



**BUREAU  
VERITAS**

# NOVI POSTOPKI ZAŠČITE LESA

## KONTROLA KAKOVOSTI PRAGOV IN DROGOV

2024

IGNACIJ KREGAR,  
FRANCI JENKO

# Bureau Veritas je vodilna družba na področju certificiranja, kakovosti in testiranja.



**€5.7**  
billion

REVENUE IN 2022



**82,000+**  
employees\*



**400,000**  
clients



**~1,600**  
offices &  
laboratories

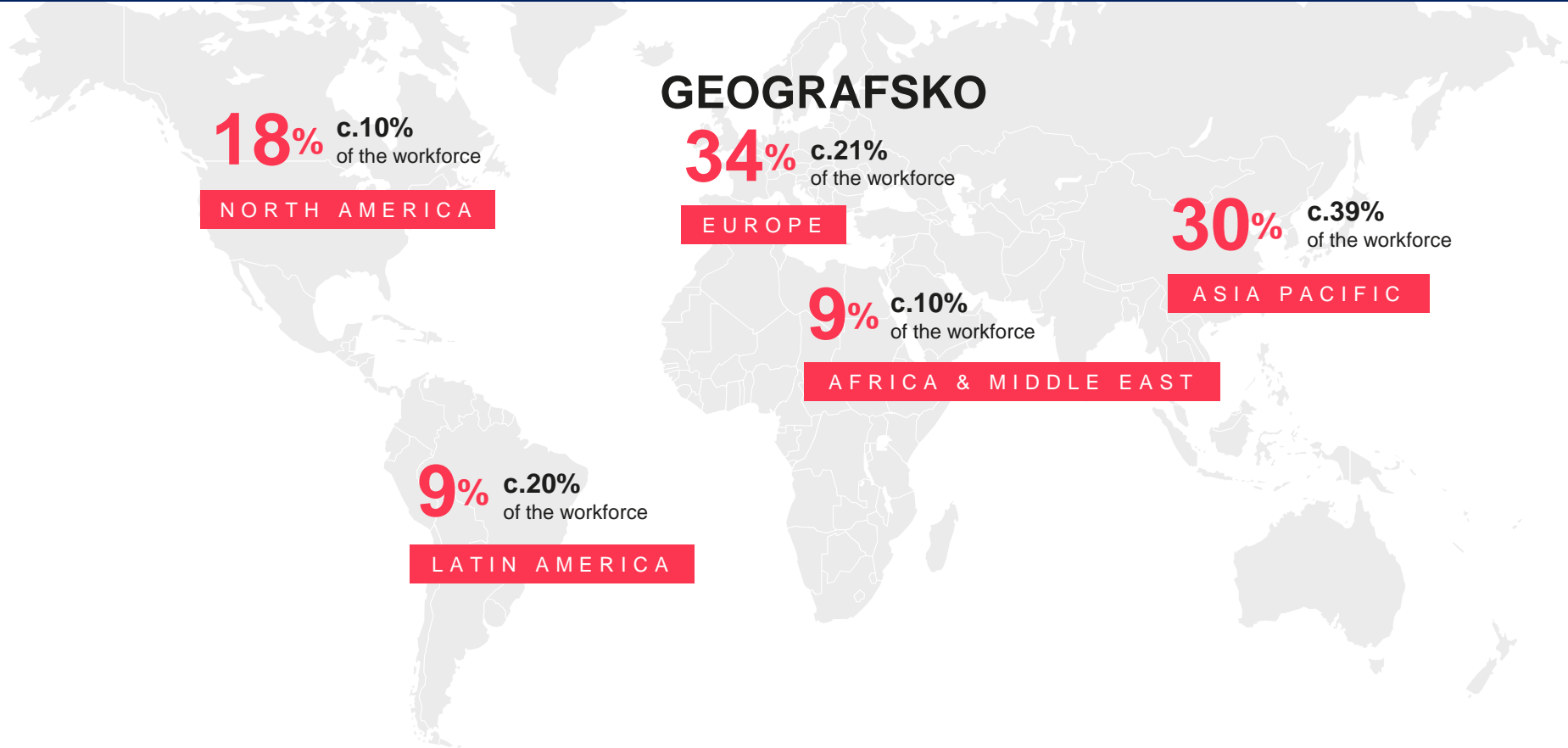
IN 140 COUNTRIES



BUREAU  
VERITAS



# Deleži prihodkov in delovne sile



\* As of December 31, 2022



# Certificiranje trajnostnih lesnih verig



The mark of  
responsible forestry

FSC® A000504



PEFC certifikacija

Bureau Veritas je  
akreditiran organ za  
izvajanje presoj  
trajnostnega  
gospodarjenja z gozdovi.

