

Wood Pellets:

Quality and Safety Assurance For Transportation and Delivery

NEBTWG Pellet Storage Working Group Edition
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Document created by the Northeast Biomass Thermal Working Group,
with assistance from the Biomass Thermal Energy Council and the Pellet Fuels Institute

Northeast

BIOMASS THERMAL WORKING GROUP



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Introduction

This document was prepared by a volunteer committee affiliated with the Biomass Thermal Energy Council to help advance discussions toward safe, efficient, bulk delivery of wood pellets in a condition suitable for use in boilers and furnaces. This document is presented solely as a set of technical “lessons learned,” intended to lead to a bulk pellet delivery standard after a significant period of industry review. Users accept all risks associated with implementing this document. Due to a reliance on Pellet Fuel Institute standards, recommendations only apply to the handling of bulk wood pellet fuel from the manufacturing point to the end-user’s storage facility. Recommendations for agricultural pellets could be shared when similar standardization exists.

We extend our gratitude to the Austrian Standardization Institute and its Technical Committee number 241, Energy from Solid Biomass, for its trail breaking leadership in the arena of biomass thermal energy.

Preliminary note

The Northeast Pellet Delivery and Storage Committee makes recommendations for transport and intermediate storage of wood pellets to maintain quality between the producer and the combustion systems.

This is intended to help pellet manufacturers, distributors, and traders avoid mistakes and thus ensure end-user satisfaction and safety to the delivery persons and property.

Recommendations for the conveyance and storage of the pellets at site of end use are made in a separate Northeast Biomass Thermal Working Group (NEBTWG) Pellet Storage Recommendation document.

1. Scope

This recommendation applies to wood pellet delivery from the manufacturing point to the point of use only, and recommends the means for quality assurance for wood pellet fuel during transport and storage. It is intended for use by manufacturers, traders, operators of reloading facilities and all other persons involved in transport.

2. Terms and definitions

For the use of this document, the following definitions apply:

Redistribution Facility: Any storage facilities or containers between production and pellet storage at the end-user premises.

Delivery truck: A truck, trailer, or equipment designed to transport wood pellets (Figure 1).

Operator: Any entity or individual that delivers bulk fuel.

Point of Origin: The pellet manufacturing facility.

Point of Secondary Storage: The last wood pellet storage location prior to truck transport.

Wood Pellet Storage: Any storage device for wood pellets including, but not limited to: steel silos, cloth bins, custom built wooden bins or bunkers, and underground tanks (Figures 2 & 3).

Fines: The percentage of fuel material in the fuel sample capable of passing through a 1/8 inch screen when sampling is conducted in accordance with the Pellet Fuels Institute Standard Specification for Residential/Commercial Densified Fuel.

3. References

3.1 Pellet Fuels Institute

The Pellet Fuels Institute is a North American trade association promoting energy independence through the efficient use of clean, renewable, densified biomass fuel. Its origins extend back to 1985 and is currently located in Arlington, VA. Members include fuel manufacturers and equipment suppliers, as well as organizations representing non-profit, university and government sectors.

3.2 Biomass Thermal Energy Council

The Biomass Thermal Energy Council (BTEC) is a 501(c)(6) non-profit trade association headquartered at 1211 Connecticut Avenue NW, Suite 600, Washington, DC, 20026. Founded in 2009, the association's mission is the advancement of biomass for heat and other thermal energy applications. BTEC engages in research, education, and public advocacy for the fast growing biomass thermal energy industry.

3.3 Northeast Biomass Thermal Working Group

The Northeast Biomass Thermal Working Group (NEBTWG) is a coalition of biomass thermal advocates committed to working together to advance the use of biomass for heating and combined heat and power (CHP) in the northeastern United States. NEBTWG was formed in 2010 to accelerate Northeastern opportunities for biomass in thermal and CHP applications by addressing market forces, policy drivers, regulatory framework, and public relations.

4. Requirements

4.1 General Requirements

4.1.1 Documentation

End users should be provided with a delivery document. The delivery document should quote:

- The Pellet Fuels Institute (PFI) grade of the pellet fuel
- Site of load out for local delivery truck
- Delivery weight
- Price and delivery date

A sample of a delivery document is provided in appendix II, on page 12.

