

**THE INTERNATIONAL RESEARCH GROUP ON WOOD PROTECTION**

**Section 2**

**Testing Methodology and Assessment**

**Norway spruce**

**Natural durable timber – Field test results  
IRG/WP Durability Database**

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**Disclaimer**

The responsibility for the data presented in this paper falls to the authors exclusively. The data presented are raw test data and intended to get used for scientific purposes only.

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## AIMS AND SCOPE OF THE IRG-WP DURABILITY DATABASE

The overall aim of the IRG-WP durability data base is the allocation of wood durability test results for comparative studies and re-analyses. The data base shall serve as pool for service life prediction and modelling and shall contribute to an enhanced understanding of wood durability. It is an open web-based platform for scientific exchange in the field of wood durability and wood protection.

It is NOT the aim of the data base to promote or denigrate any product or material. The data base will contain raw data only; no statistical evaluation will be included. Thus it will be the exclusive responsibility of the user to interpret the test results published in the data base.

For each data set, the full range of information about the test method, the test material, and other relevant parameters, is required to guarantee reliability of the data. For this reason every data set submitted is reviewed and checked for completeness of all relevant data.

The database allows submission of assessment data from all kinds of standardized and non-standardized wood durability tests.

Records of the IRG/WP Durability data base shall be cited as in the following example:

*Brischke C., Meyer L. (2013) Douglas fir. Natural durable timber - Field test results. IRG/WP Durability Database. Stockholm: The International Research Group on Wood Protection, IRG/WP/DDB 13-00001.*

## INFORMATION

Submission Date 09.04.2014

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Zip Code 031  
Country Norway

## TESTED TIMBER

Trade name Norway spruce  
Botanical name *Picea abies* Karst.  
Origin Norway  
Number of replicates 23  
Sampling (optional)  
Timber quality (optional)

## REFERENCE TIMBER

|                           |                            |
|---------------------------|----------------------------|
| Trade name                | Scots pine sapwood         |
| Botanical name            | <i>Pinus sylvestris</i> L. |
| Origin                    | Norway                     |
| Number of replicates      | 22                         |
| Sampling (optional)       |                            |
| Timber quality (optional) |                            |

## TEST METHODS

|                                   |                                                                                                                                                                                                                                                 |
|-----------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Non-standard method               | Horizontal double layer (Rapp and Augusta 2004)                                                                                                                                                                                                 |
| Reference                         | Rapp A.O., Augusta U. (2004) The full guideline for the “double layer test method” – A field test method for determining the durability of wood out of ground. Stockholm: The International Research Group on Wood Protection, IRG/WP/04-20190. |
| Specimen dimension and shape      | 25 x 50 x 500 mm <sup>3</sup>                                                                                                                                                                                                                   |
| Rating scheme                     | 0 (sound), 1 (slight decay), 2 (moderate decay), 3 (severe decay), 4 (failure) after EN 252 (1989)                                                                                                                                              |
| Address of test site              | Roof of Norwegian Institute of Wood Technology's 8 floor building, Forskningsveien 3B, NO-0373 Oslo-Blindern                                                                                                                                    |
| Geographic coordinates (optional) | 59°94'48,97''N 10°71'15,77''E                                                                                                                                                                                                                   |
| Start of test                     | October 20 2003                                                                                                                                                                                                                                 |
| Last evaluation                   | October 20 2013                                                                                                                                                                                                                                 |
| Status of test                    | Still running                                                                                                                                                                                                                                   |

