



NATIONAL TRANSPORTATION SAFETY BOARD

Office of Aviation Safety
Washington, D.C. 20594

February 2, 2015

Attachment 36 - NAC ULD Inspections Process

OPERATIONAL FACTORS

DCA13MA081



ULD Inspection Process

PALLETIZED CARGO

Palletized Cargo is defined as cargo placed on approved pallets, with the cargo load restrained to the pallet with “approved restraint devices” and the pallets restrained within the aircraft restraint by the cargo loading system fittings. Pallets and nets must meet the minimum performance standards required by TSO C90c. Marking: The following information shall be legibly and permanently marked on the cargo Unit Load Device and Net. **NO PALLET OR NET IS TO BE LOADED ON NATIONAL AIRLINES AIRCRAFT UNLESS IT MEETS THESE REQUIREMENTS:**

1. The name and address of the manufacturer.
2. The weight of the article.
3. The serial number or date of manufacturer.
4. The name, type, part, number or model designation of the article and the identification of the article in the code system set out in paragraph 1.2.1 of NAS 3610 Revision 10.
5. The applicable TSO number.
6. The burning rate determined for the article under paragraph 3.7 of NAS 3610.
7. If the article is not omni directional, the words “FORWARD”, “AFT” and “SIDE” must be conspicuously and appropriately placed.

On Previously Approved Articles: A cargo pallet, net or container approved prior to the date of this TSO may continue to be manufactured under the provisions of its original approval.

Before loading cargo on pallets or into containers, the pallet or container should be examined by the Loading Supervisor for gouges, depressions, delaminated panels, cracked edge rails, bowing, and missing corners and rivets. The following Tables provide the allowable damage limits for nets, straps, pallets and containers for the Company (See Tables 3.1.1, 3.1.2, 3.1.3 and 3.1.4). Nets, straps, pallets and containers which are found to be in a condition beyond the allowable damage limits shown, may not be used and should be returned to National Airlines or authorized repair facility (N8), Unitpool (R7) or the Department of Defense (463L) for possible repair. The pallet is relatively thin and flexible and loads exceeding 2.08 psi/300 lbs per square ft shall not be placed on the pallet without shoring so that the aircraft floor limits are not exceeded. The maximum load allowable on this type of pallet is limited by the load conditions of NAS 3610.

DAMAGED PALLETS, NETS AND OTHER RESTRAINING EQUIPMENT

Damaged Pallets, Nets and any other restraint equipment will be removed from service and returned to its proper owner for appropriate action, such as repair by qualified personnel.

Pallets should be returned in a stack with a serviceable pallet used as a base, so restraint requirements are met. This may be done by using wooden skids above the serviceable pallet and stacking damaged pallets (Sandwich Pallet). Other approved restraint devices such as straps may be used but must meet the serviceability requirements shown below.

Table 2-7: Company Allowable Damage – Nets

NET COMPONENTS	SATCO REQUIRED	AIRLINE CONTAINER	ALL OTHERS REQUIRED
Double Stud Fitting	One missing fitting per side is acceptable if the load is reduced by 1,750 Lbs (794 Kg) per missing fitting of maximum allowable gross weight and fittings are non-adjacent including corners.	One fitting per side inoperable or missing is allowable. MAX Allowable gross weight must be reduced to 80%. Reduction must be taken if 1 or 4 fitting are missing or inoperable. (See TSO for Max allowable weight of net).	One fitting per side inoperable or missing is allowable. MAX Allowable gross weight must be reduced to 50%. Reduction must be taken if 1 or 4 fitting are missing or inoperable. (See TSO for Max allowable weight of net).
Tension Hooks	Allowable limit is one missing or broken tension hook per side	One hook per side missing or broken is allowed. Allowable gross weight must be reduced to 80% for 1 or 4 sides.	Allowable limit is one missing or broken tension hook per side
Lashing Lines	Four Required	Four Required	Four Required
Rope or Web (Diamonds)	Only one cut per side where damage exceeds more than half of the rope diameter. Broken Diamonds are not allowed but a bridge strap may be used, maximum of 2 per side.	One cut rope or diamond per side is allowed, not including edge or border rope.	One cut or broken rope per side is allowable, load would have to be reduced 50%. Reduction must be taken for 1 or 4 sides
Edge Rope (Border Cords)	No broken Border Cords allowed	One Edge Rope or Border Cord cut per side not in conjunction with inoperative or missing double stud fitting.	One cut or broken Edge Rope per side is allowable gross weight must be reduced to 50%. Reduction must be taken if 1 or 4 side.
Replacement of tension hooks and double stud fitting	No replacement allowed. Bridge Straps may be used for a double stud fitting. They may be used until it is feasible to send the net for repair	Replacement of spring type tension hooks is allowed. Double studs may be replaced with loop method until it is feasible to send the net for repair.	Not allowed additional restraint per COM may be possible but must be checked
TSO Tags	Must be attached and legible.	Must be attached and legible.	Must be attached and legible.
Max Allowable gross weight rating	See TSO Tag for the maximum gross weight rating	See TSO Tag for the maximum gross weight rating	See TSO Tag for the maximum gross weight rating
Remarks	Any net with damage exceeding above allowable damage should be rejected, replaced or returned to it's owner. If the net is a N8 pallet it should be returned to YIP.		
	A nets involved in a chemical incident effecting the structural integrity of the net must be removed from service.		