4.1.2 Contamination

Wood pellets should be stored and transported separately from: pellets of a different grade, pellets made from other materials, or other biomass fuel. Blending pellets of different grades is not advised.

Transport vehicles must be thoroughly cleaned from previously transported goods other than same grade wood pellets. Ancillary equipment such as hoses and air locks must also be cleaned before refilling with wood pellets.

4.1.3 Protection Against Moisture And Wetness

Wood pellets should be kept dry during storage and transport.

4.2 Requirements For Secondary Storage

4.2.1 Storage

Wood pellets should be stored in storage facilities that are covered on all sides, such that wood pellets are kept dry at all times. Any ground surface in the storage unit must be covered with an impervious material (e. g. concrete, asphalt). Pellets can also be stored dry in closed silos (Figure 2). In particular, wood pellets should be protected against direct rain, snow and wet walls or condensation.

Handling areas and storage surfaces must be free from contamination (e.g. grit, soil, sand). Silos and conveyors should be completely cleaned and/or cleared before being filled with wood pellets, if other goods were conveyed or stored previously.

Quality marked densified fuel must not be allowed to co-mingle with non-quality marked product. Quality marked densified fuel of one grade comingled with another grade must be quality marked to the lowest quality grade present.

Pellet fines should be cleaned from all secondary storage at regular intervals to reduce accumulation of fines at the end user's location over time.

4.2.2 Loading of Transport Vehicles

Before a transport vehicle is loaded for delivery to any consumer, the fines should be separated and removed at the point of distribution.

4.2.3 Requirements For Transport Vehicles For The Delivery To End Consumers

4.3.1 General Requirements

4.3.1.1 Protection Against Moisture

Transport vehicles must be designed in such a way that wood pellets are protected against moisture throughout transport, as well as during loading and delivery (Figure 1).

4.3.1.2 Mechanical Stress on Wood Pellets Due to Delivery Truck Conveying Systems

An inspection should be carried out during standard operating conditions. After the unloading of the transport vehicle is complete, a random sample should be pulled to ensure damage to pellets is being minimized. Delivery companies should take all steps possible to reduce delivery hose length, bends, restrictions, and excessive pressure or velocity to minimize dust and fines.

Delivery truck owner/operators should consider performance testing of delivery trucks to determine what amount of fines are produced during a sample load out. The fine fraction that may exist at the final end-user's site should be no greater than 2%*.

4.3.1.3 Delivery Truck on Board Weighing Systems

On board weighing systems are recommended. If on board weighing systems are used, they should be certified in accordance with the applicable local laws. Otherwise, a weight must be recorded on an approved scale and documentation kept in accordance with local and state requirements, as applicable. Individually weighed compartments are generally acceptable, as long as each compartment delivered separately has its own weight ticket.

4.3.1.4 Static Charge

A bin that is to be filled before it has been electrically connected to the boiler by auger or vacuum system must be grounded. Any presence of static charge is an indicator of insufficient grounding and operations must stop until resolved.

In bins where there are multiple pipe accesses, all fillers should be male-ended, and vents or exhausts are female-ended. The recommended length of hose is < 100ft. Ideally, the connection to the bulk storage will allow the delivery pipe to be as straight as possible.

4.3.2 Delivery Truck

4.3.2.1 Suction Device

Equipment for suction and filtering of the delivery air from the storage room should be considered if delivery is for rigid storage units. The discharge capacity of the collection system should meet the capacity of the truck's pneumatic system. Any over-pressure or excessive vacuum in the storage room should be avoided. Suction on fabric bins, and small 3-4 ton galvanized sealed, externally vented, bins is not required unless specified by the manufacturer or installer. Extreme caution should be used to prevent over pressurization or over filling of small bins (Figure 4). When filling a fabric bin, a vent (door, window or external piping) sufficient to vent storage space from any pressurization must remain open during filling.