## RESULTS

### Assessment

| Material     | <i>Picea abies</i> Karst. |            |            |            |            |            |
|--------------|---------------------------|------------|------------|------------|------------|------------|
| Date         | 20.10.2005                | 20.10.2007 | 20.10.2008 | 20.10.2009 | 20.10.2010 | 20.10.2011 |
| Assessment   | 1                         | 2          | 3          | 4          | 5          | 6          |
| Replicate ID | [0-4]                     | [0-4]      | [0-4]      | [0-4]      | [0-4]      | [0-4]      |
| 1            | 0                         | 0          | 1          | 2          | 2          | 3          |
| 2            | 0                         | 3          | 2          | 3          | 3          | 3          |
| 3            | 0                         | 2          | 2          | 3          | 3          | 3          |
| 4            | 0                         | 0          | 2          | 2          | 3          | 3          |
| 5            | 0                         | 0          | 2          | 3          | 4          | 4          |
| 6            | 0                         | 0          | 1          | 3          | 2          | 2          |
| 7            | 2                         | 2          | 2          | 3          | 3          | 3          |
| 8            | 0                         | 1          | 2          | 2          | 3          | 3          |
| 9            | 0                         | 0          | 3          | 3          | 3          | 3          |
| 10           | 0                         | 2          | 2          | 3          | 3          | 3          |
| 11           | 0                         | 2          | 1          | 2          | 2          | 3          |
| 12           | 0                         | 0          | 3          | 3          | 4          | 4          |
| 13           | 0                         | 0          | 0          | 2          | 2          | 3          |
| 14           | 0                         | 3          | 2          | 2          | 3          | 3          |
| 15           | 0                         | 2          | 3          | 3          | 3          | 3          |
| 16           | 0                         | 2          | 2          | 3          | 4          | 4          |
| 17           | 0                         | 0          | 2          | 4          | 3          | 4          |
| 18           | 0                         | 0          | 2          | 2          | 2          | 2          |
| 19           | 0                         | 3          | 2          | 3          | 3          | 3          |
| 20           | 0                         | 3          | 3          | 3          | 3          | 4          |
| 21           | 0                         | 1          | 3          | 3          | 4          | 4          |
| 22           | 0                         | 2          | 2          | 3          | 3          | 3          |
| 23           | 0                         | 2          | 2          | 3          | 3          | 4          |

| Material     | <i>Picea abies</i> Karst. |            |       |       |       |       |
|--------------|---------------------------|------------|-------|-------|-------|-------|
| Date         | 20.10.2012                | 20.10.2013 |       |       |       |       |
| Assessment   | 7                         | 8          | 9     | 10    | 11    | 12    |
| Replicate ID | [0-4]                     | [0-4]      | [0-4] | [0-4] | [0-4] | [0-4] |
| 1            | 3                         | 2          |       |       |       |       |
| 2            | 4                         | 4          |       |       |       |       |
| 3            | 3                         | 3          |       |       |       |       |
| 4            | 4                         | 4          |       |       |       |       |
| 5            | 4                         | 4          |       |       |       |       |
| 6            | 2                         | 3          |       |       |       |       |
| 7            | 3                         | 3          |       |       |       |       |
| 8            | 3                         | 3          |       |       |       |       |
| 9            | 4                         | 4          |       |       |       |       |
| 10           | 4                         | 4          |       |       |       |       |
| 11           | 3                         | 3          |       |       |       |       |
| 12           | 4                         | 4          |       |       |       |       |
| 13           | 3                         | 3          |       |       |       |       |
| 14           | 3                         | 3          |       |       |       |       |
| 15           | 3                         | 3          |       |       |       |       |
| 16           | 4                         | 4          |       |       |       |       |
| 17           | 4                         | 4          |       |       |       |       |
| 18           | 2                         | 2          |       |       |       |       |
| 19           | 3                         | 3          |       |       |       |       |
| 20           | 4                         | 4          |       |       |       |       |
| 21           | 4                         | 4          |       |       |       |       |
| 22           | 4                         | 4          |       |       |       |       |
| 23           | 4                         | 4          |       |       |       |       |

