter		head pull-through parameter	
		$M_y$ Nm	crack	$d$	$l_{ef}$	$d_{ht}$	$R_{ax}^*$ kN
$f_{tens}$ kN	$f_u$ N/mm <sup>2</sup>			$\rho$ kg/m <sup>3</sup>	$R_{ax}$ kN	$\rho$ kg/m <sup>3</sup>	
---	Ø 3,4	---	---	---	---	---	---
---	931	---	---	---	---	---	---
---	920	---	---	---	---	---	---
---	919	---	---	---	---	---	---
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---	$f_u > 600$ N/mm <sup>2</sup>	---	---	---	---	---	---

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R. Görlacher  
Dr.-Ing. R. Görlacher

**Espoo**  
Lanttikatu 1  
02770 Espoo  
puh. (09) 5259 030  
fax. (09) 5259 0320



**Oulu**  
Myyntimiehenkuja 10 C 4  
90420 Oulu  
puh. (09) 5259 0328  
fax. (04) 211 550 4561

myynti@hhtuonti.fi - www.hhtuonti.fi

Report No. 136250/9  
Initial Type Test (ITT)



**Client:** H&H Tuonti Oy

**Base:** EN 14592:2008+A1:2012 (D)  
nails for structural timber products

**Dimensions:** diameter 3,80 mm

**Coating:** type 1 – HDG  $\geq 50\mu\text{m}$

**Material:** HPB 235 (Q235) in accordance to GB1499.1-2008



tested nail 3,80 x 100 mm smooth HDG

Dimen- sions	measured values in mm					mean value in mm	measured values related to mean value in %	
	1	2	3	4	5			
$d_h$	7,40	7,43	7,34	7,40	7,57	7,43	+ 1,95	- 1,24
$d$	3,83	3,82	3,82	3,82	3,84	3,83	+ 0,42	- 0,31
$l$	99,9	99,2	99,3	99,6	99,6	99,5	+ 0,34	- 0,33
$h_t$	2,10	2,17	2,07	2,11	2,10	2,11	+ 2,84	- 1,90
$l_p$	5,71	5,93	5,87	5,85	5,81	5,83	+ 1,65	- 2,13
$A_h$	43,0	43,4	42,3	43,0	45,0	43,3	+ 3,92	- 2,47





Report No. 136250/10  
Initial Type Test (ITT)



**Client:** H&H Tuonti Oy

**Base:** EN 14592:2008+A1:2012 (D)  
nails for structural timber products

**Dimensions:** diameter 4,20 mm

**Coating:** type 1 – HDG  $\geq 50\mu\text{m}$

**Material:** HPB 235 (Q235) in accordance to GB1499.1-2008



tested nail 4,20 x 130 mm smooth HDG

Dimen- sions	measured values in mm					mean value in mm	measured values related to mean value in %	
	1	2	3	4	5			
$d_h$	8,26	8,26	8,31	8,34	8,38	8,31	+ 0,83	- 0,61
$d$	4,26	4,27	4,28	4,25	4,25	4,26	+ 0,49	- 0,33
$l$	128	127	128	127	127	128	+ 0,23	- 0,16
$h_t$	1,99	1,96	2,07	2,04	2,01	2,01	+ 2,78	- 2,68
$l_p$	5,96	5,91	5,90	5,98	6,00	5,95	+ 0,84	- 0,84
$A_h$	53,6	53,6	54,2	54,7	55,1	54,2	+ 1,66	- 1,22

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**Espoo**  
Lanttikatu 1  
02770 Espoo  
puh. (09) 5259 030  
fax. (09) 5259 0320



**H&H**  
**TUONTI**

myynti@hhtuonti.fi - www.hhtuonti.fi

**Oulu**  
Myyntimiehenkuja 10 C 4  
90420 Oulu  
puh. (09) 5259 0328  
fax. (04) 211 550 4561

tensile capacity	tensile strength of wire	yield moment	withdrawal parameter		head pull-through parameter				
			$d$	$l_{\text{eff}}$	$\rho$	$R_{\text{ax}}$	$\rho$	$R_{\text{ax}}^*$	
$f_{\text{tens}}$ kN	$\varnothing 4,2$ $f_u$ N/mm <sup>2</sup>	$M_y$ Nm crack							
---	827 844 847 844 822 --- --- --- ---	---	---	---	---	---	---	---	---
---	$f_u > 600$ N/mm <sup>2</sup>	---	---	---	---	---	---	---	---

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*R. Görlacher*

Dr.-Ing. R. Görlacher

**Espoo**  
 Lanttikatu 1  
 02770 Espoo  
 puh. (09) 5259 030  
 fax. (09) 5259 0320



myynti@hhtuonti.fi - www.hhtuonti.fi

**Oulu**  
 Myyntimiehenkuja 10 C 4  
 90420 Oulu  
 puh. (09) 5259 0328  
 fax. (04) 211 550 4561

Report No. 136250/11  
Initial Type Test (ITT)



**Client:** H&H Tuonti Oy  
**Base:** EN 14592:2008+A1:2012 (D)  
nails for structural timber products  
**Dimensions:** diameter 4,60 mm  
**Coating:** type 1 – HDG  $\geq 50\mu\text{m}$   
**Material:** HPB 235 (Q235) in accordance to GB1499.1-2008



tested nail 4,60 x 145 mm smooth HDG

Dimen- sions	measured values in mm					mean value in mm	measured values related to mean value in %	
	1	2	3	4	5			
$d_h$	9,34	9,24	9,30	9,26	9,23	9,27	+ 0,76	- 0,48
$d$	4,64	4,66	4,66	4,64	4,64	4,65	+ 0,36	- 0,24
$l$	142	143	143	142	143	143	+ 0,15	- 0,16
$h_t$	2,06	2,11	2,17	2,05	2,15	2,11	+ 2,94	- 2,75
$l_p$	6,53	6,46	6,80	6,74	6,77	6,66	+ 2,10	- 3,00
$A_h$	68,6	67,0	67,9	67,3	66,9	67,5	+ 1,52	- 0,96

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**Espoo**  
Lanttikatu 1  
02770 Espoo  
puh. (09) 5259 030  
fax. (09) 5259 0320



**Oulu**  
Myyntimiehenkuja 10 C 4  
90420 Oulu  
puh. (09) 5259 0328  
fax. (04) 211 550 4561

myynti@hhtuonti.fi - www.hhtuonti.fi

tensile capacity	tensile strength of wire	yield moment		withdrawal parameter		head pull-through parameter	
		$M_y$ Nm	crack	$d = \dots$ $\rho$ kg/m <sup>3</sup>	$l_{ef} = \dots$ $R_{ax}$ kN	$d_h = \dots$ $\rho$ kg/m <sup>3</sup>	$R_{ax}^*$ kN
---	Ø 4,60						
$f_{tens}$ kN	$f_u$ N/mm <sup>2</sup>						
---	823	---	---	---	---	---	---
---	806	---	---	---	---	---	---
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---	$f_u > 600$ N/mm <sup>2</sup>	---	---	---	---	---	---

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*R. Görlicher*

Dr.-Ing. R. Görlicher

**Espoo**  
 Lanttikatu 1  
 02770 Espoo  
 puh. (09) 5259 030  
 fax. (09) 5259 0320



**Oulu**  
 Myyntimiehenkuja 10 C 4  
 90420 Oulu  
 puh. (09) 5259 0328  
 fax. (04) 211 550 4561

myynti@hhtuonti.fi - www.hhtuonti.fi

Report No. 136250/12  
Initial Type Test (ITT)



**Client:** H&H Tuonti Oy  
**Base:** EN 14592:2008+A1:2012 (D)  
nails for structural timber products  
**Dimensions:** diameter 5,0 mm  
**Coating:** type 1 – HDG  $\geq 50\mu\text{m}$   
**Material:** HPB 235 (Q235) in accordance to GB1499.1-2008



tested nail 5,0 x 150 mm smooth HDG

Dimen- sions	measured values in mm					mean value in mm	measured values related to mean value in %	
	1	2	3	4	5			
$d_h$	9,21	9,30	9,08	9,19	9,30	9,22	+ 0,93	- 1,48
$d$	5,10	5,10	5,09	5,12	5,10	5,10	+ 0,35	- 0,23
$l$	149	149	149	149	149	149	+ 0,03	- 0,04
$h_t$	2,23	2,24	2,22	2,14	2,18	2,20	+ 1,73	- 2,82
$l_p$	7,98	7,87	7,95	7,95	7,96	7,94	+ 0,48	- 0,91
$A_h$	66,6	67,8	64,7	66,4	67,9	66,7	+ 1,85	- 2,95

tensile capacity	tensile strength of wire	yield moment		withdrawal parameter		head pull-through parameter	
		$M_y$ Nm	crack	$d$ kg/m <sup>3</sup>	$R_{ax}$ kN	$\rho$ kg/m <sup>3</sup>	$R_{ax}^*$ kN
	Ø 5,0						
	$f_u$ N/mm <sup>2</sup>						
	$f_u > 600 \text{ N/mm}^2$						

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Dr.-Ing. R. Görlacher

**Espoo**  
 Lanttikatu 1  
 02770 Espoo  
 puh. (09) 5259 030  
 fax. (09) 5259 0320



myynti@hhtuonti.fi - www.hhtuonti.fi

**Oulu**  
 Myyntimiehenkuja 10 C 4  
 90420 Oulu  
 puh. (09) 5259 0328  
 fax. (04) 211 550 4561

www.hhtuonti.fi

**Report No. 136250/13**  
**Initial Type Test (ITT)**



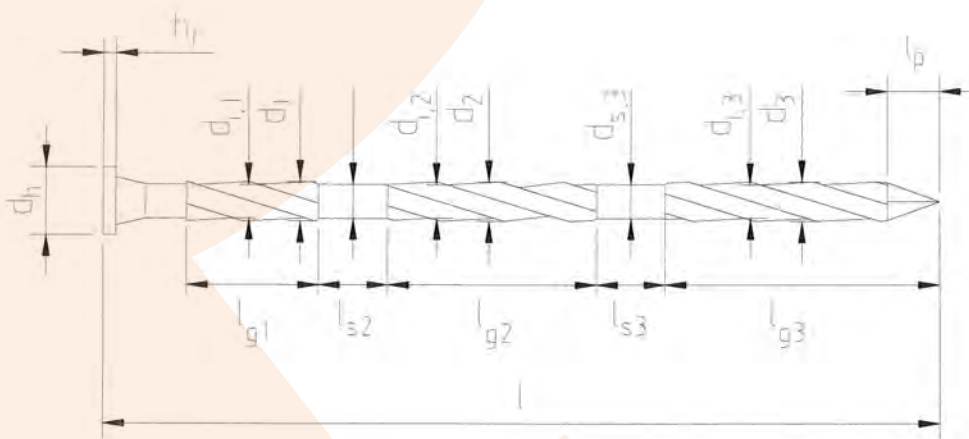
**Client:** H&H Tuonti Oy

**Base:** EN 14592:2008+A1:2012 (D)  
nails for structural timber products

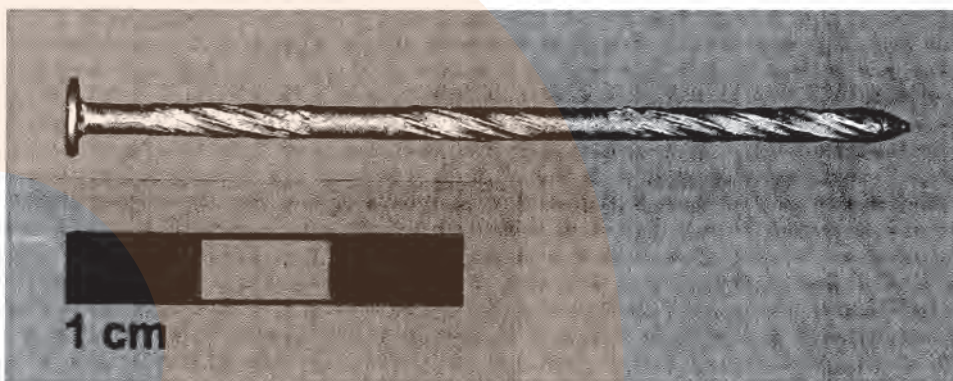
**Dimensions:** diameter 2,30 mm

**Coating:** type 1 – HDG  $\geq 50\mu\text{m}$  or bright =  $0\mu\text{m}$

**Material:** HPB 235 (Q235) in accordance to GB1499.1-2008



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tested nail 2,30 x 65 mm spiral HDG

Dimensi- ons	measured values in mm					mean value in mm	measured values related to mean value in %	
	1	2	3	4	5			
$d_h$	5,90	5,77	5,76	5,76	5,77	5,79	+ 1,87	- 0,61
$d_{s,1}$	2,26	2,24	2,26	2,31	2,29	2,27	+ 1,67	- 1,28
$d_{s,2}$	2,36	2,36	2,39	2,36	2,37	2,37	+ 0,93	- 0,51
$d_{s,3}$	2,37	2,38	2,36	2,35	2,39	2,37	+ 0,70	- 0,85
$d_1$	2,38	2,47	2,45	2,41	2,43	2,43	+ 1,84	- 1,93
$d_2$	2,48	2,56	2,50	2,54	2,52	2,52	+ 1,42	- 1,47
$d_3$	2,52	2,54	2,49	2,52	2,59	2,53	+ 2,18	- 1,65
$l_{g1}$	12,0	11,6	11,8	11,4	11,9	11,7	+ 2,13	- 2,81
$l_{g2}$	11,9	12,2	12,1	11,8	11,9	12,0	+ 2,05	- 1,87
$l_{g3}$	22,1	22,2	21,5	21,7	22,0	21,9	+ 1,43	- 1,81
$l_{s2}$	6,05	6,37	6,21	6,22	6,32	6,23	+ 2,18	- 2,95
$l_{s3}$	6,72	6,92	6,99	6,99	6,98	6,92	+ 1,01	- 2,89
$l$	63,9	64,1	64,0	63,5	64,0	63,9	+ 0,29	- 0,60
$h_t$	1,18	1,19	1,18	1,20	1,18	1,19	+ 1,18	- 0,51
$l_p$	2,80	2,88	2,85	2,74	2,73	2,80	+ 2,86	- 2,50
$A_n$	27,3	26,2	26,0	26,1	26,1	26,3	+ 3,77	- 1,23

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tested nail 2,30 x 65 mm spiral bright