4.3.2.2 Delivery Hose

The standard equipment of the bulk delivery truck should consist of:

- An anti-static hose of appropriate length (Figure 5)
- Suitable adaptors and connections (4 inch Cam Lock) (Figure 6)
- Hose must be static dissipative and the bin must be grounded either through the auger or vacuum connections, or directly to the ground
- The bin should include a filler connection with a male end fitting, a bin vent with a female fitting, and a hose with a female end fitting (Figures 5 & 7)
- Lockable caps should also be considered in public locations

4.3.2.3 Delivery Truck Inspection at Time of Delivery

There must be visual checks to establish that the

*The committee has not yet reached a consensus on this figure and seeks additional comment and/or data.

technical, conveying and delivery equipment is in working order, primarily in correlation to DOT regulations and the manufacturer's guidelines.

4.3.2.4 Auger Systems

Auger offloading systems, while effective, present additional product breakage possibilities and limitations to reaching storage since most have a straight arm (Figure 8). As long as the manufacturer of the fuel, delivering agent, and customer are aware of these impediments and have planned accordingly, such systems can work well. Since the discharge of the auger typically has no means to capture fines, discharge areas can become dusty. It is also a good habit to ensure that the truck bin has been cleared of fines after each delivery to minimize accumulation of wood dust. Key items to be aware of are bin height in relation to auger reach as well as the corresponding horizontal distance needed to access the opening of the bin (Figure 9). These two are crucial components relating to truck access and the necessary proximity to a storage bin (Figure 10). Unless the operator can utilize remote controls, it is likely two people are needed to monitor filling level and speed appropriately.

5. Requirements for the Training Delivery Staff

Operators should train any delivery personnel or employees in the operation of its equipment, delivery techniques, type of customer installations, and emergency-upset procedures.

5.1 Delivery Instructions

It is the sole responsibility of the operator delivering wood pellets in accordance with this document to create delivery instructions and to train the delivery staff.

These job instructions should include special training for at least the following topics:

- Transport from one redistribution facility to another redistribution facility (see 4.1.2 General Requirements: Contamination and 4.1.3 General Requirements: Protection Against Moisture and Wetness)
- Customer relations (notification of delivery time

and date, confirmation of access and conditions of travelled ways, ensuring access to the pellet storage bin and the heating appliance if necessary, notification of facility shortcomings or of existing safety hazards, etc.)

- Checklist completion according to 5.5 Point of Delivery Checklist
- Preparation for filling the fuel storage room
- Instructions for the careful delivery of pellets
- Technical procedure of unloading
- Correct application of the suction device (switching on of suction device before unloading, using dry and clean exhaust filters only)
- Avoiding excess pressure in the storage room (Figure 4)
- Closing of delivery and exhaust systems after use

5.2 Point of Receipt and Delivery Recommendations for Delivery Personnel

It is recognized that delivery personnel may require expertise in the transportation of wood pellet fuel to and from different types of locations, such as: manufacturing mills, reloading facilities, and the point of end use. It is recommended that personnel receive adequate training for each type of facility visited to ensure their own safety, and the safety and well being of the property and persons around them.

5.3 Point of Delivery Operations Inspection

The designer or installer of end user equipment will have responsibility for proper installation and its operation. New installations typically require an extra measure of caution. It is expected that the fuel handling equipment installed at the point of use shall have been installed properly by the original installer. However, the operator is advised to ensure the integrity of the fuel receiving equipment at the point of end use prior to beginning delivery. Operator should be sure of system integrity before first delivery.

5.4 Protection of End Use Premises

- All stray wood pellets and dust must be removed from the exterior of end use premises after delivery is complete
- Care must be taken to not damage driveways, lawns, or other end use property

- Delivery times should be considered in compact or urban neighborhoods, where noise may be a nuisance
- Collect dust from vent sites when possible. If a ground level vent is present, it is recommended to use a sock to collect dust

5.5 Point of Delivery Checklist

It is recommended that pellet fuel delivery personnel consider using a check list for every delivery. The checklist should be included in the delivery documents and may be integrated in the delivery note. The check list should be completed for every delivery to a customer by delivery staff, and it is recommended that it address the information shown below, and included in the sample checklist form available in Appendix II (on page 12).