[www.pefc.si](http://www.pefc.si)





# Certificiranje notranje kontrole proizvodnje konstrukcijskega lesa

CE

1404

23

2129 - CPR - 0101-w

EN 14081-1:2005+A1:2011

Št. CE-1/18-C24

Masivni žagani les smreke / jelke (WPCA) s pravokotnim prečnim prerezom, razvrščen po trdnosti (v svežem stanju), za stavbe in mostove

|   |  |
|---|--|
| Upogibna trdnost - $f_{m,0,k}$            | 24 N/mm <sup>2</sup><br>C24 (S10 po DIN 4074-1)          |
| Tlačna trdnost vzporedno - $f_{c,0,k}$    | 21 N/mm <sup>2</sup>                                     |
| Tlačna trdnost pravokotno - $f_{c,90,k}$  | 2,5 N/mm <sup>2</sup>                                    |
| Natezna trdnost vzporedno - $f_{t,0,k}$   | 14,5 N/mm <sup>2</sup>                                   |
| Natezna trdnost pravokotno - $f_{t,90,k}$ | 0,4 N/mm <sup>2</sup>                                    |
| Strižna trdnost - $f_{v,k}$               | 4,0 N/mm <sup>2</sup>                                    |
| Modul elastičnosti - $E_{m,0,mean}$       | 11000 N/mm <sup>2</sup>                                  |
| Naravna odpornost                         | 4  |
| Odziv na ogenj                            | Lastnost ni določena (d < 22 mm)<br>D-s2, d0 (d ≥ 22 mm) |