Dimensi- ons	measured values in mm					mean value in mm	measured values related to mean value in %	
	1	2	3	4	5			
$d_h$	5,63	5,71	5,63	5,65	5,55	5,64	+ 1,37	- 1,50
$d_{s,1}$	2,26	2,25	2,23	2,25	2,29	2,26	+ 1,51	- 1,15
$d_{s,2}$	2,29	2,29	2,29	2,28	2,28	2,29	+ 0,17	- 0,19
$d_{s,3}$	2,28	2,28	2,28	2,28	2,28	2,28	+ 0,08	- 0,14
$d_1$	2,34	2,40	2,36	2,35	2,34	2,36	+ 2,01	- 0,87
$d_2$	2,43	2,48	2,44	2,46	2,45	2,45	+ 1,30	- 1,09
$d_3$	2,44	2,46	2,46	2,46	2,43	2,45	+ 0,57	- 0,71
$l_{g1}$	11,6	11,2	11,1	11,4	11,2	11,3	+ 2,65	- 1,77
$l_{g2}$	12,2	11,9	12,2	12,0	11,9	12,0	+ 1,33	- 1,16
$l_{g3}$	23,0	22,4	23,0	22,6	22,3	22,7	+ 1,50	- 1,59
$l_{s2}$	6,09	6,20	6,19	6,01	6,00	6,10	+ 1,67	- 1,61
$l_{s3}$	6,12	6,13	6,16	6,14	6,39	6,19	+ 3,26	- 1,10
$l$	63,9	63,7	64,1	64,1	63,5	63,9	+ 0,44	- 0,62
$h_t$	1,07	1,02	1,05	1,07	1,03	1,05	+ 2,10	- 2,67
$l_p$	2,66	2,62	2,70	2,60	2,60	2,64	+ 2,43	- 1,37
$A_h$	24,9	25,6	24,9	25,1	24,2	24,9	+ 2,74	- 2,99

tensile capacity	tensile strength of wire	yield moment	withdrawal parameter	head pull-through parameter
2,30 x 65 HDG	---	2,30 x 65 HDG	2,30 x 65 bright	2,30 x 65 HDG
$f_{tens}$ kN	$f_u$ N/mm <sup>2</sup>	$M_y$ Nm	$\rho$ kg/m <sup>3</sup>	$\rho$ kg/m <sup>3</sup>
1,62	---	crack	$R_{ax}$ kN	$R_{ax}^*$ kN
1,61	---	-		
1,69	---	0,921		0,900
1,67	---	0,939		0,860
1,68	---	0,958		0,860
1,69	---	0,968		1,26
1,65	---	0,949		1,32
1,70	---	0,930		1,33
1,63	---	0,968		1,34
1,65	---	0,921		1,10
		0,930		1,43
		0,949		1,11
$f_{tens,k} = 1,49$ kN	---	$M_{y,k} = 0,849$ Nm	$f_{ax,k} = 4,50$ N/mm <sup>2</sup> with $\rho_k = 350$ kg/m <sup>3</sup>	$f_{head,k} = 22,2$ N/mm <sup>2</sup> with $\rho_k = 380$ kg/m <sup>3</sup>

\* maximal strength at a crosshead displacement of 15 mm

penetration depth: 23 mm

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*R. Görlacher*

Dr.-Ing. R. Görlacher

**Espoo**  
 Lanttikatu 1  
 02770 Espoo  
 puh. (09) 5259 030  
 fax. (09) 5259 0320



myynti@hhtuonti.fi - www.hhtuonti.fi

**Oulu**  
 Myyntimiehenkuja 10 C 4  
 90420 Oulu  
 puh. (09) 5259 0328  
 fax. (04) 211 550 4561

Report No. 136250/14  
Initial Type Test (ITT)



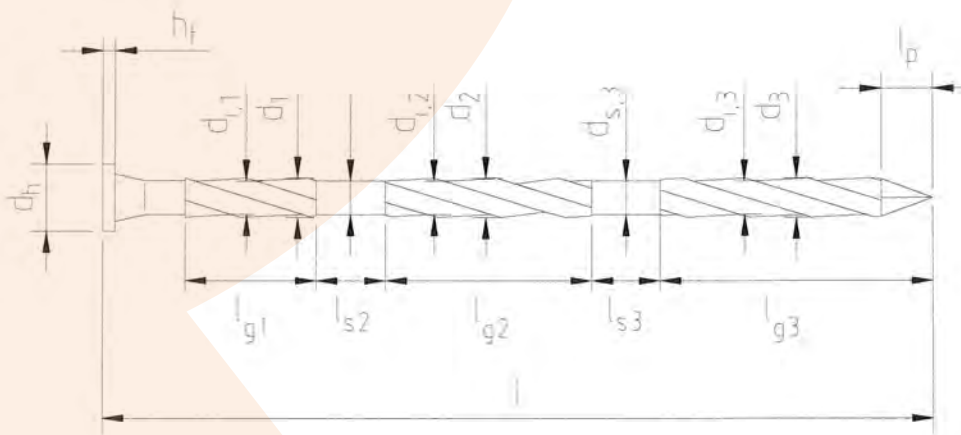
**Client:** H&H Tuonti Oy

**Base:** EN 14592:2008+A1:2012 (D)  
nails for structural timber products

**Dimensions:** diameter 2,50 mm

**Coating:** type 1 – HDG  $\geq 50\mu\text{m}$

**Material:** HPB 235 (Q235) in accordance to GB1499.1-2008



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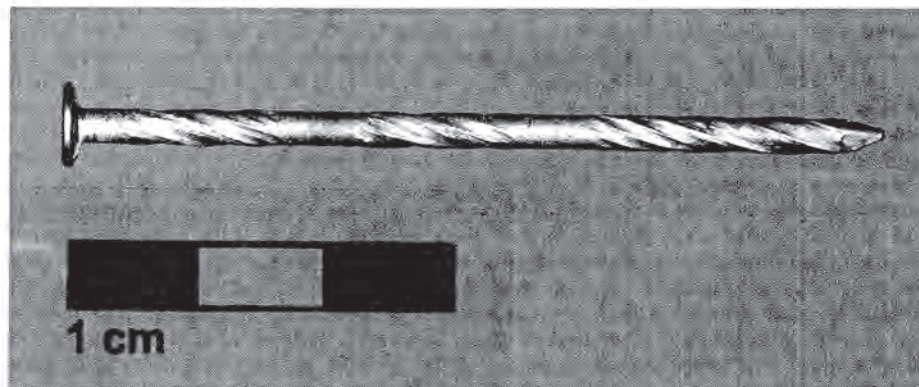
**Espoo**  
Lanttikatu 1  
02770 Espoo  
puh. (09) 5259 030  
fax. (09) 5259 0320



**H&H**  
**TUONTI**

**Oulu**  
Myyntimiehenkuja 10 C 4  
90420 Oulu  
puh. (09) 5259 0328  
fax. (04) 211 550 4561

myynti@hhtuonti.fi - www.hhtuonti.fi



tested nail 2,50 x 65 mm spiral HDG

Dimen- sions	measured values in mm					mean value in mm	measured values related to mean value in %	
	1	2	3	4	5			
$d_h$	6,38	6,35	6,52	6,40	6,34	6,40	+ 1,86	- 0,87
$d_{s,1}$	2,66	2,62	2,67	2,62	2,68	2,65	+ 1,16	- 1,24
$d_{s,2}$	2,55	2,58	2,58	2,58	2,57	2,57	+ 0,40	- 0,77
$d_{s,3}$	2,55	2,57	2,56	2,57	2,55	2,56	+ 0,41	- 0,47
$d_1$	2,79	2,64	2,68	2,70	2,76	2,71	+ 2,89	- 2,77
$d_2$	2,68	2,62	2,71	2,66	2,68	2,67	+ 1,41	- 1,72
$d_3$	2,72	2,72	2,70	2,72	2,75	2,72	+ 1,04	- 0,82
$l_{g1}$	12,8	12,4	12,5	12,7	12,2	12,5	+ 2,41	- 2,70
$l_{g2}$	11,8	12,6	12,0	12,4	12,3	12,2	+ 2,88	- 3,34
$l_{g3}$	23,0	22,6	23,0	22,5	22,4	22,7	+ 1,36	- 1,33
$l_{s2}$	7,25	7,22	7,19	6,90	6,95	7,10	+ 2,08	- 2,84
$l_{s3}$	6,72	7,00	6,94	6,92	6,93	6,90	+ 1,42	- 2,64
$l$	63,9	64,2	64,3	64,0	64,0	64,1	+ 0,30	- 0,27
$h_t$	1,15	1,20	1,14	1,19	1,16	1,17	+ 2,74	- 2,40
$l_p$	2,78	2,84	2,90	2,91	2,90	2,87	+ 1,54	- 3,00
$A_h$	31,9	31,7	33,3	32,2	31,6	32,1	+ 3,75	- 1,74

tensile capacity	tensile strength of wire	yield moment		withdrawal parameter		head pull-through parameter	
		$M_y$ Nm	crack	$\rho$ kg/m <sup>3</sup>	$R_{ax}$ kN	$\rho$ kg/m <sup>3</sup>	$R_{ax}^*$ kN
2,50 x 65	---	2,50 x 65		2,50 x 65**		2,50 x 65	
$f_{tens}$ kN	$f_u$ N/mm <sup>2</sup>			$d = 2,5 \text{ mm}$	$l_{ef} = 22,1 \text{ mm}$	$d_h = 6,40 \text{ mm}$	
2,87	---	1,58	NO	346	0,462	355	1,18
2,63	---	1,61	NO	369	0,371	406	1,59
2,62	---	1,65	NO	373	0,391	384	1,19
2,68	---	1,62	NO	366	0,404	407	1,30
2,74	---	1,65	NO	382	0,545	364	0,850
2,78	---	1,67	NO	346	0,252	373	1,06
2,74	---	1,61	NO	369	0,291	384	1,46
2,74	---	1,67	NO	373	0,203	371	1,26
2,98	---	1,64	NO	366	0,390	347	0,910
2,67	---	1,61	NO	382	0,404	360	1,46
$f_{tens,k} = 2,47 \text{ kN}$	---	$M_{y,k} = 1,47 \text{ Nm}$		$f_{ax,k} = 3,50 \text{ N/mm}^2$		$f_{head,k} = 19,1 \text{ N/mm}^2$	
				with $P_k = 350 \text{ kg/m}^3$		with $P_k = 380 \text{ kg/m}^3$	

\* maximal strength at a crosshead displacement of 15 mm

penetration depth: 25 mm

\*\* withdrawal parameter < 4,50 N/mm<sup>2</sup>

Karlsruhe 26.04.2013

Head of Notified Body NB 0769



*R. Görlacher*

Dr.-Ing. R. Görlacher

**Espoo**  
Lanttikatu 1  
02770 Espoo  
puh. (09) 5259 030  
fax. (09) 5259 0320



**Oulu**  
Myyntimiehenkuja 10 C 4  
90420 Oulu  
puh. (09) 5259 0328  
fax. (04) 211 550 4561

myynti@hhtuonti.fi - www.hhtuonti.fi

**Report No. 136250/15**  
**Initial Type Test (ITT)**



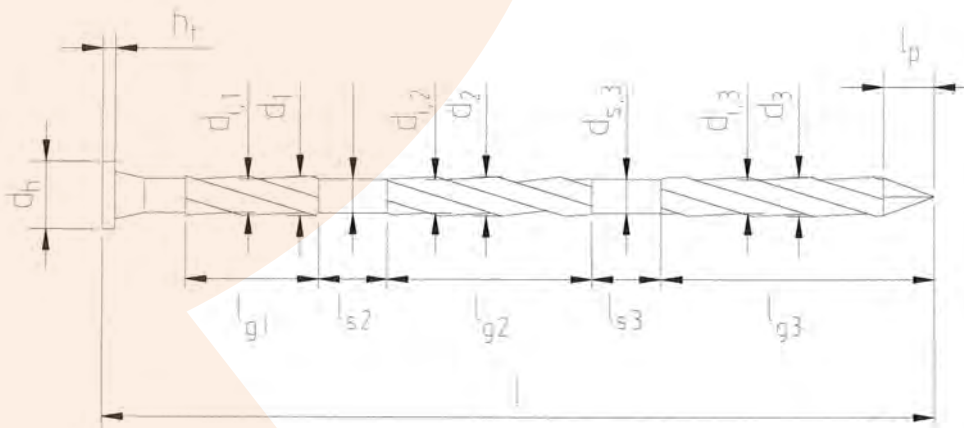
**Client:** H&H Tuonti Oy

**Base:** EN 14592:2008+A1:2012 (D)  
nails for structural timber products

**Dimensions:** diameter 2,90 mm

**Coating:** type 1 – HDG  $\geq 50\mu\text{m}$  or bright =  $0\mu\text{m}$

**Material:** HPB 235 (Q235) in accordance to GB1499.1-2008



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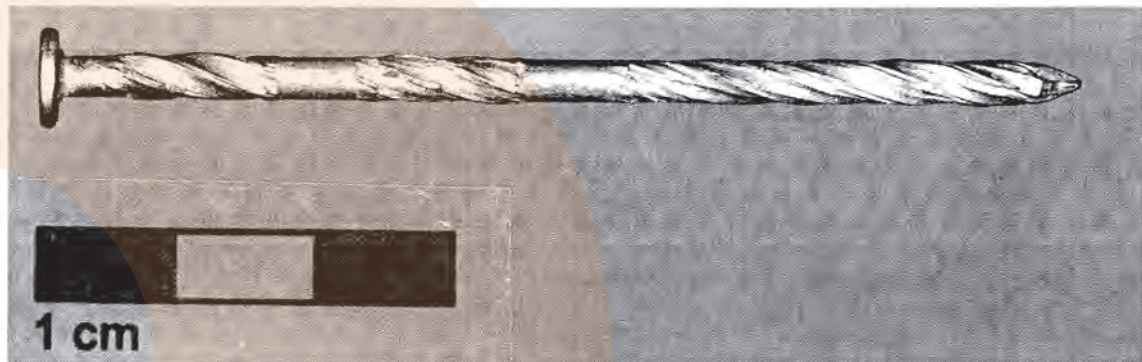
KIT – Universität des Landes Baden-Württemberg und nationales Forschungszentrum in der Helmholtz-Gemeinschaft