## Decay types

| Material     | <i>Picea abies</i> Karst. |            |            |            |            |            |
|--------------|---------------------------|------------|------------|------------|------------|------------|
| Date         | 20.10.2005                | 20.10.2007 | 20.10.2008 | 20.10.2009 | 20.10.2010 | 20.10.2011 |
| Assessment   | 1                         | 2          | 3          | 4          | 5          | 6          |
| Replicate ID |                           |            |            |            |            |            |
| 1            |                           |            |            | S          | S, B       | S, B       |
| 2            |                           | S, B       | S, B       | S, B       | S, B       | S, B       |
| 3            |                           | S          | S          | S, B       | B          | S, B       |
| 4            |                           |            | S          | S          | S, W, B    | S, W, B    |
| 5            |                           |            | S          | S          | S, W, B    | S, W, B    |
| 6            |                           |            | S          | S, B       | S, B       | S, B       |
| 7            |                           | S          | S          | S, B       | S, B       | S, B       |
| 8            |                           |            | S          | S, B       | S, B       | S, B       |
| 9            |                           |            | S, B       | S          | S, B       | S, B       |
| 10           |                           | S          | S          | S          | S, B       | S, W, B    |
| 11           |                           | S          | S          | S          | S, W, B    | S, W, B    |
| 12           |                           |            | S, B       | S, B       | S, W, B    | S, W, B    |
| 13           |                           |            | S          | S          | S          | S, B       |
| 14           |                           | S, B       | S, B       | S, B       | S, B       | S, B       |
| 15           |                           | S          | S          | S, B       | S, B       | S, B       |
| 16           |                           | S          | S          | S          | S, B       | S          |
| 17           |                           |            | S          | S          | S          | S          |
| 18           |                           |            | S          | S          | S          | S          |
| 19           |                           | S, B       | S, B       | S, B       | S, B       | S, B       |
| 20           |                           | S, B       | S, B       | S          | S, B       | S, B       |
| 21           |                           | S          | S          | S, B       | S, B       | S          |
| 22           |                           | S          | S          | S          | S          | S, B       |
| 23           |                           | S          | S          | S, B       | S, W, B    | S, W, B    |

| Material     | <i>Picea abies</i> Karst. |            |   |    |    |    |
|--------------|---------------------------|------------|---|----|----|----|
| Date         | 20.10.2012                | 20.10.2013 |   |    |    |    |
| Assessment   | 7                         | 8          | 9 | 10 | 11 | 12 |
| Replicate ID |                           |            |   |    |    |    |
| 1            | S, B                      | S          |   |    |    |    |
| 2            | S, B                      | S, B       |   |    |    |    |
| 3            | S, B                      | S, B       |   |    |    |    |
| 4            | S, W, B                   | S, W, B    |   |    |    |    |
| 5            | S, W, B                   | S, W, B    |   |    |    |    |
| 6            | S, B                      | S, B       |   |    |    |    |
| 7            | S, B                      | S, B       |   |    |    |    |
| 8            | S, B                      | S, B       |   |    |    |    |
| 9            | S, B                      | S          |   |    |    |    |
| 10           | S, W, B                   | S, W, B    |   |    |    |    |
| 11           | S, W, B                   | S, W, B    |   |    |    |    |
| 12           | S, W, B                   | S, W, B    |   |    |    |    |
| 13           | S, B                      | S          |   |    |    |    |
| 14           | S, B                      | S, B       |   |    |    |    |
| 15           | S, B                      | S, B       |   |    |    |    |
| 16           | S                         | S          |   |    |    |    |
| 17           | S                         | S          |   |    |    |    |
| 18           | S                         | S          |   |    |    |    |
| 19           | S, B                      | S, B       |   |    |    |    |
| 20           | S, B                      | S          |   |    |    |    |
| 21           | S                         | S, B       |   |    |    |    |
| 22           | S, B                      | S          |   |    |    |    |
| 23           | S, W, B                   | S, W, B    |   |    |    |    |