# Certificiranje proizvajalcev palet EPAL





# Kontrola kakovosti impregniranega lesa





**Leseni bukovi tirni pragovi impregnirani s kreozotnim oljem**





## **Leseni bukovi tirni pragovi - INCISE**





**Kontrola kakovosti v belem stanju (tehtanje, vlagomer)**



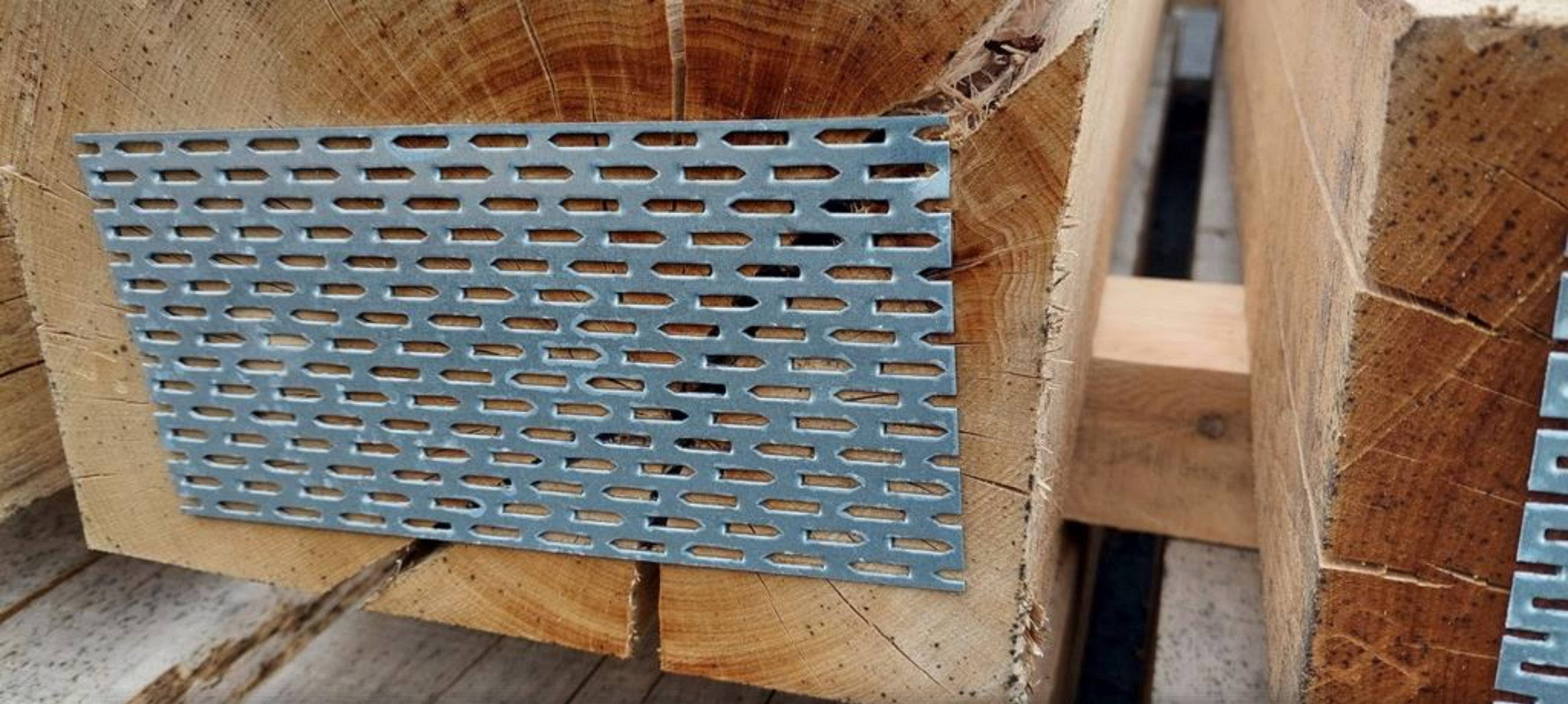






**Značilnosti lesa (rdeče srce)**





**Značilnosti lesa (razpoke)**





## Značilnosti lesa (razpoke)





**Značilnosti lesa (vraslo lubje)**





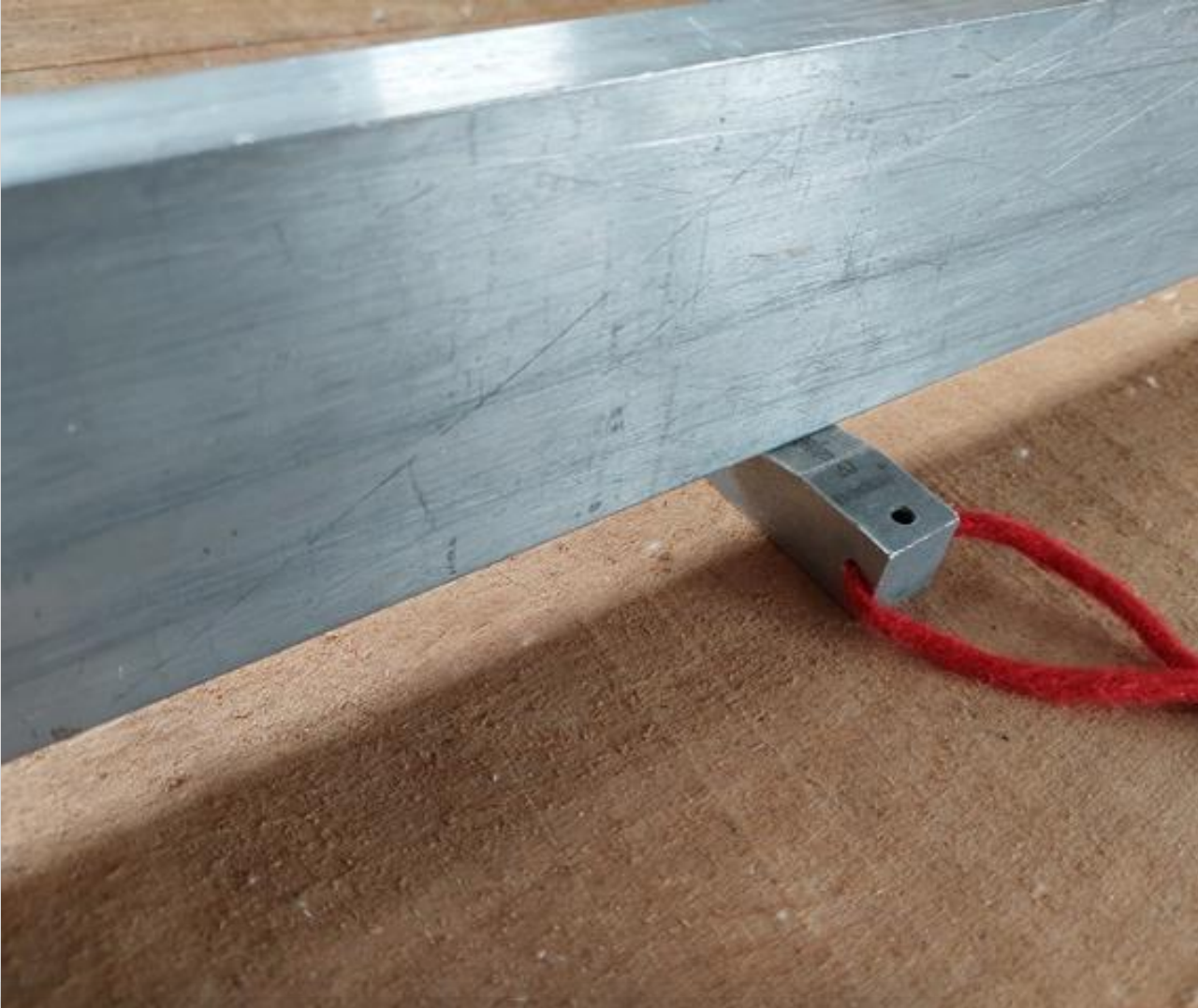
**Značilnosti lesa (grče)**





## Značilnosti lesa (lisičavost)





## Značilnosti lesa (ukrivljenost)





**Priprava paketov na impregnacijo v kotlu**





**Kontrola kakovosti impregnacije (tehtanje)**



Table A.1 — Number of samples to be taken and maximum numbers allowed to fail for different AQLs (expressed as percent) using Inspection Level II

| Batch size         | AQL in %  |           |           |          |          |
|--------------------|-----------|-----------|-----------|----------|----------|
|                    | 1         | 4         | 10        | 15       | 25       |
| 16 to 25           | 13 to 0   | 3 to 0    | 5 to 1    | 5 to 2   | 5 to 3   |
| 26 to 50           | 13 to 0   | 13 to 1   | 8 to 2    | 8 to 3   | 8 to 5   |
| 51 to 90           | 13 to 0   | 13 to 1   | 13 to 3   | 13 to 5  | 13 to 7  |
| 91 to 150          | 13 to 0   | 20 to 2   | 20 to 5   | 20 to 7  | 20 to 10 |
| 151 to 280         | 50 to 1   | 32 to 3   | 32 to 7   | 32 to 10 | 32 to 14 |
