

## Documents related to Handling and Storage of Wood Pellets

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The documents are organized according to the application. Highlighted documents are of key importance. Listed ISO Standards may over time migrate to become CSA-ISO Standards. Some documents are downloadable from the web and are highlighted in yellow. Most other documents are copyright restricted. For more information or questions, contact me at [drc@dccnet.com](mailto:drc@dccnet.com).

### **SMALL-SCALE HANDLING AND STORAGE (<100 metric tonne)**

1. ISO 20023 Safe Handling and Storage of Wood Pellets in Residential and other Small-scale Applications. ISO/TC238/WG7 Working document, November 2015, 46 pages.
  - a. Recommendation for Storage of Wood Pellets. German Wood Fuel and Pellets Association – DEPV, 2012, Chapters 1 to 11 (30 pages)  
Download: <https://www.google.ca/#q=DEPV+2012+storage+of+wood+pellets>
  - b. EPC Storage Guidelines, Recommendations on the design, installation and operation of fuel stores for pellet heating appliances. European Pellet Council (EPC), 2015.  
Download: [http://www.enplus-pellets.eu/wp-content/uploads/2015/07/ENplus-pellet-storage-guideline\\_UKPC-V1.0\\_hiRes.pdf](http://www.enplus-pellets.eu/wp-content/uploads/2015/07/ENplus-pellet-storage-guideline_UKPC-V1.0_hiRes.pdf)
  - c. VDI 3464 Storage of wood pellets at the point of end use – Requirements for pellet stores, pellet production and delivery from health and safety aspects. DIN September 2015, 41 pages.  
Source: <https://www.beuth.de/en/technical-rule/vdi-3464/238396762>
  - d. Research on Off-gassing and Self-heating in Wood Pellets During Bulk Storage. Ethanol BC, Staffan Melin, WPAC November 11, 2011.  
Download: [http://www.pellet.org/images/2011-11-11\\_Research\\_on\\_Off-gassing\\_and\\_Self-heating\\_Report\\_2\\_for\\_BC\\_Ethanol.pdf](http://www.pellet.org/images/2011-11-11_Research_on_Off-gassing_and_Self-heating_Report_2_for_BC_Ethanol.pdf)
  - e. Quality and Safety Assurance Best Management Practices for Storage of Loose Bulk Wood Pellets for Small and Medium Scale central Heating Systems. Biomass Thermal Energy Council (BTEC), Draft date January 6, 2015, 33 pages.  
Download: [http://biomassthermal.org/pdf/BTEC\\_bulk\\_pellet\\_storage\\_Final\\_9.24.2015.pdf](http://biomassthermal.org/pdf/BTEC_bulk_pellet_storage_Final_9.24.2015.pdf)
  - f. Monitoring of Carbon Monoxide Off-gassing in Wood Pellet Storage in the Northeastern US, \. Final Report December 2013, Report Number 14-18, New York State Energy Research and Development Authority (NYSERDA), Albany, 30 pages.
  - g. Dynamics of Carbon Monoxide (CO) and Volatile Organic Concentrations in Wood Pellet Storage Bins, Final Report, Report Number 15-33, NYSERDA, August 2015.  
Download: <https://www.nyserda.ny.gov/-/media/Files/Publications/Research/Biomass-Solar-Wind/Dynamics-Carbon-Monoxide-Organic-Wood-Pellet-Storage-Bins.pdf>
  - h. Compressed wood in natural state – Woodpellets Requirements for storage of pellets at the ultimate consumer (Presslinge aus naturbelassenem Holz - Holzpellets - Anforderungen an die Pelletslagerung beim Endverbraucher), ÖNORM M 7137: 2012 10 01, 12 pages.  
Download: <https://shop.austrian-standards.at/Preview.action;jsessionid=8CD259F288C0FC614FC8035ED5B58888?preview=&dokkey=447272&selectedLocale=en>
  - i. Guideline: Storage and Handling of Wood Pellets. Danish Technological Institute. Wolfgang Stelte, 2012.

