

3M Corporate General Specification

Description: Pallet Stretch Wrap, Banding, and Slip-Sheeting Guidelines.

Specification No.: RD-207

Supersedes Issue: Document was superseded December 9th, 2019.

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Change Record: This document was revised to provide current details on stretch wrapping (procedures, and load containment force), banding, and slip sheeting.

SCOPE: This Corporate General Specification describes techniques used to unitize pallets using stretch wrap, slip-sheeting or banding of loads in preparation for shipment and storage.

1.0 **PURPOSE:** This document outlines guidelines for properly securing loads to pallets.

2.0 **APPLICATION:** See below

Stretch Wrap Application Guidelines for Unitized Loads
Stretch wrap material selection, the number of wraps, the tension used on the equipment, and location of where it is applied all play a role in ensuring effective and safe product movement through the supply chain. Standardized process must be consistently followed, and equipment monitored to ensure 3M product is received by customers undamaged.
Wrapping Process 1) Attach the stretch film to the pallet (Between load and pallet or by tying to pallet decking/stringers). 2) Wrap around the pallet making sure to bond the film to the pallet with a film cable/roping of film (the action of twisting film into rope or cable), ideally down 1" to 2" from the top of the pallet; any lower than that the film is in danger of being pierced by forks or pallet jacks. 3) Continue to spiral wrap moving upward, overlap the previous layer of film by 40-60% of the film width. 4) Wrap around the top 4 times, film to extend 2"-6" above pallet load. 5) Spiral back down the load overlapping the previous applied layer of film by 40-60% of the film width. 6) At the bottom, wrap around the bottom layer and pallet 4 times, making sure 1" to 2" of material covers the pallet. 7) On a periodic basis (depending on usage) confirm containment force, as described on page 2, to ensure alignment with the load type and weight and pre-stretch for proper load containment and film optimization. Note About Loads with under-hang: When there's under-hang of the pallet load, (the product sitting inboard of the pallet's edge), the pallet can present a film break hazard. Lantech's Pallet Grip helps to mitigate this hazard as the film cable will not break even though there might be a tear in the film.

Properly wrapped loads will have:

- Sufficient containment force, based on the type of load, present everywhere on the unitized pallet
- Load locked to the pallet with a film cable
- No film tails longer than 4 inches on the unitized load

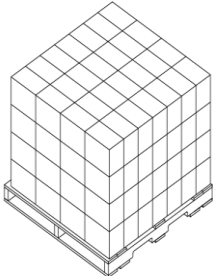
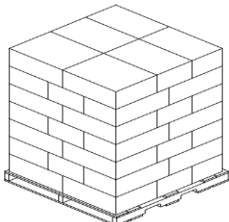
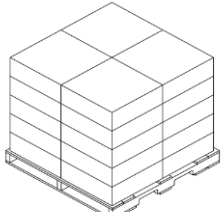
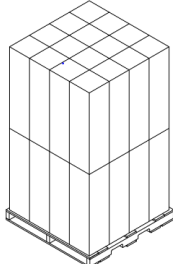


Containment Force:

Containment Force (CF) is the key to successful shipment of pallets. There must be enough CF to keep the load together and to keep it on the pallet or risk shipment failure. Too much CF will risk crushing the product/package, especially at the corners, and waste of money on film.

Statistics show the average weight of a 3M pallet load is 750 pounds and is relatively stable. Within the guidelines below, that would fall within the "Stable Mid-Weight Load" and would call for a minimum of 5-7 pounds of CF at all points of the load, i.e. Top, Middle and Bottom, as measured with a tool such as a Lantech Containment Force (CF) Tool or equivalent.