Table 2-8: Company Allowable Damage Tolerances – Pallets

ULD COMPONENTS	SATCO REQUIRED	NORDISK/HYDRO ALUM REQUIRED	ALL OTHERS REQUIRED
Edge Rails	See Note 1	No cracks allowed on the Edge Rails	Edge Rails Cracks may not exceed 3 inches (75 mm) Longitudinally or 1/2 inch (13 mm) Laterally
Seat Tracks	See Note 2	There shall be at least 4 undamaged adjacent pairs of seat track lips at each net attachment point. In order to avoid inadvertent attachment of net fittings, any damaged seat track lip should be removed.	At least 2 undamaged adjacent pairs of seat track lips at each side of net attachment point.
Corner Castings	All Corner Casting may be missing. However repair is recommended as damaged or missing castings may cause damage to the aircraft cargo loading system	No missing Corner Casters are allowed	One Casting may be missing. However repair is recommended as damaged or missing castings may cause damage to the aircraft cargo loading system
Center Sheet	Within 3 inches (75 mm) of any adjoining edge extrusion: Tear or puncture must not exceed 3 inches (75 mm) in length by 1 inch (25mm) in width. Beyond 3 inches (75 mm) of any adjoining edge extrusion: Tear or puncture must not exceed 6 inches (150mm) in length by 2 inches (50mm) in width.	There shall be no cracks or holes in the plate.	A tear or puncture within 3" of any adjoining edge extrusion may not exceed 3 inches (75mm) by 1 inch (25mm). Beyond 3 inches (75mm) , a tear or puncture may not exceed 6 inches (150mm) by 1 inch (25 mm).
Rivets	A maximum of five (5) missing edge rail to pallet sheet attach rivets total around perimeter of a pallet assembly are allowed provided that there are a minimum of five (5) good rivets between any two missing rivets.	There shall be no more than 5 loose or missing rivets per edge rail. Minimum distance between loose or missing rivets shall be 20 inches (50 cm).	No more than 5 loose or missing rivets per edge rail. Minimum distance between loose or missing rivets shall be 20 inches (51 cm)
Bowling Unladen	No more than 2 inches (50 mm)	No more than 1 1/10 inches (2.8 cm)	No more than 2 inches (50 mm)
Bowling Laden	1 1/4 inches (32 mm) Loaded	1 inch (25 mm) Loaded	1 1/4 inches (32 mm) Loaded

Welded Corners	Cracked or broken welded corners do not affect the airworthiness of the pallet and are considered allowable damage. Cracks are therefore permitted on all four corners of the pallet assembly with no reduction to the maximum gross load.	No broken corner welds	No broken corner welds
Remarks	Any pallet with damage exceeding above allowable damage should be rejected, sandwiched on a airworthy pallet or returned to it's owner. If the pallet is a N8 pallet it should be returned to YIP.		
	Repaired seat tracks that do not affect required attachment should not be considered as a broken seat track.		

Note 1: SATCO Edge Rails:

Damage to any extruded pallet edge rail must not exceed cracks of three 3 inches (75mm) longitudinally (lengthwise – with the grain) or one half (1/2) inch (12.7mm) laterally (crosswise – against the grain). Cracks, cuts or tears beyond these limits may not be welded and therefore, the entire edge rail must be replaced.

Due to prolonged contact with conveyor systems over time, single sheet pallet sheets tend to dish or cup which can raise the upper plane of the edge rails. It is allowable for an empty pallet to have such deflection up to a max allowable dimension of two (2) inches (50mm) provided that the edge rails themselves are not bent beyond the limits stated above.