**Espoo**  
Lanttikatu 1  
02770 Espoo  
puh. (09) 5259 030  
fax. (09) 5259 0320



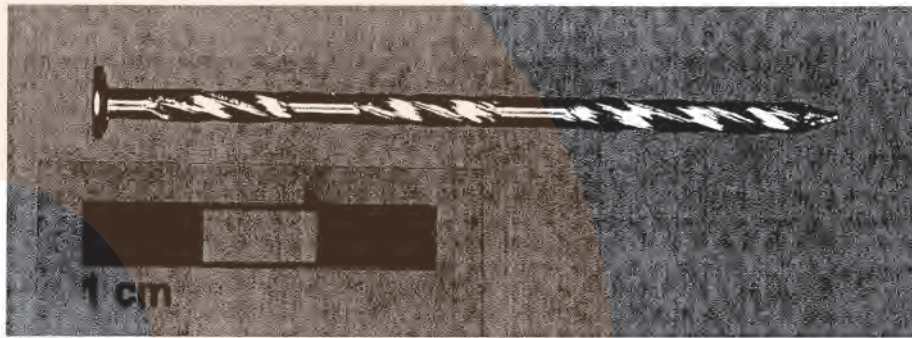
**Oulu**  
Myyntimiehenkuja 10 C 4  
90420 Oulu  
puh. (09) 5259 0328  
fax. (04) 211 550 4561

myynti@hhtuonti.fi - www.hhtuonti.fi



tested nail 2,90 x 75 mm spiral HDG

Dimen- sions	measured values in mm					mean value in mm	measured values related to mean value in %	
	1	2	3	4	5			
$d_h$	7,06	6,96	6,90	7,07	7,05	7,01	+ 0,87	- 1,49
$d_{s,1}$	2,89	2,88	2,92	2,91	2,92	2,88	+ 1,25	- 2,22
$d_{s,2}$	2,93	2,94	2,94	2,94	2,94	2,94	+ 0,15	- 0,24
$d_{s,3}$	2,94	2,93	2,93	2,94	2,93	2,94	+ 0,16	- 0,10
$d_1$	3,17	3,21	3,15	3,20	3,11	3,17	+ 1,33	- 1,83
$d_2$	3,25	3,23	3,17	3,21	3,12	3,20	+ 1,69	- 2,38
$d_3$	3,22	3,19	3,13	3,26	3,19	3,20	+ 1,94	- 2,13
$l_{g1}$	12,4	12,4	12,2	12,2	12,7	12,4	+ 2,57	- 1,63
$l_{g2}$	12,8	12,7	12,8	12,7	12,9	12,8	+ 0,88	- 0,85
$l_{g3}$	33,7	32,6	33,2	33,0	32,5	33,0	+ 2,15	- 1,52
$l_{s2}$	5,24	5,30	4,99	5,09	5,13	5,15	+ 2,91	- 3,11
$l_{s3}$	5,29	5,30	5,32	5,34	5,50	5,35	+ 2,80	- 1,12
$l$	75,0	75,1	74,7	75,0	74,6	74,9	+ 0,28	- 0,37
$h_t$	1,72	1,82	1,79	1,72	1,81	1,77	+ 2,71	- 2,93
$l_p$	3,48	3,47	3,60	3,68	3,67	3,58	+ 2,79	- 3,07
$A_h$	39,1	38,1	37,4	39,2	39,0	38,6	+ 1,74	- 2,97



tested nail 2,90 x 75 mm spiral bright

Dimen- sions	measured values in mm					mean value in mm	measured values related to mean value in %	
	1	2	3	4	5			
$d_h$	6,87	6,95	6,73	6,78	6,76	6,82	+ 1,95	- 1,26
$d_{s,1}$	2,81	2,79	2,84	2,85	2,84	2,84	+ 0,85	- 1,27
$d_{s,2}$	2,85	2,84	2,84	2,84	2,84	2,84	+ 0,19	- 0,15
$d_{s,3}$	2,84	2,84	2,84	2,84	2,84	2,84	+ 0,10	- 0,06
$d_1$	2,96	3,05	3,00	2,93	2,95	2,98	+ 2,42	- 1,61
$d_2$	2,98	3,05	3,04	2,96	2,99	3,00	+ 1,53	- 1,46
$d_3$	3,05	3,06	3,05	3,00	2,99	3,03	+ 0,99	- 1,32
$l_{g1}$	12,9	12,6	12,3	12,5	12,1	12,5	+ 3,17	- 3,16
$l_{g2}$	12,6	12,4	12,8	12,1	12,0	12,4	+ 3,39	- 3,07
$l_{g3}$	33,3	33,2	33,2	32,7	33,8	33,3	+ 1,65	- 1,75
$l_{s2}$	5,92	5,96	6,30	6,42	6,24	6,17	+ 4,09	- 4,02
$l_{s3}$	5,83	5,79	6,32	6,17	6,14	6,05	+ 4,46	- 4,30
$l$	75,1	74,5	74,9	74,8	74,7	74,8	- 0,37	- 0,39
$h_t$	1,50	1,45	1,53	1,46	1,48	1,48	+ 3,10	- 2,29
$l_p$	3,54	3,50	3,72	3,72	3,64	3,62	+ 2,65	- 3,42
$A_h$	37,1	37,9	35,6	36,0	35,9	36,5	+ 3,92	- 2,51



tensile capacity	tensile strength of wire	yield moment		withdrawal parameter		head pull-through parameter			
		$f_{tens}$ kN	$f_u$ N/mm <sup>2</sup>	$M_{y,k}$ Nm	crack	$d = 2,9$ mm $l_{ef} = 25,4$ mm	$2,90 \times 75$ HDG $d_h = 7,00$ mm	$\rho$ kg/m <sup>3</sup>	$R_{ax}^*$ kN
2,90 x 75 HDG	---	---	---	---	---	---	---	---	---
4,72	---	2,76	NO	0,753	378	1,52	378	1,52	
4,80	---	2,79	NO	0,648	346	2,41	376	2,41	
4,82	---	2,76	NO	0,571	334	1,28	355	1,28	
4,64	---	2,86	NO	0,624	357	0,990	370	0,990	
4,67	---	2,75	NO	0,676	353	1,46	364	1,46	
4,60	---	2,88	NO	0,469	373	2,01	398	2,01	
4,61	---	2,85	NO	0,406	346	2,17	393	2,17	
4,64	---	2,73	NO	0,479	334	1,81	370	1,81	
4,61	---	2,80	NO	0,497	357	1,78	374	1,78	
4,91	---	2,72	NO	0,604	353	2,05	384	2,05	
<b><math>f_{tens,k} = 4,23</math> kN</b>	---	<b><math>M_{y,k} = 2,51</math> Nm</b>		<b><math>f_{ax,k} = 5,10</math> N/mm<sup>2</sup> with <math>\rho_k = 350</math> kg/m<sup>3</sup></b>		<b><math>f_{head,k} = 19,6</math> N/mm<sup>2</sup> with <math>\rho_k = 380</math> kg/m<sup>3</sup></b>			

\* maximal strength at a crosshead displacement of 15 mm  
penetration depth: 29 mm

Karlsruhe 26.04.2013

Head of Notified Body NB 0769



*R. Görlacher*

Dr.-Ing. R. Görlacher

**Espoo**  
Lanttikatu 1  
02770 Espoo  
puh. (09) 5259 030  
fax. (09) 5259 0320



myynti@hhtuonti.fi - www.hhtuonti.fi

**Oulu**  
Myyntimiehenkuja 10 C 4  
90420 Oulu  
puh. (09) 5259 0328  
fax. (04) 211 550 4561

Report No. 136250/16  
Initial Type Test (ITT)



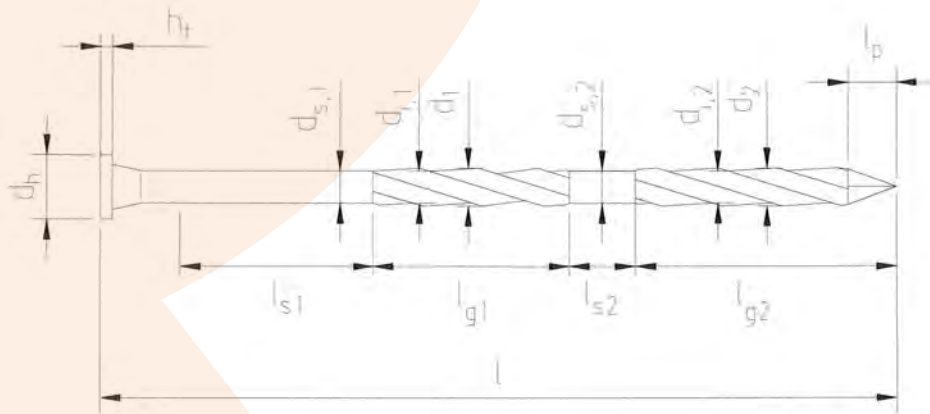
**Client:** H&H Tuonti Oy

**Base:** EN 14592:2008+A1:2012 (D)  
nails for structural timber products

**Dimensions:** diameter 3,10 mm

**Coating:** type 1 – HDG  $\geq 50\mu\text{m}$

**Material:** HPB 235 (Q235) in accordance to GB1499.1-2008



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**Espoo**  
Lanttikatu 1  
02770 Espoo  
puh. (09) 5259 030  
fax. (09) 5259 0320

**H&H**  
**TUONTI**

myynti@hhtuonti.fi - www.hhtuonti.fi

**Oulu**  
Myyntimiehenkuja 10 C 4  
90420 Oulu  
puh. (09) 5259 0328  
fax. (04) 211 550 4561



tested nail 3,10 x 90 mm spiral HDG

Dimen- sions	measured values in mm					mean value in mm	measured values related to mean value in %	
	1	2	3	4	5			
$d_h$	7,11	7,11	7,22	6,99	7,16	7,12	+ 1,42	- 1,82
$d_{s,1}$	3,13	3,09	3,12	3,12	3,13	3,12	+ 0,51	- 0,82
$d_{s,2}$	3,15	3,14	3,12	3,11	3,12	3,13	+ 0,64	- 0,53
$d_1$	3,34	3,29	3,27	3,39	3,32	3,32	+ 2,05	- 1,57
$d_2$	3,45	3,41	3,32	3,30	3,37	3,37	+ 2,37	- 2,08
$l_{g1}$	14,0	14,1	14,7	14,6	13,9	14,3	+ 3,17	- 2,51
$l_{g2}$	48,2	47,6	48,1	48,7	48,4	48,2	+ 1,02	- 1,26
$l_{s2}$	5,90	5,85	5,77	5,55	5,50	5,71	+ 3,26	- 3,75
$l$	89,0	89,2	88,9	89,0	88,8	89,0	+ 0,23	- 0,19
$h_t$	1,98	1,87	1,88	1,91	1,97	1,92	+ 3,02	- 2,71
$l_p$	3,20	3,22	3,24	3,40	3,40	3,29	+ 3,28	- 2,79
$A_h$	39,6	39,7	40,9	38,3	40,2	39,7	+ 2,86	- 3,62

tensile capacity	tensile strength of wire	yield moment		withdrawal parameter		head pull-through parameter	
		$M_{y,k}$ Nm	crack	$\rho$ kg/m <sup>3</sup>	$R_{ax}$ kN	$\rho$ kg/m <sup>3</sup>	$R_{ax}^*$ kN
3,10 x 90	---	3,10 x 90		3,10 x 90		3,10 x 90	
$f_{tens}$ kN	$f_u$ N/mm <sup>2</sup>	$M_y$ Nm	crack	$\rho$ kg/m <sup>3</sup>	$R_{ax}$ kN	$\rho$ kg/m <sup>3</sup>	$R_{ax}^*$ kN
5,54	---	3,52	NO	369	0,730	384	2,01
5,53	---	3,50	NO	364	0,820	374	1,83
5,54	---	3,57	NO	375	0,758	370	1,99
5,25	---	3,60	NO	346	0,869	393	1,85
5,26	---	3,56	NO	381	0,824	398	1,97
5,29	---	3,53	NO	369	0,722	364	1,32
5,44	---	3,48	NO	375	0,828	370	1,56
5,31	---	3,52	NO	358	0,448	355	1,37
5,27	---	3,56	NO	346	0,438	410	1,83
5,29	---	3,51	NO	381	0,938	371	1,31
$f_{tens,k}$ = 4,84 kN	---	$M_{y,k}$ = 3,18 Nm		$f_{ax,k}$ = 4,78 N/mm <sup>2</sup> with $\rho_k$ = 350 kg/m <sup>3</sup>		$f_{head,k}$ = 22,4 N/mm <sup>2</sup> with $\rho_k$ = 380 kg/m <sup>3</sup>	

\* maximal strength at a crosshead displacement of 15 mm

penetration depth: 31 mm

Karlsruhe 26.04.2013

Head of Notified Body NB 0769



*R. Görlicher*

Dr.-Ing. R. Görlicher

**Espoo**  
Lanttikatu 1  
02770 Espoo  
puh. (09) 5259 030  
fax. (09) 5259 0320

**H&H**  
**TUONTI**

myynti@hhtuonti.fi - www.hhtuonti.fi

**Oulu**  
Myyntimiehenkuja 10 C 4  
90420 Oulu  
puh. (09) 5259 0328  
fax. (04) 211 550 4561

Report No. 136250/17  
Initial Type Test (ITT)



**Client:** H&H Tuonti Oy

**Base:** EN 14592:2008+A1:2012 (D)  
nails for structural timber products

**Dimensions:** diameter 3,40 mm

**Coating:** type 1 – HDG  $\geq 50\mu\text{m}$

**Material:** HPB 235 (Q235) in accordance to GB1499.1-2008



tested nail 3,40 x 100 mm spiral HDG

Dimen- sions	measured values in mm					mean value in mm	measured values related to mean value in %	
	1	2	3	4	5			
$d_h$	7,09	7,07	7,02	7,20	7,11	7,10	+ 1,40	- 1,10
$d$	3,43	3,41	3,42	3,38	3,40	3,41	+ 0,64	- 0,89
$d_a$	3,54	3,55	3,59	3,58	3,62	3,58	+ 1,23	- 1,01
$l_g$	72,6	74,8	73,9	72,8	72,6	73,3	+ 1,99	- 1,01
$l$	99,6	99,9	99,2	100	99,9	99,7	+ 0,39	- 0,54
$h_t$	1,97	1,94	2,05	2,04	1,97	1,99	+ 2,81	- 2,71
$l_p$	4,21	4,26	4,27	4,13	4,35	4,24	+ 2,50	- 2,69
$A_h$	39,5	39,2	38,7	40,7	39,7	39,6	+ 2,80	- 2,19