W = White rot, B = Brown rot, S = Soft rot



## Assessment Reference

| Material     | <i>Pinus sylvestris</i> L. sapwood |            |            |            |            |            |
|--------------|------------------------------------|------------|------------|------------|------------|------------|
| Date         | 20.10.2005                         | 20.10.2007 | 20.10.2008 | 20.10.2009 | 20.10.2010 | 20.10.2011 |
| Assessment   | 1                                  | 2          | 3          | 4          | 5          | 6          |
| Replicate ID | [0-4]                              | [0-4]      | [0-4]      | [0-4]      | [0-4]      | [0-4]      |
| 1            | 0                                  | 2          | 2          | 2          | 3          | 3          |
| 2            | 0                                  | 0          | 1          | 2          | 3          | 3          |
| 3            | 0                                  | 1          | 2          | 3          | 4          | 4          |
| 4            | 0                                  | 2          | 1          | 2          | 3          | 3          |
| 5            | 0                                  | 1          | 2          | 3          | 3          | 3          |
| 6            | 0                                  | 2          | 3          | 4          | 4          | 4          |
| 7            | 0                                  | 0          | 3          | 3          | 3          | 4          |
| 8            | 0                                  | 3          | 3          | 4          | 4          | 4          |
| 9            | 0                                  | 3          | 3          | 3          | 4          | 4          |
| 10           | 0                                  | 3          | 3          | 3          | 4          | 4          |
| 11           | 0                                  | 2          | 2          | 3          | 3          | 3          |
| 12           | 0                                  | 0          | 3          | 3          | 4          | 4          |
| 13           | 0                                  | 1          | 1          | 2          | 3          | 3          |
| 14           | 0                                  | 0          | 1          | 3          | 4          | 4          |
| 15           | 0                                  | 0          | 1          | 3          | 4          | 4          |
| 16           | 0                                  | 1          | 1          | 3          | 4          | 4          |
| 17           | 0                                  | 2          | 1          | 3          | 3          | 4          |
| 18           | 0                                  | 3          | 3          | 3          | 4          | 4          |
| 19           | 2                                  | 3          | 3          | 3          | 4          | 4          |
| 20           | 1                                  | 3          | 3          | 3          | 3          | 4          |
| 21           | 0                                  | 2          | 3          | 3          | 3          | 4          |
| 22           | 0                                  | 3          | 3          | 3          | 4          | 4          |

| Material     | <i>Pinus sylvestris</i> L. sapwood |            |       |       |       |       |
|--------------|------------------------------------|------------|-------|-------|-------|-------|
| Date         | 20.10.2012                         | 20.10.2013 |       |       |       |       |
| Assessment   | 7                                  | 8          | 9     | 10    | 11    | 12    |
| Replicate ID | [0-4]                              | [0-4]      | [0-4] | [0-4] | [0-4] | [0-4] |
| 1            | 4                                  | 4          |       |       |       |       |
| 2            | 4                                  | 4          |       |       |       |       |
| 3            | 4                                  | 4          |       |       |       |       |
| 4            | 4                                  | 4          |       |       |       |       |
| 5            | 4                                  | 4          |       |       |       |       |
| 6            | 4                                  | 4          |       |       |       |       |
| 7            | 4                                  | 4          |       |       |       |       |
| 8            | 4                                  | 4          |       |       |       |       |
| 9            | 4                                  | 4          |       |       |       |       |
| 10           | 4                                  | 4          |       |       |       |       |
| 11           | 4                                  | 4          |       |       |       |       |
| 12           | 4                                  | 4          |       |       |       |       |
| 13           | 4                                  | 4          |       |       |       |       |
| 14           | 4                                  | 4          |       |       |       |       |
| 15           | 4                                  | 4          |       |       |       |       |
| 16           | 4                                  | 4          |       |       |       |       |
| 17           | 4                                  | 4          |       |       |       |       |
| 18           | 4                                  | 4          |       |       |       |       |
| 19           | 4                                  | 4          |       |       |       |       |
| 20           | 4                                  | 4          |       |       |       |       |
| 21           | 4                                  | 4          |       |       |       |       |
| 22           | 4                                  | 4          |       |       |       |       |