Note 2: SATCO Seat Tracks:

Distortion and/or indentation of the pallet assembly or edge rails must not exceed one-half (1/2) inch (12.7mm) up to the length of the edge rail. There are no limitations to the quantity or location of damaged, broken or missing seat track lips provided that there are a minimum of 3 contiguous undamaged pairs of seat track lips immediately adjacent to any and all net tie down points. The 3 undamaged pairs of seat track lips may be on either side of the net tie down point.

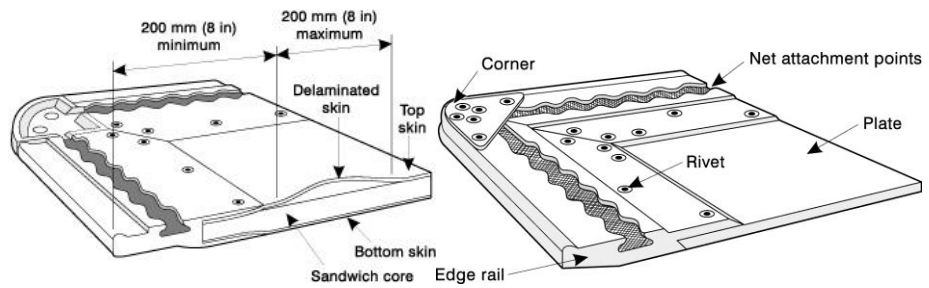
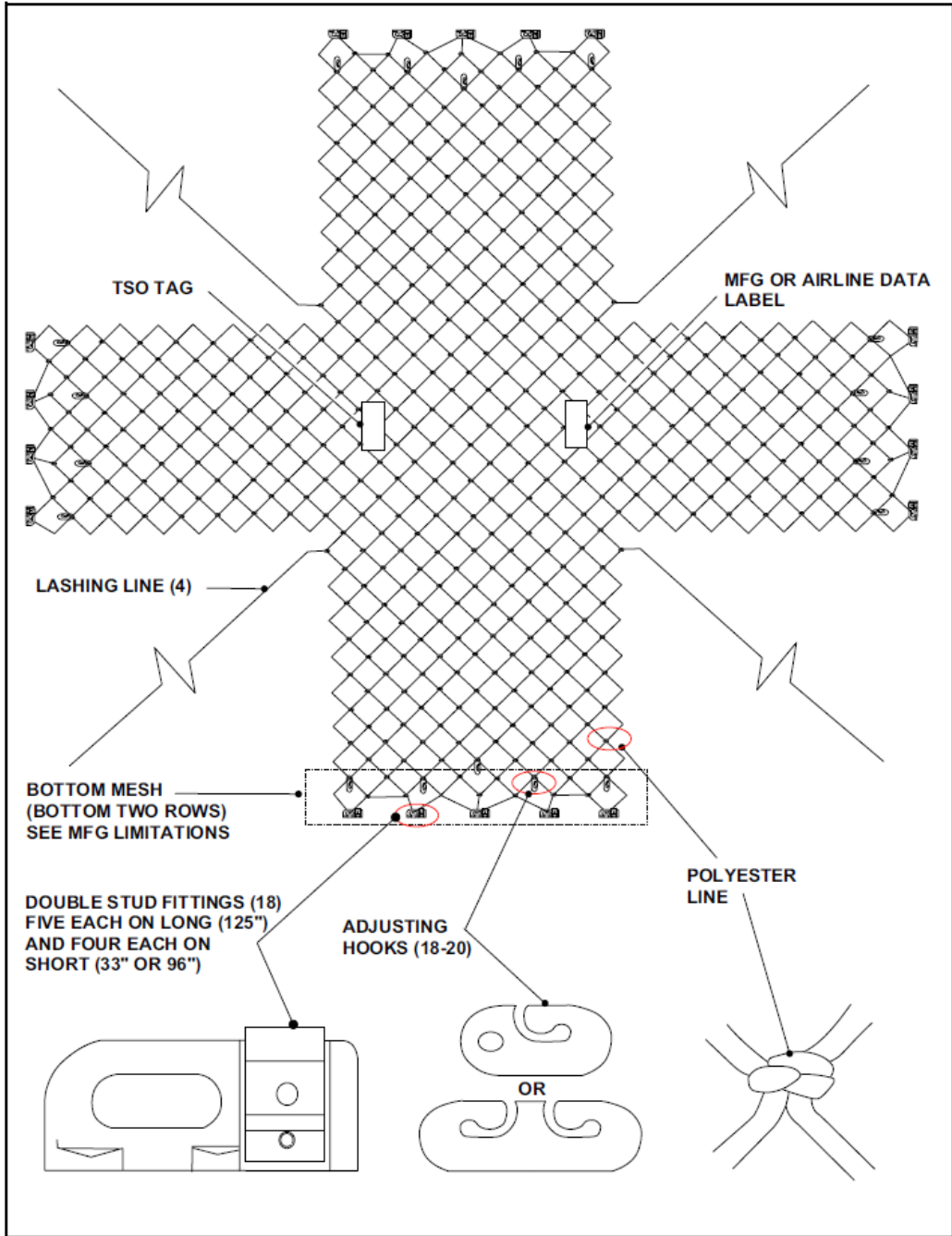