$d_a$  = outer diameter

tensile capacity	tensile strength of wire	yield moment	withdrawal parameter	head pull-through parameter
3,40 x 100	---	3,40 x 100	3,40 x 100 d = 3,4 mm l <sub>ef</sub> = 30 mm	3,40 x 100 d <sub>h</sub> = 7,10 mm
f <sub>tens</sub> kN	f <sub>u</sub> N/mm <sup>2</sup>	M <sub>y</sub> Nm crack	ρ kg/m <sup>3</sup> R <sub>ax</sub> kN	ρ kg/m <sup>3</sup> R <sub>ax</sub> kN
6,44	---	4,42 NO	381 0,801	398 1,90
6,56	---	4,46 NO	346 0,653	370 1,61
6,47	---	4,44 NO	365 0,978	393 1,55
6,24	---	4,53 NO	369 0,677	374 1,44
6,62	---	4,50 NO	358 0,755	384 1,62
6,32	---	4,62 NO	381 1,140	370 1,33
6,18	---	4,55 NO	346 0,731	355 0,970
6,16	---	4,55 NO	369 0,630	364 1,11
6,14	---	4,60 NO	358 0,834	410 1,43
6,24	---	4,53 NO	375 0,750	393 1,47
f <sub>tens,k</sub> = 5,70 kN	---	M <sub>y,k</sub> = 4,07 Nm	f <sub>ax,k</sub> = 5,25 N/mm <sup>2</sup> with p <sub>k</sub> = 350 kg/m <sup>3</sup>	f <sub>head,k</sub> = 18,8 N/mm <sup>2</sup> with p <sub>k</sub> = 380 kg/m <sup>3</sup>

\* maximal strength at a crosshead displacement of 15 mm  
 penetration depth: 34 mm

Karlsruhe 26.04.2013

Head of Notified Body NB 0769



*R. Görlacher*

Dr.-Ing. R. Görlacher

**Espoo**  
 Lanttikatu 1  
 02770 Espoo  
 puh. (09) 5259 030  
 fax. (09) 5259 0320



myynti@hhtuonti.fi - www.hhtuonti.fi

**Oulu**  
 Myyntimiehenkuja 10 C 4  
 90420 Oulu  
 puh. (09) 5259 0328  
 fax. (04) 211 550 4561

Report No. 136250/18  
Initial Type Test (ITT)



**Client:** H&H Tuonti Oy  
**Base:** EN 14592:2008+A1:2012 (D)  
nails for structural timber products  
**Dimensions:** diameter 3,80 mm  
**Coating:** type 1 – HDG  $\geq 50\mu\text{m}$   
**Material:** HPB 235 (Q235) in accordance to GB1499.1-2008



tested nail 3,80 x 110 mm spiral HDG

Dimen- sions	measured values in mm					mean value in mm	measured values related to mean value in %	
	1	2	3	4	5			
$d_h$	8,14	8,12	8,15	8,24	8,23	8,18	+ 0,75	- 0,68
$d$	3,86	3,86	3,85	3,79	3,79	3,83	+ 0,78	- 1,00
$d_a$	4,09	4,06	4,12	4,04	4,17	4,10	+ 1,86	- 1,44
$l_g$	74,5	76,7	76,4	75,3	75,0	75,6	+ 1,44	- 1,41
$l$	108	108	108	108	108	108	+ 0,24	- 0,16
$h_t$	2,09	2,09	2,01	1,98	1,98	2,03	+2,96	-2,46
$l_p$	4,30	4,28	4,24	4,42	4,38	4,32	+2,22	-1,94
$A_h$	52,0	51,8	52,1	53,3	53,2	52,5	+ 1,50	- 1,35

$d_a$  = outer diameter

KIT – Universität des Landes Baden-Württemberg und nationales Forschungszentrum in der Helmholtz-Gemeinschaft

**Espoo**  
Lanttikatu 1  
02770 Espoo  
puh. (09) 5259 030  
fax. (09) 5259 0320



**Oulu**  
Myyntimiehenkuja 10 C 4  
90420 Oulu  
puh. (09) 5259 0328  
fax. (04) 211 550 4561

myynti@hhtuonti.fi - www.hhtuonti.fi

tensile capacity	tensile strength of wire	yield moment		withdrawal parameter		head pull-through parameter	
		$M_y$ Nm	crack	$\rho$ kg/m <sup>3</sup>	$R_{ax}$ kN	$\rho$ kg/m <sup>3</sup>	$R_{ax}^*$ kN
3,80 x 110	---	3,80 x 110		3,80 x 110		3,80 x 110	
$f_{tens}$ kN	$f_u$ N/mm <sup>2</sup>			$d = 3,8 \text{ mm}$	$l_{ef} = 33,7 \text{ mm}$	$d_h = 8,20 \text{ mm}$	
8,22	---	6,68	NO	375	0,970	355	2,55
8,16	---	6,63	NO	364	1,20	389	2,86
8,21	---	6,30	NO	365	1,01	407	3,43
8,22	---	6,66	NO	369	0,749	399	2,69
8,26	---	6,54	NO	346	0,809	384	2,47
8,27	---	6,39	NO	375	0,796	373	2,15
8,23	---	6,39	NO	364	1,28	384	2,46
8,10	---	6,53	NO	381	1,237	371	2,13
8,10	---	6,52	NO	369	0,835	360	4,51
8,22	---	6,46	NO	346	0,744	360	2,99
$f_{tens,k} = 7,38 \text{ kN}$	---	$M_{y,k} = 5,86 \text{ Nm}$		$f_{ax,k} = 4,72 \text{ N/mm}^2$ with $P_k = 350 \text{ kg/m}^3$		$f_{head,k} = 25,5 \text{ N/mm}^2$ with $P_k = 380 \text{ kg/m}^3$	

\* maximal strength at a crosshead displacement of 15 mm

penetration depth: 38 mm

Karlsruhe 26.04.2013

Head of Notified Body NB 0769



*R. Görlacher*

Dr.-Ing. R. Görlacher

**Espoo**  
Lanttikatu 1  
02770 Espoo  
puh. (09) 5259 030  
fax. (09) 5259 0320



myynti@hhtuonti.fi - www.hhtuonti.fi

**Oulu**  
Myyntimiehenkuja 10 C 4  
90420 Oulu  
puh. (09) 5259 0328  
fax. (04) 211 550 4561



Report No. 136250/19  
Initial Type Test (ITT)



**Client:** H&H Tuonti Oy

**Base:** EN 14592:2008+A1:2012 (D)  
nails for structural timber products

**Dimensions:** diameter 4,60 mm

**Coating:** type 1 – HDG  $\geq 50\mu\text{m}$  or bright =  $0\mu\text{m}$

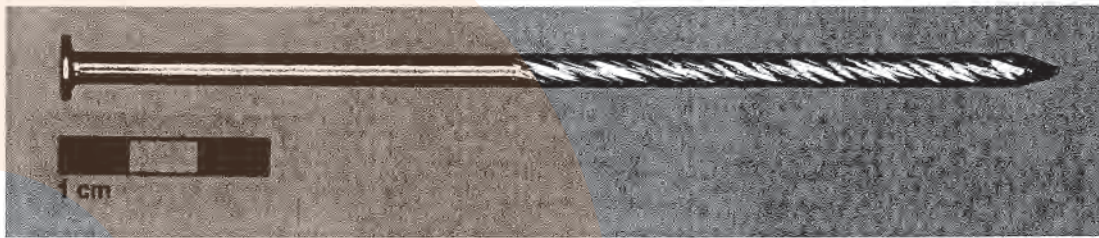
**Material:** HPB 235 (Q235) in accordance to GB1499.1-2008



tested nail 4,60 x 145 mm spiral HDG

Dimen- sions	measured values in mm					mean value in mm	measured values related to mean value in %	
	1	2	3	4	5			
$d_h$	9,09	9,10	9,09	9,14	9,10	9,11	+ 0,38	- 0,14
$d$	4,64	4,60	4,62	4,64	4,64	4,63	+ 0,23	- 0,48
$d_a$	4,89	4,82	4,72	4,73	4,82	4,80	+ 1,93	- 1,49
$l_g$	75,3	76,1	74,1	77,2	74,6	75,0	+ 1,43	- 1,23
$l$	142	143	143	143	143	143	+ 0,14	- 0,25
$h_t$	2,05	2,10	2,11	2,08	2,07	2,08	+ 1,34	- 1,54
$l_p$	7,12	7,05	7,04	6,93	6,96	7,02	+ 1,42	- 1,28
$A_h$	64,9	65,0	64,9	65,9	65,0	65,1	+ 0,76	- 0,29

$d_a$  = outer diameter



tested nail 4,60 x 145 mm spiral bright

Dimen- sions	measured values in mm					mean value in mm	measured values related to mean value in %	
	1	2	3	4	5			
$d_h$	9,34	9,20	9,29	9,20	9,2	9,26	+ 0,92	- 0,68
$d$	4,53	4,54	4,54	4,55	4,53	4,54	+ 0,32	- 0,17
$d_a$	4,73	4,68	4,74	4,76	4,73	4,73	+ 0,74	- 1,07
$l_g$	78,7	78,7	77,9	77,1	78,6	78,2	+ 0,69	- 1,41
$l$	142	142	143	142	143	143	+ 0,22	- 0,17
$h_t$	1,64	1,64	1,75	1,79	1,78	1,72	+ 4,07	- 4,65
$l_p$	6,96	6,80	7,12	7,20	7,31	7,08	+ 3,28	- 3,93
$A_h$	68,5	66,4	67,7	66,4	67,4	67,3	+ 1,84	- 1,37

$d_a$  = outer diameter

tensile capacity	tensile strength of wire	yield moment		withdrawal parameter		head pull-through parameter			
		$f_{\text{tens}}$ kN	$f_u$ N/mm <sup>2</sup>	$M_y$ Nm	crack	$d = 4,6 \text{ mm}$ $l_{\text{ef}} = 39,0 \text{ mm}$	$R_{\text{ax}}$ kN	$\rho$ kg/m <sup>3</sup>	$R_{\text{ax}}^*$ kN
4,60 x 145 HDG	---	---	---	---	---	---	---	---	---
12,0	---	11,6	NO	0,957	361	2,37			
12,1	---	11,8	NO	1,16	334	3,23			
11,8	---	11,6	NO	1,28	357	3,48			
12,1	---	11,5	NO	1,43	353	2,82			
12,1	---	11,7	NO	1,269	333	3,88			
12,2	---	11,9	NO	1,074	373	3,13			
12,2	---	11,6	NO	1,117	334	2,46			
12,1	---	11,5	NO	1,66	357	3,00			
11,9	---	11,6	NO	1,75	353	2,99			
12,2	---	11,4	NO	1,35	333	2,41			
<b><math>f_{\text{tens,k}} = 10,9 \text{ kN}</math></b>	---	<b><math>M_{y,k} = 10,5 \text{ Nm}</math></b>		<b><math>f_{\text{ax,k}} = 4,81 \text{ N/mm}^2</math> with <math>\rho_k = 350 \text{ kg/m}^3</math></b>		<b><math>f_{\text{head,k}} = 24,7 \text{ N/mm}^2</math> with <math>\rho_k = 380 \text{ kg/m}^3</math></b>			

\* maximal strength at a crosshead displacement of 15 mm  
penetration depth: 46 mm

Karlsruhe 26.04.2013

Head of Notified Body NB 0769



*R. Görlacher*

Dr.-Ing. R. Görlacher

**Espoo**  
Lanttikatu 1  
02770 Espoo  
puh. (09) 5259 030  
fax. (09) 5259 0320



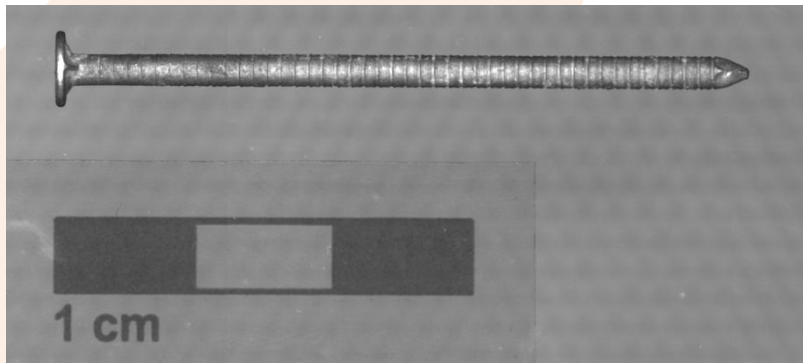
myynti@hhtuonti.fi - www.hhtuonti.fi

**Oulu**  
Myyntimiehenkuja 10 C 4  
90420 Oulu  
puh. (09) 5259 0328  
fax. (04) 211 550 4561

Report No. 136250/20  
Initial Type Test (ITT)



**Client:** H&H Tuonti Oy  
**Base:** EN 14592:2008+A1:2012 (D)  
nails for structural timber products  
**Dimensions:** diameter 2,10 mm  
**Coating:** type 1 – HDG  $\geq 50\mu\text{m}$   
**Material:** HPB 235 (Q235) in accordance to GB1499.1-2008



tested nail 2,10 x 50 mm ring HDG

Dimen- sions	measured values in mm					mean value in mm	measured values related to mean value in %	
	1	2	3	4	5			
$d_h$	5,21	5,26	5,24	5,25	5,29	5,25	+ 0,75	- 0,77
$d_1$	1,95	1,97	2,03	2,03	2,01	2,00	+ 1,72	- 2,49
$d_a$	2,36	2,36	2,37	2,31	2,42	2,36	+ 2,42	- 2,13
$l$	50,0	49,7	49,4	49,8	50,0	49,8	+ 0,48	- 0,75
$h$	1,00	1,03	1,01	1,01	1,00	1,01	+ 1,85	- 1,05
$h_t$	1,24	1,19	1,27	1,20	1,27	1,23	+ 2,95	- 3,57
$l_p$	2,19	2,31	2,23	2,31	2,21	2,25	+ 2,67	- 2,67
$A_h$	21,3	21,7	21,6	21,6	22,0	21,6	+ 1,50	- 1,53

$d_a$  = outer diameter

tensile capacity	tensile strength of wire	yield moment		withdrawal parameter		head pull-through parameter	
		$M_y$ Nm	crack	$\rho$ kg/m <sup>3</sup>	$R_{ax}$ kN	$\rho$ kg/m <sup>3</sup>	$R_{ax}^*$ kN
2,10 x 50	---	2,10 x 50		2,10 x 50		2,10 x 50	
$f_{tens}$ kN	$f_u$ N/mm <sup>2</sup>			$d = 2,10 \text{ mm}$ $l_{ef} = 18,8 \text{ mm}$	$d_h = 5,30 \text{ mm}$		
1,33	---	0,699	NO	365	0,438	384	1,01
1,31	---	0,727	NO	346	0,421	398	0,890
1,25	---	0,803	NO	369	0,393	374	0,800
1,27	---	0,737	NO	381	0,391	347	0,840
1,30	---	0,727	NO	375	0,431	335	0,800
1,24	---	0,671	NO	364	0,520	371	0,690
1,32	---	0,690	NO	365	0,252	347	0,480
1,28	---	0,690	NO	346	0,213	384	0,970
1,23	---	0,708	NO	369	0,369	343	0,630
1,25	---	0,708	NO	381	0,323	338	0,730
$f_{tens,k} = 1,15 \text{ kN}$	---	$M_{y,k} = 0,644 \text{ Nm}$		$f_{ax,k} = 5,22 \text{ N/mm}^2$ with $\rho_k = 350 \text{ kg/m}^3$		$f_{head,k} = 17,2 \text{ N/mm}^2$ with $\rho_k = 360 \text{ kg/m}^3$	