Note: Some 3M products, namely those described as "Bulk Roll" could require higher amounts concentrated containment force at the bottom where the product meets the pallet. Further observation and testing required to determine the amount

Very Light Loads [<250 lbs]	Stable Mid-Weight Loads [250 to <750 lbs]	Heavy Loads [750 to <2,000 lbs]	Very Unstable Loads [>2,000 lbs]
2 – 5 lbs CF (0.9 – 2.3 kg)	5 - 7 lbs CF (2.3 – 3.2 kg)	7 – 12 lbs CF (3.2 – 5.4 kg)	12 – 20 lbs CF (5.4 – 9.1 kg)
Scotch-Brite Sponges Disposable Ear Plugs Command Products	Filtrete Filters Floor Pads Abrasive Belts	Post-it Notes Cutoff Wheels	Grinding Wheels Adhesives/Chemicals
			

Containment Force Tool

Use a Lantech Containment Force Tool or equivalent containment force tool, these tools are a very consistent way to measure containment force (CF) on pallet/loads wrapped with stretch film.

Containment Force - The cumulative force on the load from the layers of film, measured at any point. It is the best indicator for load shipment success.

Good practice recommendation is all loads should be checked regularly across all manufacturing production lines. When ten consecutive good readings are obtained, sampling rates may be reduced.

Where and How to Measure the Containment Force

- 1) Measure the Containment Force at three positions on one side of the load. Measure at the top, the approximate middle and the bottom of the load. (refer to photo 1)
- 2) Measure the Containment Force on the longest side of the load, if it is possible. Example: If the load is 40" x 48", measure the Containment Force on the 48" side of the load.
- 3) Measure from the right corner of the load for the 3 positions, using the cable attached to the tool for reference.
- 4) Push the "piercing finger" through the film.
- 5) Pull the scale to the left until the green indicator shows in the center of the slot.
- 6) Record the data on the scale display.

Photo 1



Containment Force Chart

This chart includes the basic Containment Force ranges and the load types.

Containment Force	Load Types
Low – 1 - 2 kg (2 - 5 lb)	Scotch-Brite Sponges, Disposable Ear Plugs, Command Products
Medium – 2 - 3 kg (5 - 7 lb)	Filtrete Filters, Floor Pads, Abrasive Belts
High – 3 - 5 kg (7 - 12 lb)	Post-it Notes, Cutoff Wheels
Extreme – 5 - 9 kg (12 - 20 lb)	Grinding Wheels, Adhesives/Chemicals



Pre-Stretch:

Pre-stretch values, (which is a different parameter from CF), should be between 200% to 250% range. Staying in this range reduces the risk of film breaks yet maximizes film yield.

Proper pre-stretch values should be verified at minimum twice per year. Various issues can degrade pre-stretch values, the most common being damaged to stretch rollers. Other factors are stretch roller wear, and broken drive chain or coupling chain between rollers.

One good way to measure the amount of pre-stretch a stretch wrapper is producing is to make two marks on the film (on the roll) before it enters the film carriage, see picture to the left. The tool shown helps you to make the two marks exactly one inch apart from each other. Start the wrapper and allow the film to go thru the Film Delivery System and onto the pallet load. Measure the distance between the two marks. If they are now three inches apart, you're getting 200% pre-stretch.

Maintenance:

Preventative maintenance schedules must be developed and managed by each site aligned to the equipment manufacturers recommendations. Recommendations may include daily removal of debris with careful attention given to not cutting into dancer rollers, pre-stretch rollers and other components with a utility knife. It's critically important to follow PM schedules and replace components as required.

Banding Application Guidelines for Unitized Loads

Banding (strapping) is used to stabilize containers on a pallet or within a crate. Proper use of banding material types and tensioning equipment will help ensure the load will withstand the normal rigors of the transportation environment.

Materials:

Both plastic and steel banding materials are available options. However, because of safety concerns, steel banding is not recommended. Additionally, polyester banding material is preferred since polypropylene banding is known to stretch, which may impact the stability of the load over time.

Tensioning:

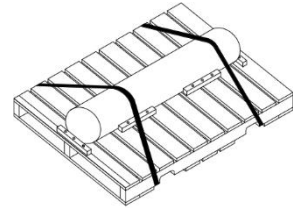
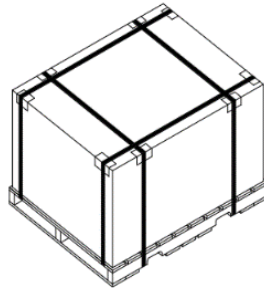
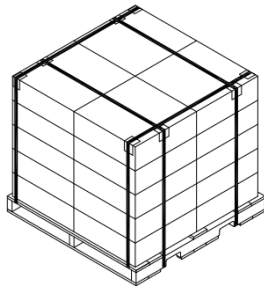
Plastic banding recommended: strapping is as tight as the load will allow without damaging the product or its packaging.