Table 3.1.3 All Container Damage Limits

TSO/NAS 3610 MARKINGS		REQUIRED
Shell to Pallet Attachments	Fiberglass	No more than one broken shell to pallet attachment every 6 inches or Maximum one missing fastener per side of each panel
	Aluminum	Not more than 10% of rivets on one panel shall be loose or missing. Minimum distance between loose or missing rivets shall be 5".
	Lexan	No more than one broken shell to pallet attachment every 6 inches or Maximum one missing fastener per side of each panel.
Holes in Shell or Panel Sheets	Fiberglass	No hole may exceed 12" in any direction or 100 sq. inches
	Aluminum	NO tears, punctures or holes greater than 4" x 2" within 3" of any edge extrusion. No greater than 7" x 4" beyond 3" or any adjoining edge extrusion.
	Lexan	No hole may exceed 10" in any direction or 100 sq. inches.
Cracks	Fiberglass	Cracks less than 12" allowable.
	Aluminum	NO tears, punctures or holes greater than 4" x 2" within 3" of any edge extrusion. No greater than 7" x 4" beyond 3" of any adjoining edge extrusion.
	Lexan	No tear greater than 10" beyond 2' of any adjoining edge extrusion.
Doors or Net	Fiberglass	No inoperable Door or Webbing latches. Nets or straps should have no excessive fraying and cuts may not exceed more than 25% of the diameter or width of the net or strap.
	Aluminum	No Inoperable Door or Webbing latches. Containers incorporating Fabric Door cover shall have no cuts or holes
	Lexan	No inoperative Door or Webbing latches.
Extrusions/ Frame	Fiberglass	Permanent deformation of frame or stiffener extrusion shall not protrude beyond max container contour.
	Aluminum	Permanent deformation of frame or stiffener shall not protrude beyond max container contour. Length of any weld crack shall not exceed 1.
	Lexan	Permanent deformation of frame or stiffener extrusion shall not protrude beyond max container contour.
Edge Rail Cracks		See Allowable Damage Tolerances Pallets
Corner Castings		See Allowable Damage Tolerances Pallets
Rivets		See Allowable Damage Tolerances Pallets

(Continuation) Table 3.1.3 All Container Damage Limits

Bowing Unladen		See Allowable Damage Tolerances Pallets
Bowing Laden		See Allowable Damage Tolerances Pallets
Welded Corners		See Allowable Damage Tolerances Pallets
Remarks		Cracks must be through panel material not just in Gel Coat or paint
		Non Serviceable containers may be returned empty on Aircraft to the Owner or YIP for repair.

TSO Straps: As per TSO-C172 “New models of cargo restraint strap assemblies identified and manufactured on or after date of this TSO must meet the MPS qualification and documentation requirement in SAE International (SAE) document, Aerospace Standard (AS) 5385C, Cargo Restraint Straps – Design Criteria and Testing Methods, dated January 2007.”

With this said we will be able to accept any strap the adhered to TSO-C172 and Aerospace Standard (AS) 5385C. All straps will need the following information to be accepted;

- AS5385" (or "ISO 16049-1"),
- Rated ultimate load in daN and lbf (daN to be used to conform with commercial usage)

Note: For the purpose of identifying daN, daN is a prefix designated as 101 or daN divided by 10 to obtain the actual N weight involved.

- Serial number (when required in accordance with Environmental Degradation, only if expiry date is based on date first placed in service),
- Manufacturer or suppliers name or identifiable logo,
- Assembly designation (part number),
- Traceability code

Note: The indication “AS5385 (or ISO 16049-1)” shall be deemed to mean, under the manufacturers or suppliers responsibility, that the unit complies with the mandatory requirements of this Standard (or ISO equivalent) for the stated rated ultimate load, and meets its recommended criteria.