| 281 to 500         | 50 to 1   | 50 to 5   | 50 to 10  | 50 to 14 | 50 to 21 |
| 501 to 1 200       | 80 to 2   | 80 to 7   | 80 to 14  | 80 to 21 | 50 to 21 |
| 1 201 to 3 200     | 125 to 3  | 125 to 10 | 125 to 21 | 80 to 21 | 50 to 21 |
| 3 201 to 10 000    | 200 to 5  | 200 to 14 | 125 to 21 | 80 to 21 | 50 to 21 |
| 10 001 to 35 000   | 315 to 7  | 315 to 21 | 125 to 21 | 80 to 21 | 50 to 21 |
| 35 001 to 150 000  | 500 to 10 | 315 to 21 | 125 to 21 | 80 to 21 | 50 to 21 |
| 150 001 to 500 000 | 800 to 14 | 315 to 21 | 125 to 21 | 80 to 21 | 50 to 21 |

**Vzorčenje po tabeli AQL iz standarda SIST EN 351-2**





## Kontrola kakovosti impregnacije (izvrtki)





 PLACE OF INSPECTION: HUEFINGEN - D POR-20-0001/24  
Manufacturer/proizvajalec: FTHP Datum: 10.1.2024  
Wood species/vrsta lesa: Fagus sylvatica Impregnirana količina: 1750 kes  
Dimensions of sleepers: 2600 mm x 260 mm x 160 mm FSS - 1. PHASE

Number of borings: 125 total AQL10% 104 passed / 21 reject (EN 351-2:2007)  
Number of borings: \_\_\_\_\_ - passed / \_\_\_\_\_ - reject (drilling) 30  
IMPREGNATION : PASSED (passed or reject)



## Kontrola kakovosti impregnacije (izvrtki)









**Odrezek na razdalji 80cm od čela praga**





Date: Ljubljana, 30. 11. 2023

Bureau Veritas d.o.o.  
Linhartova 49a  
SI-1000 Ljubljana,  
Slovenija

Analysis of penetration and retention of copper in beech sleepers impregnated according to the dual process with Korasit and Sleeper protect 52/2023