\* maximal strength at a crosshead displacement of 15 mm

penetration depth: 2.1 mm

Karlsruhe 26.04.2013

Head of Notified Body NB 0769

Dr.-Ing. R. Görlacher

**Espoo**  
Lanttikatu 1  
02770 Espoo  
puh. (09) 5259 030  
fax. (09) 5259 0320



myynti@hhtuonti.fi - www.hhtuonti.fi

**Oulu**  
Myyntimiehenkuja 10 C 4  
90420 Oulu  
puh. (09) 5259 0328  
fax. (04) 211 550 4561

**Report No. 136250/21**  
**Initial Type Test (ITT)**



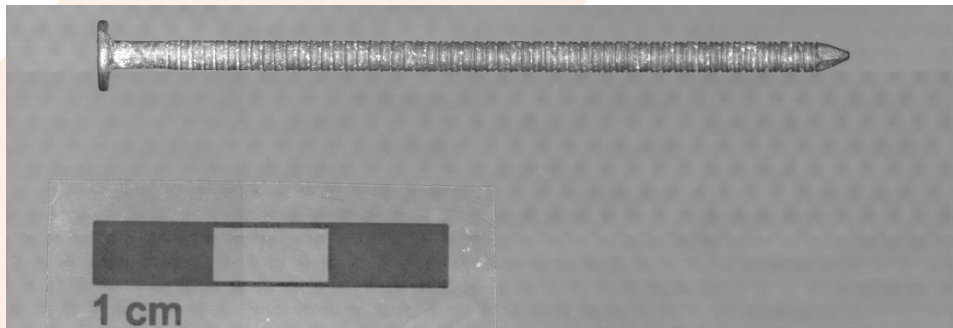
**Client:** H&H Tuonti Oy

**Base:** EN 14592:2008+A1:2012 (D)  
nails for structural timber products

**Dimensions:** diameter 2,30 mm

**Coating:** type 1 – HDG  $\geq 50\mu\text{m}$

**Material:** HPB 235 (Q235) in accordance to GB1499.1-2008



tested nail 2,30 x 65 mm ring HDG

Dimen- sions	measured values in mm					mean value in mm	measured values related to mean value in %	
	1	2	3	4	5			
$d_h$	5,79	5,90	5,85	5,78	5,79	5,82	+ 1,35	- 0,72
$d$	2,31	2,30	2,32	2,27	2,29	2,30	+ 0,89	- 1,34
$d_1$	2,25	2,24	2,23	2,18	2,22	2,22	+ 1,22	- 1,92
$d_a$	2,49	2,44	2,50	2,52	2,43	2,48	+ 1,83	- 1,80
$l_g$	57,9	58,4	58,0	57,8	58,3	58,1	+ 0,62	- 0,50
$l$	64,1	64,1	64,1	64,1	64,1	64,1	+ 0,08	- 0,07
$h$	1,03	1,00	1,04	1,01	1,00	1,01	+ 2,60	- 1,81
$h_t$	1,22	1,18	1,19	1,21	1,20	1,20	+ 1,67	- 1,67
$l_p$	2,89	2,80	2,91	2,50	2,83	2,88	+ 2,57	- 2,64
$A_h$	26,4	27,4	26,9	26,2	26,3	26,6	+ 2,71	- 1,45

$d_a$  = outer diameter

KIT – Universität des Landes Baden-Württemberg und nationales Forschungszentrum in der Helmholtz-Gemeinschaft

**Espoo**  
Lanttikatu 1  
02770 Espoo  
puh. (09) 5259 030  
fax. (09) 5259 0320



**Oulu**  
Myyntimiehenkuja 10 C 4  
90420 Oulu  
puh. (09) 5259 0328  
fax. (04) 211 550 4561

myynti@hhtuonti.fi - www.hhtuonti.fi

tensile capacity	tensile strength of wire	yield moment	withdrawal parameter	head pull-through parameter
$f_{tens}$ kN	$f_u$ N/mm <sup>2</sup>	$M_y$ Nm crack	$\rho$ kg/m <sup>3</sup> $R_{ax}$ kN	$\rho$ kg/m <sup>3</sup> $R_{ax}^*$ kN
2,30 x 65	---	2,30 x 65	2,30 x 65	2,30 x 65
			$d = 2,3 \text{ mm}$ $l_{ef} = 20,1 \text{ mm}$	$d_h = 5,80 \text{ mm}$
1,55	---	0,808 NO	375 0,491	378 1,20
1,52	---	0,827 NO	381 0,488	355 0,760
1,53	---	0,864 NO	369 0,528	370 1,08
1,50	---	0,780 NO	346 0,566	364 0,900
1,56	---	0,827 NO	364 0,601	376 0,770
1,53	---	0,827 NO	375 0,422	398 1,38
1,55	---	0,845 NO	381 0,562	393 1,22
1,54	---	0,827 NO	369 0,549	370 1,29
1,53	---	0,845 NO	346 0,281	384 1,29
1,51	---	0,874 NO	364 0,585	374 1,18
<b><math>f_{tens,k} = 1,38 \text{ kN}</math></b>	---	<b><math>M_{y,k} = 0,749 \text{ Nm}</math></b>	<b><math>f_{ax,k} = 6,69 \text{ N/mm}^2</math></b> <b>with <math>\rho_k = 350 \text{ kg/m}^3</math></b>	<b><math>f_{head,k} = 20,4 \text{ N/mm}^2</math></b> <b>with <math>\rho_k = 380 \text{ kg/m}^3</math></b>

\* maximal strength at a crosshead displacement of 15 mm

penetration depth: 23 mm

Karlsruhe 26.04.2013

Head of Notified Body NB 0769

Dr.-Ing. R. Görlacher

**Espoo**  
Lanttikatu 1  
02770 Espoo  
puh. (09) 5259 030  
fax. (09) 5259 0320



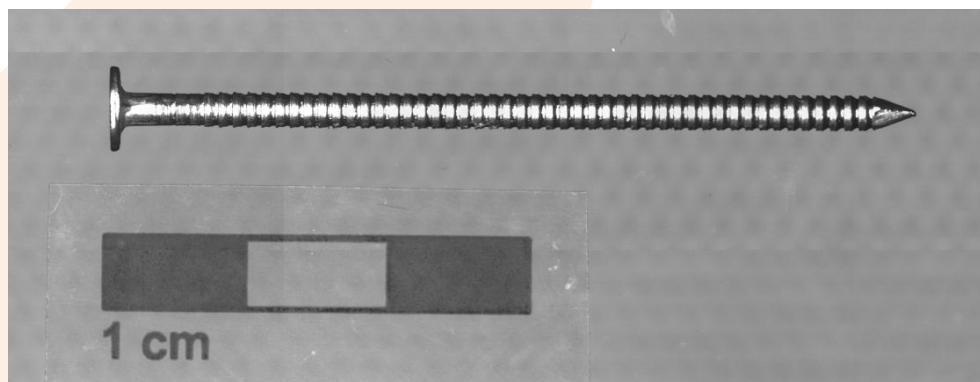
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**Oulu**  
Myyntimiehenkuja 10 C 4  
90420 Oulu  
puh. (09) 5259 0328  
fax. (04) 211 550 4561

Report No. 136250/22  
Initial Type Test (ITT)



**Client:** H&H Tuonti Oy  
**Base:** EN 14592:2008+A1:2012 (D)  
nails for structural timber products  
**Dimensions:** diameter 2,30 mm  
**Coating:** no  
**Material:** SS304 in accordance to GB1499.1-2008



tested nail 2,30 x 57 ring

Dimen- sions	measured values in mm					mean value in mm	measured values related to mean value in %	
	1	2	3	4	5			
$d_h$	5,82	5,84	5,84	5,77	5,83	5,82	+ 0,34	- 0,89
$d$	2,27	2,27	2,27	2,25	2,27	2,26	+ 0,19	- 0,49
$d_1$	2,09	2,10	2,11	2,09	2,09	2,10	+ 0,76	- 0,58
$d_a$	2,38	2,40	2,37	2,38	2,40	2,39	+ 0,69	- 0,82
$l$	56,8	57,1	56,6	56,8	56,9	56,8	+ 0,43	- 0,46
$h$	1,00	1,01	1,01	1,00	1,02	1,01	+ 0,84	- 0,52
$h_t$	1,04	1,05	1,09	1,07	1,05	1,06	+ 2,83	- 1,89
$l_p$	3,19	3,14	3,13	3,11	3,10	3,13	+ 1,79	- 1,08
$A_h$	26,6	26,8	26,8	26,1	26,7	26,6	+ 0,68	- 1,78

$d_a$  = outer diameter

KIT – Universität des Landes Baden-Württemberg und nationales Forschungszentrum in der Helmholtz-Gemeinschaft

**Espoo**  
Lanttikatu 1  
02770 Espoo  
puh. (09) 5259 030  
fax. (09) 5259 0320



**Oulu**  
Myyntimiehenkuja 10 C 4  
90420 Oulu  
puh. (09) 5259 0328  
fax. (04) 211 550 4561

myynti@hhtuonti.fi - www.hhtuonti.fi



tensile capacity	tensile strength of wire	yield moment	withdrawal parameter	head pull-through parameter
2,30 x 57	Ø 2,3	2,30 x 57	---	---
$f_{tens}$ kN	$f_u$ N/mm <sup>2</sup>	$M_y$ Nm	$\rho$ kg/m <sup>3</sup>	$\rho$ kg/m <sup>3</sup>
3,93	921	crack -	$R_{ax}$ kN	$R_{ax}^*$ kN
3,86	935	NO	---	---
3,92	954	NO	---	---
3,83	943	NO	---	---
3,84	948	NO	---	---
3,89	---	NO	---	---
3,86	---	NO	---	---
3,82	---	NO	---	---
3,80	---	NO	---	---
3,82	---	NO	---	---
$f_{tens,k} = 3,47$ kN	$f_u > 600$ N/mm <sup>2</sup>	$M_{y,k} = 1,83$ Nm	---	---

Karlsruhe 26.04.2013

Head of Notified Body NB 0769

Dr.-Ing. R. Görlacher

**Espoo**  
 Lanttikatu 1  
 02770 Espoo  
 puh. (09) 5259 030  
 fax. (09) 5259 0320



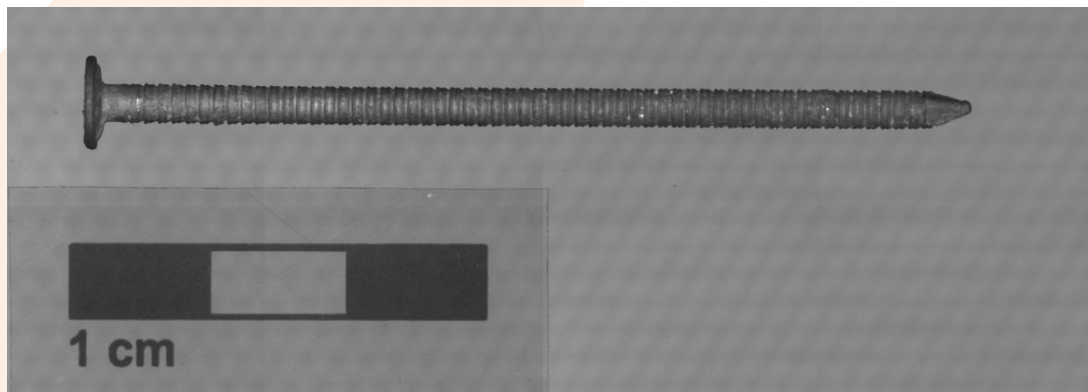
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**Oulu**  
 Myyntimiehenkuja 10 C 4  
 90420 Oulu  
 puh. (09) 5259 0328  
 fax. (04) 211 550 4561

Report No. 136250/23  
Initial Type Test (ITT)



**Client:** H&H Tuonti Oy  
**Base:** EN 14592:2008+A1:2012 (D)  
nails for structural timber products  
**Dimensions:** diameter 2,50 mm  
**Coating:** type 1 – HDG  $\geq 50\mu\text{m}$   
**Material:** HPB 235 (Q235) in accordance to GB1499.1-2008



tested nail 2,50 x 70 mm ring HDG

Dimen- sions	measured values in mm					mean value in mm	measured values related to mean value in %	
	1	2	3	4	5			
$d_h$	5,72	5,58	5,68	5,75	5,67	5,68	+ 1,14	- 1,73
$d_1$	2,61	2,62	2,59	2,62	2,62	2,61	+ 0,48	- 0,85
$d_a$	2,72	2,74	2,75	2,72	2,69	2,72	+ 0,95	- 1,36
$l$	70,0	69,5	69,7	69,8	69,7	69,7	+ 0,40	- 0,38
$h$	1,00	1,00	1,00	1,00	1,00	1,00	+ 0,21	- 0,18
$h_t$	1,23	1,29	1,25	1,23	1,30	1,26	+3,17	-2,38
$l_p$	3,40	3,34	3,33	3,38	3,36	3,36	+1,13	-0,95
$A_h$	25,7	24,5	25,3	25,9	25,3	25,3	+ 2,29	- 3,44

$d_a$  = outer diameter

tensile capacity	tensile strength of wire	yield moment		withdrawal parameter		head pull-through parameter			
		$f_{\text{tens}}$ kN	$f_u$ N/mm <sup>2</sup>	$M_y$ Nm	crack	$d = 2,5 \text{ mm}$ $l_{ef} = 21,6 \text{ mm}$	$d_h = 5,70 \text{ mm}$	$\rho$ kg/m <sup>3</sup>	$R_{ax}^*$ kN
2,50 x 70	---	---	---	---	---	---	---	---	---
3,26	---	1,79	NO	346	0,744	406	1,45	406	1,45
3,30	---	1,93	NO	366	0,598	407	1,46	407	1,46
3,18	---	1,94	NO	388	0,614	384	1,16	384	1,16
3,31	---	1,94	NO	373	0,615	399	1,04	399	1,04
3,29	---	1,90	NO	369	0,605	355	0,900	355	0,900
3,35	---	1,92	NO	346	0,449	376	1,03	376	1,03
3,42	---	1,95	NO	366	0,453	384	1,24	384	1,24
3,22	---	1,90	NO	388	0,655	371	0,970	371	0,970
3,17	---	1,90	NO	373	0,440	347	0,570	347	0,570
3,38	---	1,88	NO	369	0,615	360	0,950	360	0,950
<b><math>f_{\text{tens,k}} = 2,96 \text{ kN}</math></b>	<b><math>f_u &gt; 600 \text{ N/mm}^2</math></b>	<b><math>M_{y,k} = 1,71 \text{ Nm}</math></b>		<b><math>f_{ax,k} = 7,25 \text{ N/mm}^2</math></b> <b>with <math>\rho_k = 350 \text{ kg/m}^3</math></b>		<b><math>f_{\text{head,k}} = 18,2 \text{ N/mm}^2</math></b> <b>with <math>\rho_k = 380 \text{ kg/m}^3</math></b>			