## Decay types reference

| Material     | <i>Pinus sylvestris</i> L. sapwood |            |            |            |            |            |
|--------------|------------------------------------|------------|------------|------------|------------|------------|
| Date         | 20.10.2005                         | 20.10.2007 | 20.10.2008 | 20.10.2009 | 20.10.2010 | 20.10.2011 |
| Assessment   | 1                                  | 2          | 3          | 4          | 5          | 6          |
| Replicate ID |                                    |            |            |            |            |            |
| 1            |                                    | S          | S          | S          | S, W       | S, W       |
| 2            |                                    |            | S          | S          | S, W       | S, W       |
| 3            |                                    | S          | S          | S, W       | S, W       | S, W       |
| 4            |                                    | S          | S          | S, W       | S, W       | S, W       |
| 5            |                                    | S          | S          | S, W       | S, W       | S, W       |
| 6            |                                    | S          | S          | S, W       | S, W       | S, W       |
| 7            |                                    |            | S          | S, W       | S, W       | S, W       |
| 8            |                                    | S          | S          | S, W       | S, W       | S, W       |
| 9            |                                    | S          | S          | S, W       | S, W       | S, W       |
| 10           |                                    | S          | S          | S, W       | S, W       | S, W       |
| 11           |                                    | S          | S          | S, W       | S, W       | S, W       |
| 12           |                                    |            | S          | S, B       | S, W, B    | S, W, B    |
| 13           |                                    | S          | S          | S, W       | S, W       | S, W       |
| 14           |                                    |            | S          | S, W       | S, W       | S, W       |
| 15           |                                    |            | S          | S, W       | S, W       | S, W       |
| 16           |                                    | S          | S          | S, W       | S, W       | S, W       |
| 17           |                                    | S          | S          | S, W       | S, W       | S, W       |
| 18           |                                    | S          | S          | S, W       | S, W       | S, W       |
| 19           | S                                  | S          | S          | S, W       | S, W       | S, W       |
| 20           | S                                  | S          | S          | S, W       | S, W       | S, W       |
| 21           |                                    | S          | S          | S, W       | S, W       | S, W       |
| 22           |                                    | S          | S          | S, W       | S, W       | S, W       |

| Material     | <i>Pinus sylvestris</i> L. sapwood |            |   |    |    |    |
|--------------|------------------------------------|------------|---|----|----|----|
| Date         | 20.10.2012                         | 20.10.2013 |   |    |    |    |
| Assessment   | 7                                  | 8          | 9 | 10 | 11 | 12 |
| Replicate ID |                                    |            |   |    |    |    |
| 1            | S, W, B                            | S, W, B    |   |    |    |    |
| 2            | S, W, B                            | S, W, B    |   |    |    |    |
| 3            | S, W                               | S, W       |   |    |    |    |
| 4            | S, W, B                            | S, W, B    |   |    |    |    |
| 5            | S, W, B                            | S, W, B    |   |    |    |    |
| 6            | S, W                               | S, W       |   |    |    |    |
| 7            | S, W                               | S, W       |   |    |    |    |
| 8            | S, W                               | S, W       |   |    |    |    |
| 9            | S, W                               | S, W       |   |    |    |    |
| 10           | S, W                               | S, W       |   |    |    |    |
| 11           | S, W, B                            | S, W, B    |   |    |    |    |
| 12           | S, W                               | S, W       |   |    |    |    |
| 13           | S, W, B                            | S, W, B    |   |    |    |    |
| 14           | S, W                               | S, W       |   |    |    |    |
| 15           | S, W                               | S, W       |   |    |    |    |
| 16           | S, W                               | S, W       |   |    |    |    |
| 17           | S, W                               | S, W       |   |    |    |    |
| 18           | S, W                               | S, W       |   |    |    |    |
| 19           | S, W                               | S, W       |   |    |    |    |
| 20           | S, W                               | S, W       |   |    |    |    |
| 21           | S, W                               | S, W       |   |    |    |    |
| 22           | S, W                               | S, W       |   |    |    |    |

W = White rot, B = Brown rot, S = Soft rot

## REFERENCES

Evans F., Alfredsen G., Flæte P.O. (2011) Natural durability of wood in Norway – results after eight years above ground exposure. Proceedings of the 7<sup>th</sup> Meeting of the Nordic Baltic Network on Wood Material Science and Engineering, Oslo, Norway. Report from Norwegian Forest and Landscape Institute 15/2011: 1-6.