- Always ensure that you use two metal banding clips to ensure that slipping does not occur.
- If using a battery powered strapping combo tool, ensure banding tension is set per manufacturer's recommendation.

Placement of Banding:

- Standard two-way pallet - Banding is positioned parallel to the stringers of the pallet. For example, left side next to stringer. Center next to stringer. Right next to the stringer. **Note*** if the banding is positioned in the center of the boards, you will run the risk of pulling the boards up. ******The use of drawings to denote location is encouraged.
- Standard four way – Position banding next to the bottom deck boards and ensure that the banding will not interfere with the pallet-jacks wheels swinging back and forward.
- Number of bands should be a minimum of two in each direction or more based on the application.

- Tubed items will need to have the proper sized pallet. Always ensure that the pallet is long enough to be able to add in stops on each end, and in the center. Then band a minimum of two times in the length and one time through the center if the package allows.
- Ensure that all banding is horizontal and clean looking to ensure the proper securing of package to pallet.



Additional Considerations:

- Utilize a laminated V-board piece or plastic banding corner to support the drawn banding on the pallet load. As this will prevent the banding from cutting into the load when drawn down to a minimum of .125 - .1875 (1/8" to 3/16") -inch crush until taught.



Load Tie Sheets /Slip-Sheet Guidelines for Unitized Loads

Load tie sheets:

Tie sheets are designed to stabilize between layers of load and are typically used for unstable loads including; small cartons, open load designs or totes that otherwise can cause a load to be unstable. These sheets can be placed between every layer, every other layer, the center of a load, or in a location that will provide the most stability for your specific load.

Load tie sheets can be constructed using the following materials:

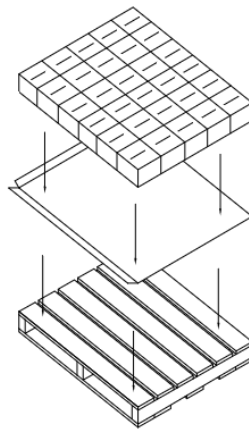
- 1) A minimum of 36-point paper board sheeting
- 2) A minimum of 32 ECT C flute (200 lb. Mullen burst)
- 3) A honey comb sheeting that is a minimum thickness of .375" and not exceeding .5" thickness. These are most often going to be utilized as a top sheet for a pallet load to protect against carton top damage and carton crushing.

Pallet Load Slip Sheets:

Pallet load slip sheets should be used on new or reconditioned pallets that have:

- 1) High moisture content - This will lessen the probability of moisture migration to the bottom cartons. (Consider two sheets).
- 2) Nails pops - that didn't set right when pallet was manufactured.
- 3) Deck board spacing that is not optimally aligned to the box footprint (i.e. box corners do not rest on top deck boards)

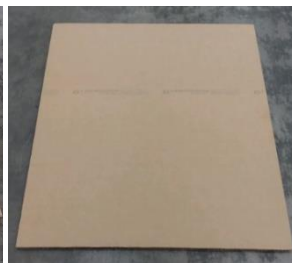
Examples of Load Tie Sheets, Pallet Slip Sheets and Pallet Top Caps:



**Paper board Slip-Sheet.
On Pallet**



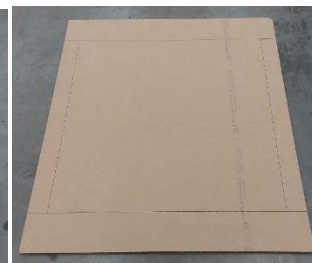
**Honey Comb Sheet
On Pallet**



**Honey Comb sheet
On Pallet**



**Die-Cut Honey Comb Cap
On Pallet**



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