Download: <https://www.google.ca/#q=DEPV+2012+storage+of+wood+pellets>

### **Other guidelines for small-scale handling and storage**

2. Material Safety Data Sheet (MSDS) for Wood Pellets in Bags. WPAC May 5, 2009.  
Download: <http://www.pellet.org>
3. Small Scale Biomass District Heating Handbook, A Reference for Alberta & BC Local Governments, March 2014, 46 pages.  
Download: <http://www.districtenergy.org/blog/2014/05/18/handbook-available-on-biomass-district-heating/>
4. Wood Pellets: Quality and Safety Assurance for Transportation and Delivery, NEBTWG Pellet Storage Working Group Edition, November 5, 2012, 12 pages.  
Download: [http://nebioheat.org/pdf/woodPellets\\_safetyTransportDelivery\\_web.pdf](http://nebioheat.org/pdf/woodPellets_safetyTransportDelivery_web.pdf)
5. Research into the Storage of Wood Biomass Fuels for Heating Equipment, Maurice Millar, NIFES Consulting Group, January 2006, 28 pages.  
Download: <http://www.gov.scot/resource/doc/217736/0090841.pdf>

### **LARGE-SCALE HANDLING AND STORAGE (>100 metric tonne)**

#### **ISO Standards** (not published yet)

6. ISO 20024-1 Safe Handling and Storage of Wood Pellets in Commercial and Industrial Applications – Part 1 General. ISO/TC238/WG7 Committee Draft (CD) document, January 2016, 49 pages.
7. ISO 20024-2 Safe Handling and Storage of Wood Pellets in Commercial and Industrial Applications Part 2. Detection, suppression and management of Fires and Explosions. ISO/TC238/WG7 Committee Draft (CD) document, January 2016, 45 pages.
8. ISO 20048 Determination of Off-gassing and Oxygen Depletion. New Work Item Proposal (NWIP).
9. ISO 20049 Determination of Self-heating. ISO/TC238/WG7 Committee Draft (CD) document January 2016, 18 pages.

#### **NFPA, ATEX and IMO guidelines** (Source: <http://www.nfpa.org/codes-and-standards/free-access> )

10. NFPA 68 Standard on Explosion Protection by Deflagration Venting, 2007 edition.
11. NFPA 69 Standard on Explosion Prevention Systems, 2002 edition.
12. NFPA 70 National Electrical Code, 2014 edition.
13. NFPA 77 Recommended Practice on Static Electricity, 2007 edition.
14. NFPA 664 Standard for the Prevention of Fires and Explosions in Wood Processing and Woodworking Facilities, 2007 edition
15. ATEX 137 – European Guidelines for Explosion Safety Directive 94/9/EC  
Download:  
[https://www.icheme.org/communities/subject\\_groups/safety%20and%20loss%20prevention/resources/hazards%20archive/~/\\_media/Documents/Subject%20Groups/Safety\\_Loss\\_Prevention/Hazards%20Archive/XVII/XVII-Paper-35.pdf](https://www.icheme.org/communities/subject_groups/safety%20and%20loss%20prevention/resources/hazards%20archive/~/_media/Documents/Subject%20Groups/Safety_Loss_Prevention/Hazards%20Archive/XVII/XVII-Paper-35.pdf)
16. International Maritime Solid Bulk Cargoes (IMSBC) Code and Supplements. IMO IG260E, 2013.