\* maximal strength at a crosshead displacement of 15 mm

penetration depth: 25 mm

Karlsruhe 26.04.2013

Head of Notified Body NB 0769

Dr.-Ing. R. Görlacher

**Espoo**  
Lanttikatu 1  
02770 Espoo  
puh. (09) 5259 030  
fax. (09) 5259 0320



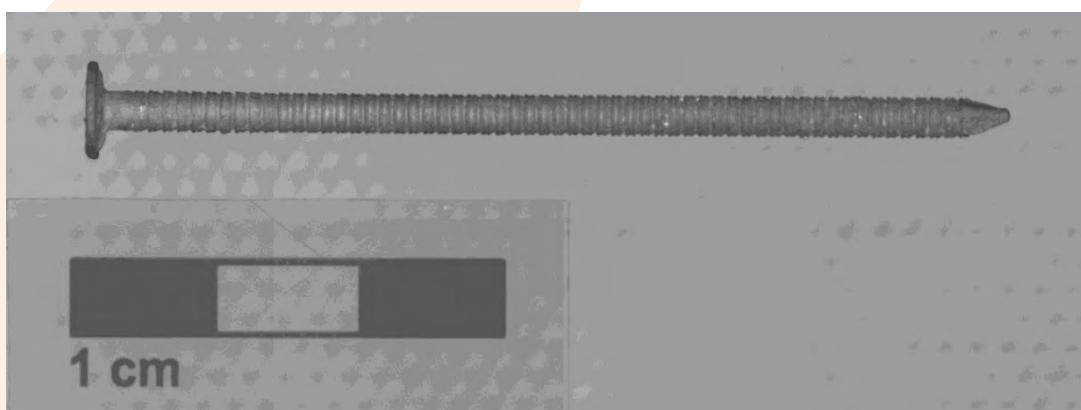
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**Oulu**  
Myyntimiehenkuja 10 C 4  
90420 Oulu  
puh. (09) 5259 0328  
fax. (04) 211 550 4561

Report No. 136250/24  
Initial Type Test (ITT)



**Client:** H&H Tuonti Oy  
**Base:** EN 14592:2008+A1:2012 (D)  
nails for structural timber products  
**Dimensions:** diameter 2,50 mm  
**Coating:** type 1 – HDG  $\geq 50\mu\text{m}$   
**Material:** HPB 235 (Q235) in accordance to GB1499.1-2008



tested nail 2,50 x 65 mm ring HDG

Dimen- sions	measured values in mm					mean value in mm	measured values related to mean value in %	
	1	2	3	4	5			
$d_h$	6,54	6,54	6,35	6,30	6,46	6,44	+ 1,61	- 2,22
$d$	2,56	2,57	2,58	2,57	2,57	2,57	+ 0,39	- 0,39
$d_1$	2,43	2,42	2,35	2,35	2,42	2,39	+ 1,67	- 1,99
$d_a$	2,67	2,68	2,68	2,75	2,68	2,69	+ 2,09	- 0,83
$l$	64,0	63,8	63,9	64,1	64,1	64,0	+ 0,24	- 0,26
$h_t$	1,16	1,22	1,21	1,16	1,15	1,18	+ 3,39	- 2,54
$l_p$	3,10	3,20	3,21	3,19	3,17	3,17	+ 1,13	- 2,33
$A_h$	33,6	33,6	31,7	31,1	32,8	32,6	+ 3,23	- 4,42

$d_a$  = outer diameter

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**Espoo**  
Lanttikatu 1  
02770 Espoo  
puh. (09) 5259 030  
fax. (09) 5259 0320



**Oulu**  
Myyntimiehenkuja 10 C 4  
90420 Oulu  
puh. (09) 5259 0328  
fax. (04) 211 550 4561

myynti@hhtuonti.fi - www.hhtuonti.fi

tensile capacity	tensile strength of wire	yield moment	withdrawal parameter	head pull-through parameter
2,50 x 65	---	---	---	2,50 x 65
$f_{tens}$ kN	$f_u$ N/mm <sup>2</sup>	$M_y$ Nm crack -	$\rho$ kg/m <sup>3</sup> $R_{ax}$ kN	$\rho$ kg/m <sup>3</sup> $R_{ax}^*$ kN
2,49	---	---	---	374
2,43	---	---	---	384
2,35	---	---	---	370
2,42	---	---	---	393
2,42	---	---	---	398
2,48	---	---	---	370
2,39	---	---	---	364
2,41	---	---	---	378
2,48	---	---	---	376
2,45	---	---	---	355
$f_{tens,k} = 3,20$ kN	---	---	---	$f_{head,k} = 21,5$ N/mm <sup>2</sup> with $\rho_k = 380$ kg/m <sup>3</sup>

\* maximal strength at a crosshead displacement of 15 mm

Karlsruhe 26.04.2013

Head of Notified Body NB 0769

Dr.-Ing. R. Görlacher

**Espoo**  
 Lanttikatu 1  
 02770 Espoo  
 puh. (09) 5259 030  
 fax. (09) 5259 0320



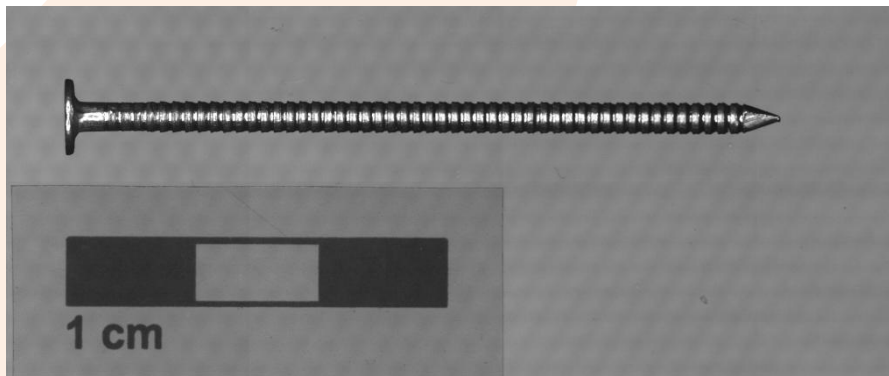
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**Oulu**  
 Myyntimiehenkuja 10 C 4  
 90420 Oulu  
 puh. (09) 5259 0328  
 fax. (04) 211 550 4561

Report No. 136250/25  
Initial Type Test (ITT)



**Client:** H&H Tuonti Oy  
**Base:** EN 14592:2008+A1:2012 (D)  
nails for structural timber products  
**Dimensions:** diameter 2,50 mm  
**Coating:** no  
**Material:** SS304 in accordance to GB1499.1-2008



tested nail 2,50 x 75 ring

Dimen- sions	measured values in mm					mean value in mm	measured values related to mean value in %	
	1	2	3	4	5			
$d_h$	5,91	5,89	5,78	5,83	5,84	5,85	+ 1,04	- 1,17
$d$	2,43	2,42	2,45	2,42	2,43	2,43	+ 0,88	- 0,49
$d_1$	2,26	2,32	2,28	2,26	2,28	2,28	+ 1,66	- 0,89
$d_a$	2,68	2,65	2,74	2,71	2,71	2,70	+ 1,54	- 1,78
$l$	75,0	74,8	74,2	74,9	75,2	74,8	+ 0,55	- 0,87
$h$	1,01	1,00	1,00	1,00	1,00	1,00	+ 0,70	- 0,53
$h_t$	1,19	1,19	1,25	1,26	1,25	1,23	+ 2,61	- 3,09
$l_p$	3,29	3,30	3,34	3,34	3,26	3,31	+ 1,03	- 1,39
$A_h$	27,4	27,2	26,2	26,7	26,8	26,9	+ 2,08	- 2,33

$d_a$  = outer diameter

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**Espoo**  
Lanttikatu 1  
02770 Espoo  
puh. (09) 5259 030  
fax. (09) 5259 0320



**Oulu**  
Myyntimiehenkuja 10 C 4  
90420 Oulu  
puh. (09) 5259 0328  
fax. (04) 211 550 4561

myynti@hhtuonti.fi - www.hhtuonti.fi

tensile capacity	tensile strength of wire	yield moment		withdrawal parameter		head pull-through parameter				
		$f_{tens}$ kN	$f_u$ N/mm <sup>2</sup>	$M_y$ Nm	crack	$d = \dots$ $l_{ef} = \dots$	$\rho$ kg/m <sup>3</sup>	$R_{ax}$ kN	$\rho$ kg/m <sup>3</sup>	$R_{ax}^*$ kN
2,50 x 75	Ø 2,5	2,50 x 75	---	---	---	---	---	---	---	---
4,47	972	2,73	NO	---	---	---	---	---	---	---
4,49	968	2,80	NO	---	---	---	---	---	---	---
4,53	967	2,79	NO	---	---	---	---	---	---	---
4,48	982	2,74	NO	---	---	---	---	---	---	---
4,56	966	2,78	NO	---	---	---	---	---	---	---
4,46	---	2,78	NO	---	---	---	---	---	---	---
4,56	---	2,70	NO	---	---	---	---	---	---	---
4,51	---	2,75	NO	---	---	---	---	---	---	---
4,55	---	2,70	NO	---	---	---	---	---	---	---
4,59	---	2,74	NO	---	---	---	---	---	---	---
<b><math>f_{tens,k} = 4,07</math> kN</b>	<b><math>f_u &gt; 600</math> N/mm<sup>2</sup></b>	<b><math>M_{y,k} = 2,48</math> Nm</b>								

Karlsruhe 26.04.2013

Head of Notified Body NB 0769

Dr.-Ing. R. Görlacher

**Espoo**  
 Lanttikatu 1  
 02770 Espoo  
 puh. (09) 5259 030  
 fax. (09) 5259 0320



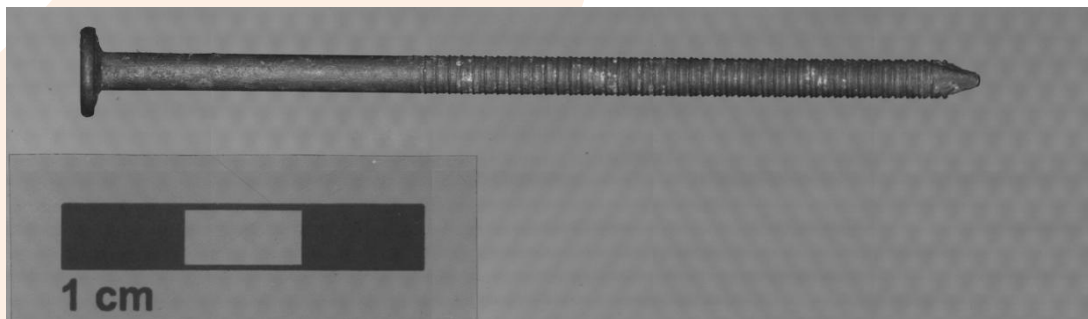
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**Oulu**  
 Myyntimiehenkuja 10 C 4  
 90420 Oulu  
 puh. (09) 5259 0328  
 fax. (04) 211 550 4561

Report No. 136250/26  
Initial Type Test (ITT)



**Client:** H&H Tuonti Oy  
**Base:** EN 14592:2008+A1:2012 (D)  
nails for structural timber products  
**Dimensions:** diameter 2,90 mm  
**Coating:** type 1 – HDG  $\geq 50\mu\text{m}$   
**Material:** HPB 235 (Q235) in accordance to GB1499.1-2008



tested nail 2,90 x 75 mm ring HDG

Dimen- sions	measured values in mm					mean value in mm	measured values related to mean value in %	
	1	2	3	4	5			
$d_h$	6,90	7,03	7,01	7,22	6,80	6,99	+ 3,24	- 2,70
$d$	2,95	2,93	2,95	2,97	2,94	2,95	+ 0,70	- 0,51
$d_1$	2,78	2,82	2,81	2,84	2,82	2,81	+ 0,92	- 1,21
$d_a$	3,09	3,12	3,09	3,08	3,06	3,09	+ 1,05	- 0,83
$l_g$	49,5	49,2	49,3	49,8	49,4	49,5	+ 0,78	- 0,60
$l$	74,7	75,1	74,4	74,8	74,9	74,8	+ 0,45	- 0,57
$h$	1,01	1,02	1,00	1,02	1,00	1,01	+ 1,01	- 0,99
$h_t$	1,81	1,83	1,79	1,77	1,80	1,80	+1,67	-1,67
$l_p$	3,05	3,08	3,11	3,10	3,15	3,10	+1,68	-1,55
$A_h$	37,4	38,7	38,6	40,9	36,3	38,4	+ 6,54	- 5,37

$d_a$  = outer diameter

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**Espoo**  
Lanttikatu 1  
02770 Espoo  
puh. (09) 5259 030  
fax. (09) 5259 0320



**Oulu**  
Myyntimiehenkuja 10 C 4  
90420 Oulu  
puh. (09) 5259 0328  
fax. (04) 211 550 4561

myynti@hhtuonti.fi - www.hhtuonti.fi



tensile capacity	tensile strength of wire	yield moment		withdrawal parameter		head pull-through parameter	
		$M_y$ Nm	crack -	$\rho$ kg/m <sup>3</sup>	$R_{ax}$ kN	$\rho$ kg/m <sup>3</sup>	$R_{ax}^*$ kN
2,90 x 75	Ø 2,90	2,90 x 75		2,90 x 75		2,90 x 75	
$f_{tens}$ kN	$f_u$ N/mm <sup>2</sup>			$d = 2,9$ mm $l_{ef} = 25,9$ mm	$d_{ht} = 7,00$ mm		
4,20	---	2,60	NO	388	0,853	370	1,74
4,19	---	2,70	NO	366	0,791	374	1,89
4,22	---	2,66	NO	369	0,670	398	2,01
4,16	---	2,57	NO	346	0,831	393	2,04
4,23	---	2,70	NO	373	0,743	384	1,78
4,25	---	2,75	NO	382	0,678	370	1,67
4,29	---	2,70	NO	388	0,718	371	1,36
4,09	---	2,73	NO	366	0,607	355	1,49
4,08	---	2,71	NO	369	0,606	410	1,51
4,29	---	2,69	NO	346	0,725	393	1,92
$f_{tens,k} = 3,78$ kN	---	$M_{y,k} = 2,41$ Nm		$f_{ax,k} = 7,45$ N/mm <sup>2</sup> with $\rho_k = 350$ kg/m <sup>3</sup>		$f_{head,k} = 26,4$ N/mm <sup>2</sup> with $\rho_k = 380$ kg/m <sup>3</sup>	