The traceability code shall enable the unit's manufacturing and (if recorded by the user) in service history to be retraced, and include:

- Year/month of manufacture (date format shall be yyyy/mm),

- Year/month of expiration date (environmental degradation evaluation, see Environmental Degradation),
- Code of production batch, assigned by the manufacturer and reflected in the corresponding test record. A production batch code shall be assigned any time a change occurs in either materials nature or procurement source, or fabrication process.

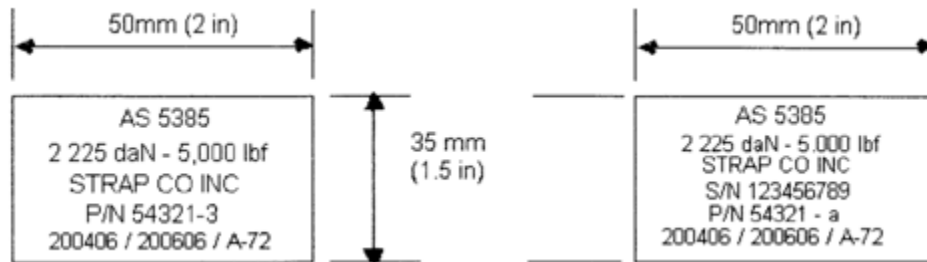
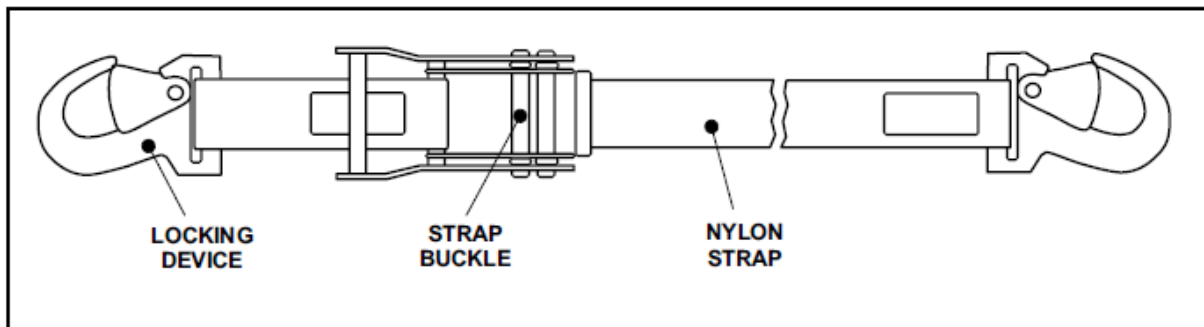


Table 3.1.4 Strap Damage Limits

Strap Buckle	Missing or inoperable	Reject
Hook or Double-stud Locking Device	Missing or inoperable	Reject
Nylon Strap	Torn, cut or frayed	Cannot exceed 1/8th inch Only once per strap
Stitches on Strap	Missing or broken	Reject
Knots in Strap	Not Allowed	Reject



MILITARY PALLET STANDARDS

Reject Military Pallets that do not meet these standards:

- Pallets with missing rails, broken rails, rail with holes or those with more than one locking lip On the short rail or two locking lips missing on the long rail.
- Pallets with all 1 inch high locking lips and pallets with both 1 inch high and 7/8 inch high locking lips, out of flat more than one finger width or pallets with all 7/8 inch high locking lips, out of flat more than one finger width.
- Missing skin or skin with surface delaminations exceeding 12 inches long in any direction, exceeding 32 inches square in an area, closer than 6 inches from edge of pallet, closer than 24 inches from another area of delamination.
- Edge delamination exceeding 12 inches total accumulated length on any one edge or more than two delaminations on any one edge.
- Fractures exceeding 12 inches long in any one direction, exceeding 32 inches square in area, closer than 6 inches from the edge of the pallet or closer than two feet apart.
- Corner damage exceeding 7 inches along the rail or more than one corner damaged.
- Damage to both surfaces - damage requiring patches greater than 6 inches in diameter, closer than two feet from another repaired area or closer than 6 inches from the rail.
- Surface corrosion where area exceeds 12 inch by 16 inch area or more.
- Tie down rings - no missing, broken or inoperable tie down rings are allowed.
- Damaged identification and TSO marking plate. There shall be no missing data plates and text must be readable.

MILITARY NET INSPECTION CRITERIA

Reject Military Nets that do not meet these standards:

- Sliding or moving parts that cannot be freed and/or continues to bind.
- Missing, twisted, bent or cracked attachment hooks.
- Nets that are scuffed or torn where 15% or ¼ inch of strands broken is considered unserviceable.