### **Other guidelines for large-scale handling and storage**

17. Silo Fires, Fire Extinguishing and Preventive and preparatory Measures. Swedish Civil Contingencies Agency (MSB), ISBN 978-91-7383-364-6, July 2013, Chapters 1 to 8 (121 pages).  
Download: <https://www.msb.se/RibData/Filer/pdf/27144.pdf>
18. Material Safety Data Sheet (MSDS) for Wood Pellets in Bulk. WPAC January 31, 2014.  
Download: <http://www.pellet.org>
19. Extinguishing Smouldering Fires in Silos. Brandsforsk Project 745-961, VTT Building Technology, ISBN 1455-0849, 1998, Chapters 1 to 6 (74 pages)

- Download: <http://www.vtt.fi/inf/pdf/publications/1998/P339.pdf>
20. The Pellet Handbook. Earthscan, ISBN 978-1-84407-631-4, 2010, Chapters 4 and 5 (pages 85-129)  
Source: [https://www.amazon.ca/s/?ie=UTF8&keywords=the+pellet+handbook&tag=googcana-20&index=aps&hvadid=9876402222&hvpos=1t1&hvexid=&hvnetw=g&hvrnd=10446837204761506280&hvpone=&hvptwo=&hvqmt=e&hvdev=c&ref=pd\\_sl\\_1ho8ij92ze\\_e](https://www.amazon.ca/s/?ie=UTF8&keywords=the+pellet+handbook&tag=googcana-20&index=aps&hvadid=9876402222&hvpos=1t1&hvexid=&hvnetw=g&hvrnd=10446837204761506280&hvpone=&hvptwo=&hvqmt=e&hvdev=c&ref=pd_sl_1ho8ij92ze_e)
  21. Health and Safety Aspects of Solid Biomass Storage, Transportation and Feeding. International Energy Agency (IEA Bioenergy Task 32, 36, 37 and 40), 2013, Chapters 1 to 9 (87 pages).  
Download: <http://www.ieabioenergy.com/wp-content/uploads/2013/10/Health-and-Safety-Aspects-of-Solid-Biomass-Storage-Transportation-and-Feeding.pdf>
  22. Guidelines for storing and handling solid biofuels. Nordic Innovation Center, May 2008, 25 pages.  
Source: <http://www.nordtest.info/index.php/methods/item/guidelines-for-storing-and-handling-of-solid-biofuels-nt-envir-010.html>
  23. SAFEPELLETS Research Report, FP7 SME-2011-2 (€4 million). February 28, 2015, Summary report, 58 pages.  
Download: <http://www.safepellets.eu/wp-content/uploads/2015/06/Publishable-Summary-of-the-project.pdf>
  24. Material Safety Data Sheet (MSDS) for Torrefied Material. SECTOR Project January 10, 2013.  
Download: [https://sector-project.eu/fileadmin/downloads/deliverables/SECTOR\\_Deliverable\\_8.2\\_final.pdf](https://sector-project.eu/fileadmin/downloads/deliverables/SECTOR_Deliverable_8.2_final.pdf)

**Related Engineering Literature** (Source: amazon.com)

25. Silos, Fundamentals of Theory, Behavior and Design. C.J Brown and J. Nielsen, ISBN 0-419-21580-8, 1998, 836 pages.
26. Powder and Bulk Solids, Behavior Characterization, Storage and Flow. D. Schulze, ISBN 978-3-540-73767-4, 2007, 508 pages.
27. Electrostatic Ignitions of Fires and Explosions, Thomas Pratt, ISBN 0-8169-9948-1, 2000.
28. Dust explosions in the Process Industries, Rolf Eckehoff, ISBN 0-7506-7602-7, 2003, 715 pages.
29. Principles of Fire Protection Chemistry and Physics, Raymond Friedman, ISBN 13:978-0-7637-6070-0, 2009.
30. Electrostatic Hazard in Powder Handling, Martin Glor, ISBN 0-471-92024-X, 1988, 171 pages.
31. Dust Explosion Prevention and Protection, A Practical Guide, John Barton, ISBN 0-7506-7519-3, 2002, 352 pages.
32. Bulk Solids Handling, Equipment Selection and Operation, Don McGlinchey, ISBN 978-1-4051-5825-1, 2008, 290 Pages.
33. Electrostatics second edition, Niels Jonassen, ISBN 1-4020-7161-2, 2002, 185 pages.
34. Forensic Fire Scene Reconstruction, David Icove, John DeHaan, ISBN 13: 978-0-13-222857-2, 2009, 526 pages.