\* maximal strength at a crosshead displacement of 15 mm

penetration depth: 29 mm

Karlsruhe 26.04.2013

Head of Notified Body NB 0769

Dr.-Ing. R. Görlacher

**Espoo**  
Lanttikatu 1  
02770 Espoo  
puh. (09) 5259 030  
fax. (09) 5259 0320



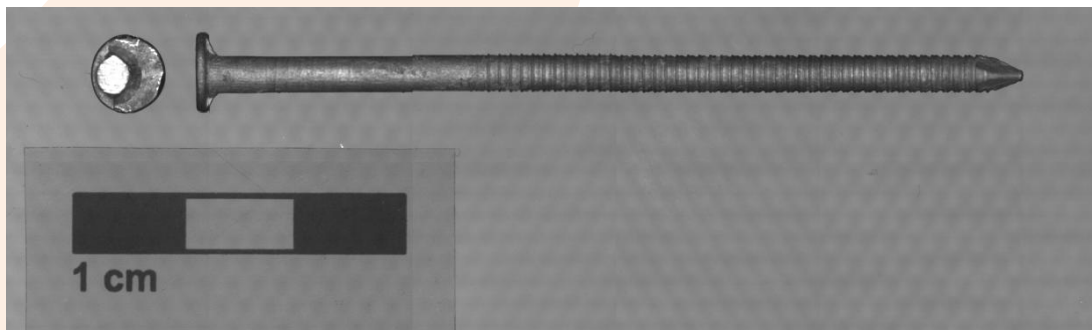
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**Oulu**  
Myyntimiehenkuja 10 C 4  
90420 Oulu  
puh. (09) 5259 0328  
fax. (04) 211 550 4561

Report No. 136250/27  
Initial Type Test (ITT)



**Client:** H&H Tuonti Oy  
**Base:** EN 14592:2008+A1:2012 (D)  
nails for structural timber products  
**Dimensions:** diameter 2,90 mm  
**Coating:** type 1 – HDG  $\geq 50\mu\text{m}$   
**Material:** HPB 235 (Q235) in accordance to GB1499.1-2008



tested nail 2,90 x 76 mm ring HDG

Dimen- sions	measured values in mm					mean value in mm	measured values related to mean value in %	
	1	2	3	4	5			
$d_h$	6,71	6,95	6,81	6,95	6,97	6,88	+ 1,39	- 2,47
$d$	2,96	2,95	2,93	2,94	2,96	2,95	+ 0,33	- 0,57
$d_1$	2,90	2,88	2,89	2,86	2,91	2,89	+ 0,76	- 1,02
$d_a$	3,07	3,09	3,07	3,10	3,11	3,09	+ 0,71	- 0,58
$l_g$	49,0	49,9	49,6	48,3	49,9	49,3	+ 1,14	- 2,02
$l$	74,7	74,9	74,9	75,3	75,0	75,0	+ 0,49	- 0,38
$h$	1,00	0,99	1,01	1,00	1,01	1,00	+ 0,90	- 1,39
$h_t$	1,57	1,63	1,62	1,56	1,54	1,58	+ 2,90	- 2,78
$l_p$	3,71	3,72	3,78	3,80	3,85	3,77	+ 2,07	- 1,67
$A_h$	35,3	37,9	36,4	37,9	38,2	37,1	+ 2,77	- 4,90

$d_a$  = outer diameter

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**Espoo**  
Lanttikatu 1  
02770 Espoo  
puh. (09) 5259 030  
fax. (09) 5259 0320



**Oulu**  
Myyntimiehenkuja 10 C 4  
90420 Oulu  
puh. (09) 5259 0328  
fax. (04) 211 550 4561

myynti@hhtuonti.fi - www.hhtuonti.fi

tensile capacity	tensile strength of wire	yield moment		withdrawal parameter		head pull-through parameter	
		$M_y$ Nm	crack -	$\rho$ kg/m <sup>3</sup>	$R_{ax}$ kN	$\rho$ kg/m <sup>3</sup>	$R_{ax}^*$ kN
2,90 x 76	---	---	---	$d = \text{---}$	$l_{ef} = \text{---}$	2,90 x 76	$d_h = 6,90 \text{ mm}$
$f_{tens}$ kN	$f_u$ N/mm <sup>2</sup>						
4,67	---	---	---	---	---	393	1,68
4,66	---	---	---	---	---	410	1,33
4,57	---	---	---	---	---	364	1,10
4,69	---	---	---	---	---	371	0,90
4,49	---	---	---	---	---	370	1,60
4,46	---	---	---	---	---	384	1,65
4,32	---	---	---	---	---	393	2,11
4,68	---	---	---	---	---	398	1,97
4,68	---	---	---	---	---	370	1,70
4,54	---	---	---	---	---	374	1,51
$f_{tens,k} = 4,12 \text{ kN}$			---			$f_{head,k} = 18,4 \text{ N/mm}^2$ with $\rho_k = 380 \text{ kg/m}^3$	

\* maximal strength at a crosshead displacement of 15 mm

Karlsruhe 26.04.2013

Head of Notified Body NB 0769

Dr.-Ing. R. Görlacher

**Espoo**  
Lanttikatu 1  
02770 Espoo  
puh. (09) 5259 030  
fax. (09) 5259 0320



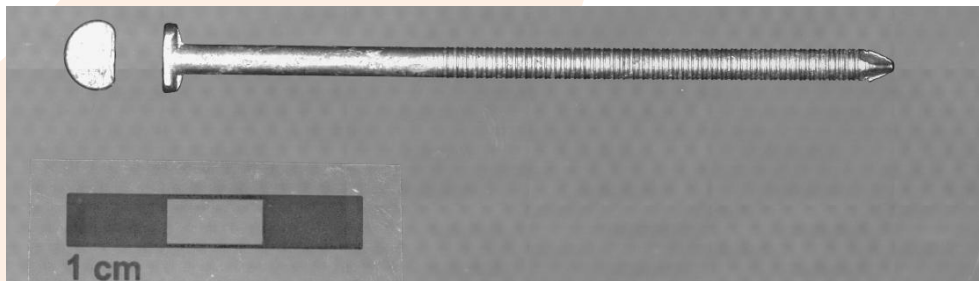
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**Oulu**  
Myyntimiehenkuja 10 C 4  
90420 Oulu  
puh. (09) 5259 0328  
fax. (04) 211 550 4561

Report No. 136250/28  
Initial Type Test (ITT)



**Client:** H&H Tuonti Oy  
**Base:** EN 14592:2008+A1:2012 (D)  
nails for structural timber products  
**Dimensions:** diameter 2,90 mm  
**Coating:** type 1 – HDG  $\geq 50\mu\text{m}$   
**Material:** HPB 235 (Q235) in accordance to GB1499.1-2008



tested nail 2,90 x 75 mm ring HDG

Dimen- sions	measured values in mm					mean value in mm	measured values related to mean value in %	
	1	2	3	4	5			
$d_h, \text{max}$	7,05	6,95	6,95	6,88	6,99	6,96	+ 1,24	- 1,24
$d_h, \text{min}$	5,30	5,30	5,26	5,25	5,32	5,29	+ 0,64	- 0,68
$d$	2,97	2,97	2,95	2,99	2,97	2,97	+ 0,60	- 0,67
$d_1$	2,86	2,84	2,85	2,93	2,88	2,87	+ 2,09	- 0,97
$d_a$	3,07	3,14	3,09	3,03	3,08	3,08	+ 1,78	- 1,53
$l_g$	50,0	47,7	50,3	50,4	48,3	49,3	+ 2,14	- 3,25
$l$	74,8	74,9	74,9	74,8	74,9	74,9	+ 0,07	- 0,09
$h$	1,01	0,96	1,00	1,00	0,98	0,99	+ 1,91	- 2,90
$h_t$	1,73	1,74	1,76	1,66	1,67	1,71	+ 2,80	- 3,04
$l_p$	3,08	3,19	3,18	3,21	3,22	3,18	+ 1,39	- 3,02
$A_h$	31,5	31,0	30,8	30,4	31,3	31,0	+ 1,49	- 1,91

$d_a$  = outer diameter

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**Espoo**  
Lanttikatu 1  
02770 Espoo  
puh. (09) 5259 030  
fax. (09) 5259 0320



**Oulu**  
Myyntimiehenkuja 10 C 4  
90420 Oulu  
puh. (09) 5259 0328  
fax. (04) 211 550 4561

myynti@hhtuonti.fi - www.hhtuonti.fi

tensile capacity	tensile strength of wire	yield moment	withdrawal parameter	head pull-through parameter
2,90 x 75	---	---	---	2,90 x 75
$f_{tens}$ kN	$f_u$ N/mm <sup>2</sup>	$M_y$ Nm	$\rho$ kg/m <sup>3</sup>	$\rho$ kg/m <sup>3</sup>
4,56	---	---	---	384
4,48	---	---	---	371
4,50	---	---	---	347
4,62	---	---	---	360
4,46	---	---	---	355
4,42	---	---	---	399
4,53	---	---	---	384
4,43	---	---	---	406
4,65	---	---	---	407
4,45	---	---	---	373
$f_{tens,k} = 4,06$ kN	---	---	---	$f_{head,k} = 14,4$ N/mm <sup>2</sup> with $\rho_k = 380$ kg/m <sup>3</sup>

\* maximal strength at a crosshead displacement of 15 mm

Karlsruhe 26.04.2013

Head of Notified Body NB 0769

Dr.-Ing. R. Görlacher

**Espoo**  
 Lanttikatu 1  
 02770 Espoo  
 puh. (09) 5259 030  
 fax. (09) 5259 0320



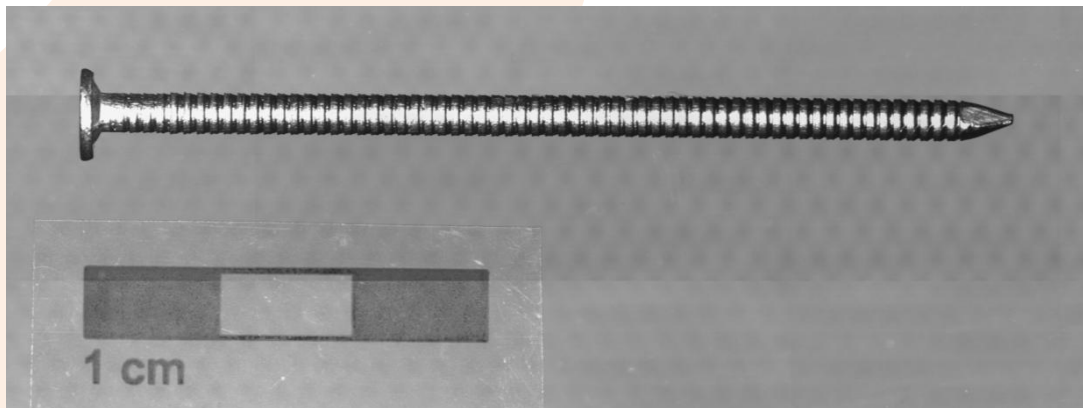
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**Oulu**  
 Myyntimiehenkuja 10 C 4  
 90420 Oulu  
 puh. (09) 5259 0328  
 fax. (04) 211 550 4561

Report No. 136250/29  
Initial Type Test (ITT)



**Client:** H&H Tuonti Oy  
**Base:** EN 14592:2008+A1:2012 (D)  
nails for structural timber products  
**Dimensions:** diameter 2,90 mm  
**Coating:** no  
**Material:** SS304 in accordance to GB1499.1-2008



tested nail 2,90 x 70 ring

Dimen- sions	measured values in mm					mean value in mm	measured values related to mean value in %	
	1	2	3	4	5			
$d_h$	6,76	6,72	6,67	6,64	6,70	6,70	+ 0,97	- 0,83
$d$	2,88	2,88	2,87	2,88	2,89	2,88	+ 0,21	- 0,40
$d_1$	2,65	2,64	2,64	2,70	2,64	2,65	+ 1,72	- 0,61
$d_a$	3,01	3,03	3,01	2,99	3,05	3,02	+ 0,90	- 0,83
$l$	70,0	69,6	69,8	70,1	69,9	69,9	+ 0,23	- 0,20
$h_t$	1,57	1,58	1,59	1,49	1,50	1,55	+ 2,85	- 3,62
$l_p$	4,14	4,18	4,19	4,20	4,20	4,18	+ 0,43	- 1,00
$A_h$	35,9	35,4	34,9	34,7	35,2	35,2	+ 1,94	- 1,66

$d_a$  = outer diameter

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**Espoo**  
Lanttikatu 1  
02770 Espoo  
puh. (09) 5259 030  
fax. (09) 5259 0320



**Oulu**  
Myyntimiehenkuja 10 C 4  
90420 Oulu  
puh. (09) 5259 0328  
fax. (04) 211 550 4561

myynti@hhtuonti.fi - www.hhtuonti.fi

tensile capacity	tensile strength of wire	yield moment		withdrawal parameter		head pull-through parameter	
		$M_y$ Nm	crack	$\rho$ kg/m <sup>3</sup>	$R_{ax}$ kN	$\rho$ kg/m <sup>3</sup>	$R_{ax}^*$ kN
2,90 x 70	Ø 2,9	2,90 x 70		---	---	2,90 x 70	
				$d = \dots$	$l_{ef} = \dots$	$d_h = 6,70 \text{ mm}$	
$f_{tens}$ kN	$f_u$ N/mm <sup>2</sup>						
5,65	861	3,49	NO	---	---	373	1,21
5,55	834	3,51	NO	---	---	384	1,37
5,69	846	3,53	NO	---	---	371	1,39
5,54	847	3,48	NO	---	---	347	0,940
5,58	835	3,53	NO	---	---	360	1,30
5,59	---	3,47	NO	---	---	355	1,70
5,60	---	3,40	NO	---	---	399	1,47
5,59	---	3,42	NO	---	---	384	1,25
5,58	---	3,47	NO	---	---	406	2,03
5,66	---	3,49	NO	---	---	407	1,66
$f_{tens,k} = 5,04 \text{ kN}$	$f_u > 600 \text{ N/mm}^2$	$M_{y,k} = 3,13 \text{ Nm}$		---		$f_{head,k} = 20,0 \text{ N/mm}^2$ with $\rho_k = 380 \text{ kg/m}^3$	