Date of the delivery: 24. 11. 2023  
Contact person: Nace Kregar  
Sample description: 125 carrots taken from the impregnated beech sleepers  
Sleepers were impregnated according to dual-impregnation process.  
First impregnation: Korasite  
Second impregnation: Sleeper protect  
Impregnation plant: FTHP – Sobeslav  
SŽ FSS Bukev  
1 in 2 faza LOT: 1600 kos POR -26-0726/23  
Date of analysis: 24 – 30. 11. 2023  
Method: X-ray fluorescence spectroscopy, Oxford Instruments Twin X;  
SIST EN 13183-1, 2004, Assessment of penetration SIST EN 351-1

Results:  
Sleepers were made of European beech – *Fagus sylvatica*.

| INSPECTION REPORT<br>POROČILO O KONTROLI                    |  | POR-20-1053/23<br>Page / Stran: 1/1  |             |
|---|--|--------------------------------------|-------------|
| Customer / Naročnik:  |  |                                      |             |
| Order Nr / Št. Naročila:                                    |  |                                      |             |
| Manufacturer /Proizvajalec:                                 |  |                                      |             |
| Project / Projekt:  | Pragi na zalogo ŽGP  |                                      |             |
| Place of inspect. / Kraj kontrole:                          | Sobeslav (CZ)  |                                      |             |
| Date of inspect. / Datum kontrole:                          | 04.12.-06.12.2023  |                                      |             |
| Subject of inspection/<br>Predmet kontrole                  | Beech (fagus sylvatica) sleepers - impregnated, 2600 x 260 x 160 mm<br>Bukovi pragovi - impregnirani (fagus sylvatica) 2600 x 260 x 160 mm |                                      |             |
| Technical requierm.<br>Tehnične zahteve                     | SIST EN 13145:2004+A1:2012 ter Splošne in posebne tehnične zahteve za lesene železniške prage, SŽ Infrastruktura d.o.o., dec. 2022         |                                      |             |
| RESULTS OF INSPECTION / REZULTATI KONTROLE                  |  |                                      |             |
| Impregnated quantity / Količina impregniranih pragov:       | 1247 kos   |                                      |             |
| Oznaka ustreznih pragov:                                    | V6   |                                      |             |
| Number of borings / Število izvrtkov - skupno število:      | 112 kos  |                                      |             |
| Nr. of borings - good / rejected /Št. izvrtkov- dobri/slabi | 97 /15   |                                      |             |
| Marking nails / Markirni žebliji (leto proizv.):            | FTHP 23  |                                      |             |
| Marking hammer BV / Markirno kladivo BV:                    | V6   |                                      |             |
| REVIEW OF DOCUMENTATION / PREGLED DOKUMENTACIJE             |  |                                      |             |
| ES declaration of conformity / ES izjava o skladnosti :     | /  |                                      |             |
| Certificate of creosote / Certifikat o kakovosti kreozota:  | Koppers, certificate of analysis (APP 2)   |                                      |             |
| Impregnation protocol / Zapisi o impregnaciji:              | št. 508, 510, 513, 516, 523 (APP 1)  |                                      |             |
| Weight report - records / Tehtni listi:                     | 5 x  |                                      |             |
| Impregnation diagrams / Diagrami o poteku impregnacije:     | 5 x  |                                      |             |
| Retention of creosote / Navzem kreozota:                    | 135 kg/m <sup>3</sup>  |                                      |             |
| Origin of the wood -declaration / Poreklo lesa izjava:      |  |                                      |             |
| POR and date-white ins. / Št. POR in datum beli prevzem     | POR-20-0992/23 (13. - 18.12.2023)  |                                      |             |
| Passed / Zadovoljivo  | Not Passed / Ni zadovoljivo  | Control Condition / Kontrolni pogoji |             |
| Manufacturer:<br>Proizvajalec                               | Name / Ime   | Signature/ Podpis                    | Stamp / Žig |
| Inspectors:<br>Kontrolorji:                                 | Name / Ime<br>Franci Jenko / Samo Jereb  | Signature/ Podpis                    | Stamp / Žig |
| Remarks:<br>Opombe:   |  |                                      |             |

# Analiza in izdaja končnega poročila





**Leseni drogovi**





## Leseni drogovi





**Leseni drogovi**





**Kontrola kakovosti lesa v belem stanju**





## Kontrola kakovosti lesa v belem stanju





**Kontrola kakovosti impregnacije (izvrtki, odrezki)**







# HVALA ZA POZORNOST

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