- Overhead power lines or other hazards present?
- Adequate venting of storage units to prevent over-pressurization?
- Storage room closed (fuel storage room access ways)?
- Apparent nature and estimated quantity of remaining fuel stock in the storage system?
- Approximate length of pipe to bin from external connectors? (Figure 3)
- Adequate space available above textile bag for expansion during filling?
- Heating switched off prior to delivery of fuel?
- Post-delivery visual check of pellet store and area around pellet storage unit for excess dust or damage of any sort.
- Re-start the appliance if necessary. Check to assure that appliance is successfully re-starting.
- Note and report any deficiencies of the existing equipment if necessary, for example that the connections are properly labeled and grounded.

Appendix I: Illustrations



Figure 1: Pellet truck making a residential delivery in Vermont



Figure 2: Auger truck delivering to an outdoor silo



Figure 3: Indoor pellet storage bin with pipes



Figure 4: Delivery hose pressure gauge



Figure 5: Delivery truck driver holding hose with female fitting



Figure 6: Male and female cam locks shown to scale



Figure 7: End user storage bin delivery location with male fittings

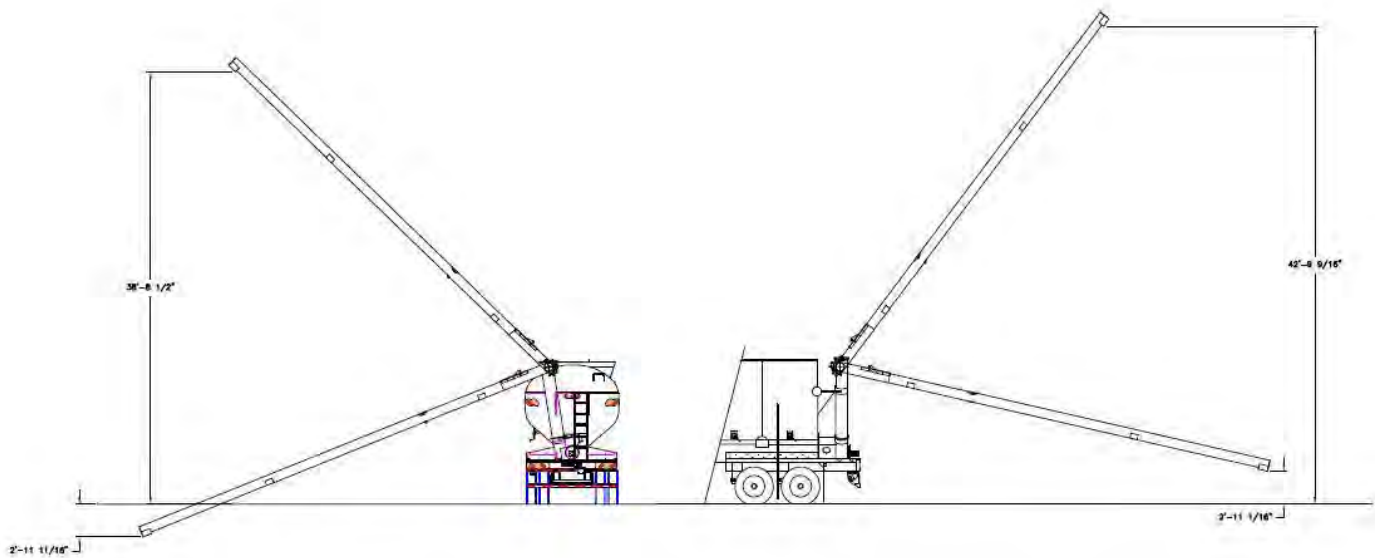


Figure 8: Auger delivery truck schematic

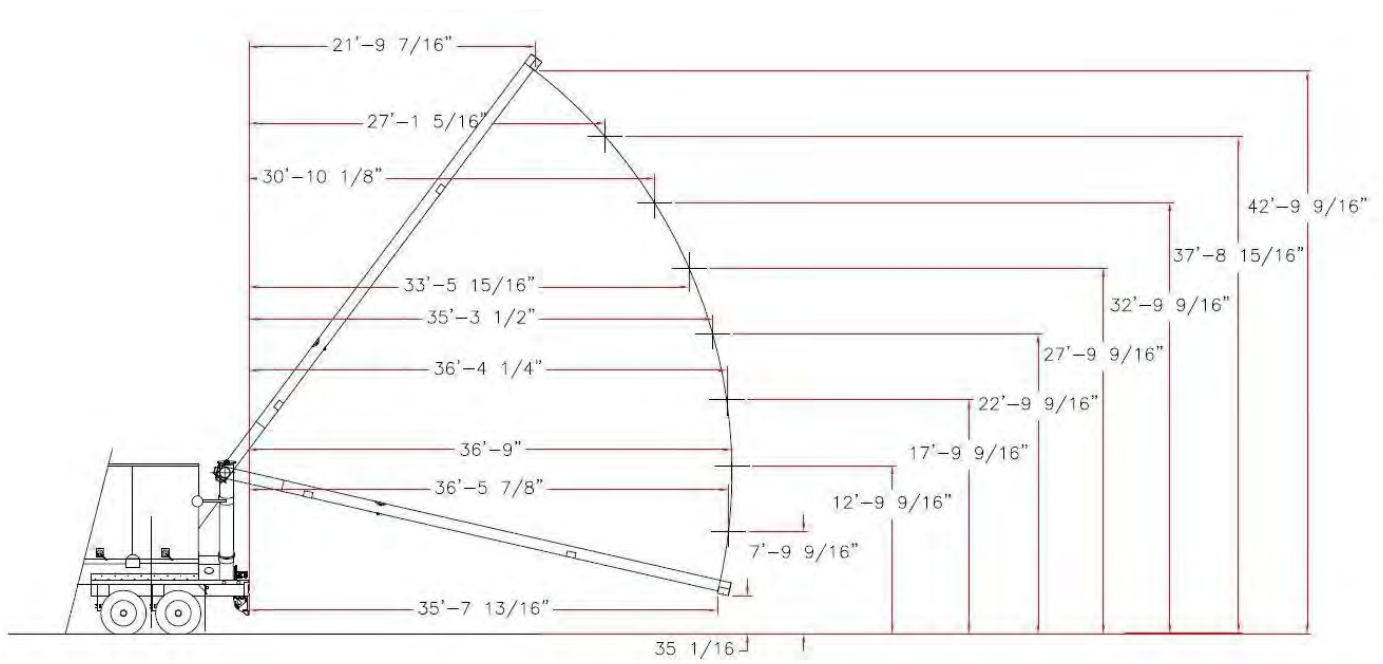


Figure 9: Forty foot bulk trailer schematic with silo heights

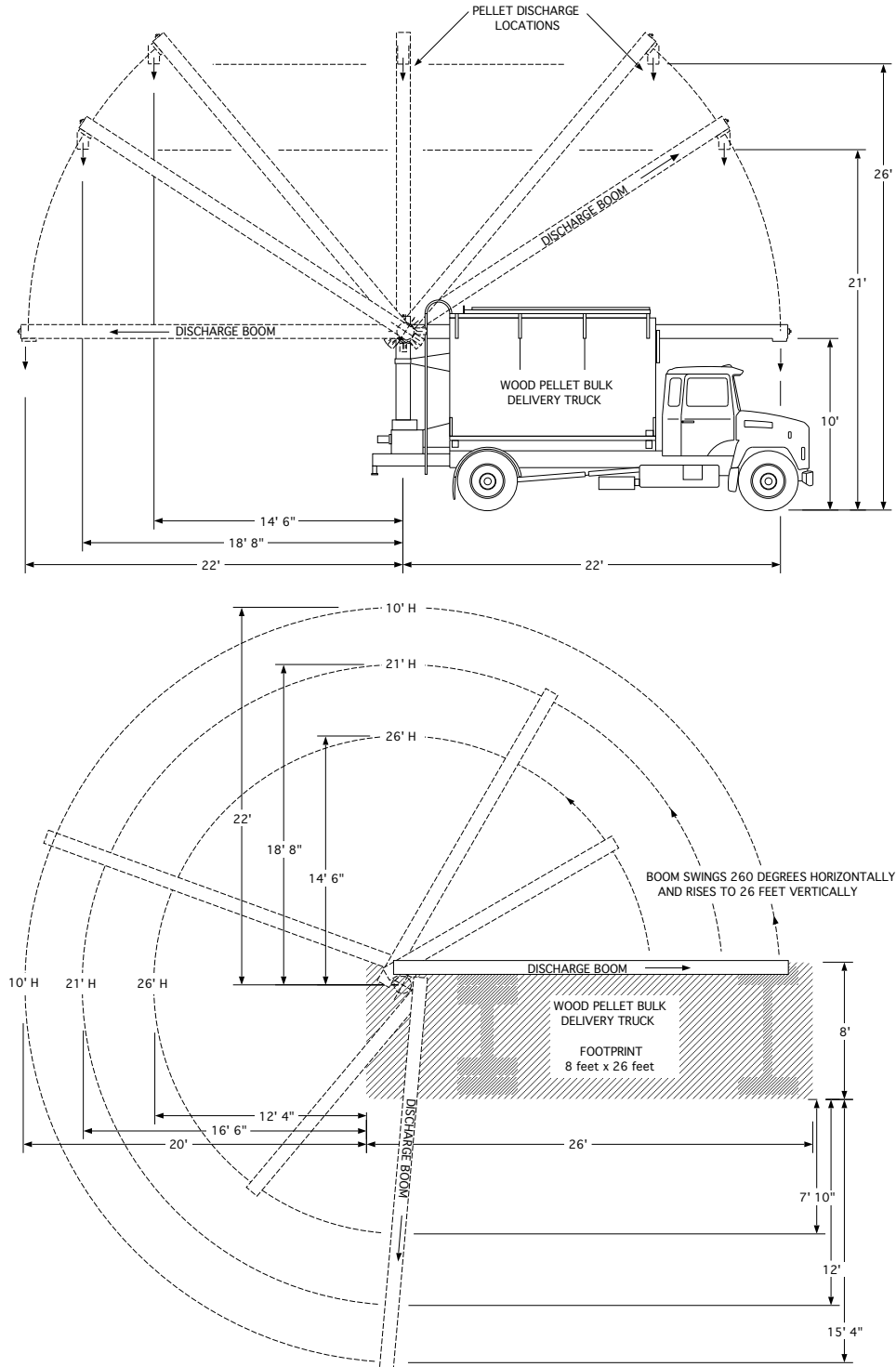


Figure 10: Bulk pellet delivery truck diagram illustrating height and distance of potential locations reachable by the truck's discharge boom for dispensing wood pellets

Appendix II: Sample Delivery Checklist

Company Logo Delivery Ticket

Date: _____

Wood Pellet Manufacturer and Mill Location: _____

Delivery Personnel Name: _____

Customer Name and Address: _____

Weight of Fuel Delivered _____ Pounds

Grade of Fuel Delivered _____

Time of Delivery _____ PM/AM (circle one)

Length of Delivery Pipe Needed: _____ Feet.

Approximate Length of delivery pipe from exterior connections to storage device: _____ Feet.

Type of Storage Bin _____

On-site Checklist:

Checked at Time of Delivery	Yes	No
Overhead Power Lines		
Adequate Venting of Storage Device (over-pressure)		
Storage device closed (all access ways)		
Nature and quantity of fuel remaining in storage device		
Adequate overhead space for cloth bag expansion		
Heating appliance switched off prior to start of delivery		
Post delivery quality and cleanliness check		
Re-start the heating appliance if necessary		

Notes: (For example, deficiencies in grounding or other shortcomings of site or conditions, delicious cookies offered by grateful home owner)

Product has been properly delivered and paid in full.

Delivery Agent Signature _____ Date _____

Receiving Customer Signature _____ Date _____