\* maximal strength at a crosshead displacement of 15 mm

Karlsruhe 26.04.2013

Head of Notified Body NB 0769

Dr.-Ing. R. Görlacher

**Espoo**  
Lanttikatu 1  
02770 Espoo  
puh. (09) 5259 030  
fax. (09) 5259 0320



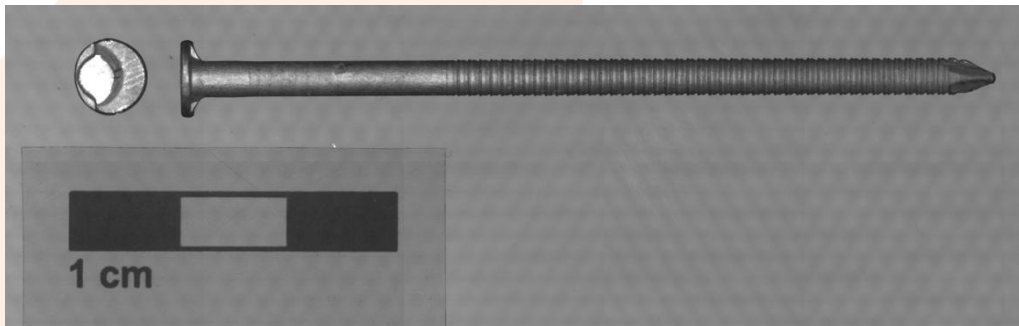
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**Oulu**  
Myyntimiehenkuja 10 C 4  
90420 Oulu  
puh. (09) 5259 0328  
fax. (04) 211 550 4561

Report No. 136250/30  
Initial Type Test (ITT)



**Client:** H&H Tuonti Oy  
**Base:** EN 14592:2008+A1:2012 (D)  
nails for structural timber products  
**Dimensions:** diameter 3,10 mm  
**Coating:** type 1 – HDG  $\geq 50\mu\text{m}$   
**Material:** HPB 235 (Q235) in accordance to GB1499.1-2008



tested nail 3,10 x 76 mm ring HDG

Dimen- sions	measured values in mm					mean value in mm	measured values related to mean value in %	
	1	2	3	4	5			
$d_h$	6,93	6,82	6,87	6,85	6,86	6,86	+ 0,88	- 0,65
$d$	3,20	3,16	3,16	3,16	3,16	3,17	+ 0,96	- 0,40
$d_1$	3,01	2,97	3,05	2,98	3,03	3,01	+ 1,54	- 1,38
$d_a$	3,33	3,28	3,22	3,26	3,26	3,27	+ 1,79	- 1,62
$l_g$	50,0	50,3	49,1	49,0	48,9	49,4	+ 1,65	- 1,02
$l$	74,9	74,9	74,3	74,7	74,8	74,7	+ 0,22	- 0,52
$h$	1,02	1,01	1,02	1,02	1,05	1,02	+ 2,56	- 1,58
$h_t$	1,50	1,51	1,58	1,55	1,57	1,54	+ 2,46	- 2,72
$l_p$	4,17	4,07	4,17	4,19	4,20	4,16	+ 0,96	- 2,16
$A_h$	37,7	36,5	37,1	36,8	37,0	37,0	+ 1,77	- 1,29

$d_a$  = outer diameter

KIT – Universität des Landes Baden-Württemberg und nationales Forschungszentrum in der Helmholtz-Gemeinschaft

**Espoo**  
Lanttikatu 1  
02770 Espoo  
puh. (09) 5259 030  
fax. (09) 5259 0320



**Oulu**  
Myyntimiehenkuja 10 C 4  
90420 Oulu  
puh. (09) 5259 0328  
fax. (04) 211 550 4561

myynti@hhtuonti.fi - www.hhtuonti.fi



tensile capacity	tensile strength of wire	yield moment	withdrawal parameter	head pull-through parameter
3,10 x 76	---	3,10 x 76	3,10 x 76	3,10 x 76
$f_{tens}$ kN	$f_u$ N/mm <sup>2</sup>	$M_y$ Nm crack -	$\rho$ kg/m <sup>3</sup> $R_{ax}$ kN	$\rho$ kg/m <sup>3</sup> $R_{ax}^*$ kN
4,68 4,51 4,84 4,60 4,76 4,69 4,76 4,52 4,77 4,84	--- --- --- --- --- --- --- --- --- ---	3,01 2,94 2,82 2,91 2,86 2,94 3,05 3,05 2,87 2,81	373 346 388 369 366 373 346 388 369 366	407 406 384 399 355 360 347 371 384 376
$f_{tens,k} = 4,23$ kN	---	$M_{y,k} = 2,63$ Nm	$f_{ax,k} = 6,52$ N/mm <sup>2</sup> with $\rho_k = 350$ kg/m <sup>3</sup>	$f_{head,k} = 19,7$ N/mm <sup>2</sup> with $\rho_k = 380$ kg/m <sup>3</sup>

penetration depth: 31 mm  
 \* maximal strength at a crosshead displacement of 15 mm

Karlsruhe 26.04.2013

Head of Notified Body NB 0769

Dr.-Ing. R. Görlacher

**Espoo**  
 Lanttikatu 1  
 02770 Espoo  
 puh. (09) 5259 030  
 fax. (09) 5259 0320



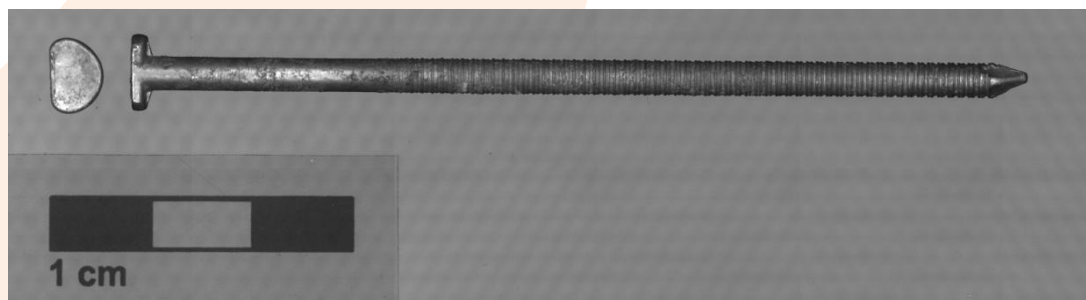
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**Oulu**  
 Myyntimiehenkuja 10 C 4  
 90420 Oulu  
 puh. (09) 5259 0328  
 fax. (04) 211 550 4561

Report No. 136250/31  
Initial Type Test (ITT)



**Client:** H&H Tuonti Oy  
**Base:** EN 14592:2008+A1:2012 (D)  
nails for structural timber products  
**Dimensions:** diameter 3,10 mm  
**Coating:** type 1 – HDG  $\geq 50\mu\text{m}$   
**Material:** HPB 235 (Q235) in accordance to GB1499.1-2008



tested nail 3,10 x 89 mm ring HDG

Dimen- sions	measured values in mm					mean value in mm	measured values related to mean value in %	
	1	2	3	4	5			
$d_h, \text{max}$	7,24	7,16	7,16	7,23	7,27	7,21	+ 0,75	- 0,76
$d_h, \text{min}$	5,30	5,34	5,32	5,38	5,33	5,33	+ 0,86	- 0,64
$d$	3,13	3,13	3,15	3,14	3,19	3,15	+ 1,18	- 0,55
$d_1$	3,01	3,02	2,99	2,99	3,12	3,03	+ 3,20	- 1,31
$d_a$	3,31	3,33	3,32	3,26	3,35	3,31	+ 1,04	- 1,73
$l_g$	63,3	62,3	64,4	63,7	62,2	63,1	+ 1,95	- 1,56
$l$	88,7	88,5	89,2	88,9	88,8	88,8	+ 0,45	- 0,38
$h$	0,99	1,01	1,01	1,01	1,00	1,00	+ 0,48	- 1,40
$h_t$	1,99	2,06	2,05	2,03	2,05	2,04	+ 1,18	- 2,26
$l_p$	4,46	4,40	4,39	4,52	4,51	4,46	+ 1,44	- 1,48
$A_h$	32,3	32,2	32,0	32,7	32,6	32,4	+ 1,20	- 0,99

$d_a$  = outer diameter

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**Espoo**  
Lanttikatu 1  
02770 Espoo  
puh. (09) 5259 030  
fax. (09) 5259 0320



**Oulu**  
Myyntimiehenkuja 10 C 4  
90420 Oulu  
puh. (09) 5259 0328  
fax. (04) 211 550 4561

myynti@hhtuonti.fi - www.hhtuonti.fi

tensile capacity	tensile strength of wire	yield moment	withdrawal parameter	head pull-through parameter
3,10 x 89	---	---	---	3,10 x 89
$f_{tens}$ kN	$f_u$ N/mm <sup>2</sup>	$M_y$ Nm crack -	$d$ --- $\rho$ kg/m <sup>3</sup> $R_{ax}$ kN $l_{ef}$ = ---	$\rho$ kg/m <sup>3</sup> $R_{ax}^*$ kN
5,29 5,16 5,20 5,19 5,34 5,22 5,22 5,27 5,27 5,14	---	---	---	378 371 364 355 370 398 370 393 374 384
$f_{tens,k} = 4,71$ kN	---	---	---	$f_{head,k} = 15,0$ N/mm <sup>2</sup> with $\rho_k = 380$ kg/m <sup>3</sup>

\* maximal strength at a crosshead displacement of 15 mm

Karlsruhe 26.04.2013

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Dr.-Ing. R. Görlacher

**Espoo**  
 Lanttikatu 1  
 02770 Espoo  
 puh. (09) 5259 030  
 fax. (09) 5259 0320



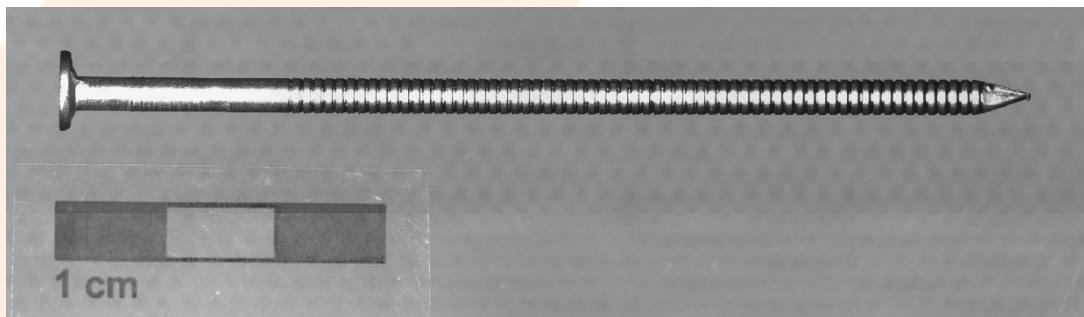
myynti@hhtuonti.fi - www.hhtuonti.fi

**Oulu**  
 Myyntimiehenkuja 10 C 4  
 90420 Oulu  
 puh. (09) 5259 0328  
 fax. (04) 211 550 4561

Report No. 136250/32  
Initial Type Test (ITT)



**Client:** H&H Tuonti Oy  
**Base:** EN 14592:2008+A1:2012 (D)  
nails for structural timber products  
**Dimensions:** diameter 3,10 mm  
**Coating:** no  
**Material:** SS304 in accordance to GB1499.1-2008



tested nail 3,10 x 90 / 7,0 ring

Dimen- sions	measured values in mm					mean value in mm	measured values related to mean value in %	
	1	2	3	4	5			
$d_h$	6,90	6,67	6,91	6,67	6,88	6,81	+ 1,52	- 2,04
$d$	3,02	2,99	3,00	3,00	3,01	3,00	+ 0,56	- 0,50
$d_1$	2,77	2,64	2,77	2,65	2,72	2,71	+ 2,21	- 2,58
$d_a$	3,18	3,16	3,20	3,14	3,17	3,17	+ 0,79	- 0,96
$l_g$	68,2	68,1	68,4	68,5	68,5	68,3	+ 0,24	- 0,38
$l$	88,7	89,0	88,8	89,0	88,7	88,8	+ 0,19	- 0,14
$h$	1,01	1,00	0,99	1,00	1,01	1,00	+ 0,78	- 1,17
$h_t$	1,41	1,48	1,47	1,41	1,49	1,45	+ 2,62	- 2,89
$l_p$	5,25	5,00	5,10	5,04	5,10	5,10	+ 2,98	- 1,92
$A_h$	37,4	34,9	39,8	34,9	37,2	36,4	+ 3,04	- 4,07

$d_a$  = outer diameter

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**Espoo**  
Lanttikatu 1  
02770 Espoo  
puh. (09) 5259 030  
fax. (09) 5259 0320



**Oulu**  
Myyntimiehenkuja 10 C 4  
90420 Oulu  
puh. (09) 5259 0328  
fax. (04) 211 550 4561

myynti@hhtuonti.fi - www.hhtuonti.fi

tensile capacity	tensile strength of wire	yield moment		withdrawal parameter		head pull-through parameter				
		$f_{tens}$ kN	$f_u$ N/mm <sup>2</sup>	$M_y$ Nm	crack	$d = \dots$	$l_{ef} = \dots$	$\rho$ kg/m <sup>3</sup>	$R_{ax}$ kN	$R_{ax}^*$ kN
3,10 x 90	Ø 3,1	3,10 x 90	---	---	---	---	---	---	---	---
6,16	855	4,01	NO	---	---	---	---	---	---	1,22
6,12	878	4,08	NO	---	---	---	---	---	---	1,10
5,98	866	4,02	NO	---	---	---	---	---	---	1,04
5,99	881	3,86	NO	---	---	---	---	---	---	1,39
6,12	872	4,03	NO	---	---	---	---	---	---	1,10
6,07	---	3,92	NO	---	---	---	---	---	---	1,13
6,20	---	3,97	NO	---	---	---	---	---	---	1,67
6,05	---	4,09	NO	---	---	---	---	---	---	1,06
6,13	---	4,03	NO	---	---	---	---	---	---	1,88
6,08	---	3,92	NO	---	---	---	---	---	---	1,27
$f_{tens,k} = 5,48$ kN	$f_u > 600$ N/mm <sup>2</sup>	$M_{y,k} = 3,59$ Nm	---	---	---	---	---	---	---	$f_{head,k} = 17,3$ N/mm <sup>2</sup> with $\rho_k = 380$ kg/m <sup>3</sup>

\* maximal strength at a crosshead displacement of 15 mm

Karlsruhe 26.04.2013

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Dr.-Ing. R. Görlacher

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myynti@hhtuonti.fi - www.hhtuonti.fi

**Oulu**  
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puh. (09) 5259 0328  
fax. (04) 211 550 4561