

# PROMEDICA, INC.

MEDICAL PRODUCT DESIGN AND MANUFACTURING

114 DOUGLAS ROAD EAST  
OLDSMAR, FLORIDA 34677  
OFFICE: 813.889.9250  
800.899.5278  
FAX: 813.886.9342  
WWW.PROMEDICA-USA.COM

## Risk Assessment and Testing Results for Promedica 750t Video Cart

### Testing based on UL 1667 (Tall Institutional Carts for Audio, Video and TV-Type Equipment)

#### Procedure

Verify the following criteria have been considered and the cart complies with these requirements and the applicable sections of the Design Specification.

#### **6.0 General Construction**

#### **6.1 Corrosion Protection (Ref. UL 1667, Section 7)**

Risk: Corrosion of all metal parts

Mitigation: All parts are either non-corrosive or will have a protective coating applied.

- ▶ Ferrous metal parts are protected against corrosion by going through a 7-stage pretreatment/cleaning cycle ensuring proper paint adhesion.
- ▶ Electro-Static Powder coat paint application process is baked and cured per powder coat paint specifications/requirements.

#### **6.2 Risk of Injury to Persons (Ref. UL 1667, Section 8)**

Risk: Injury to persons resulting from sharp edges that are accessible during normal use.

Mitigation: All accessible edges are smooth and well rounded to reduce the risk of injury during user assembly or normal use – per Final Inspection Procedure.

#### **6.3 Securement of Appliances (Ref. UL 1667, Section 9)**

Risk: Un-Secured appliances would become dislodged and fall off the cart creating a safety hazard.

Mitigation: Surfaces on the cart intended to support appliances, i.e. video monitor, gas bottle holder, are provided with either hardware or a Velcro lock-down strap to secure the appliance to its' intended surface.

#### **6.4 Ventilation (Ref. UL 1667, Section 10)**

Risk: Non-Ventilated cart would cause equipment to overheat and potentially become inoperative.

Mitigation: Each enclosed area intended to accommodate equipment is provided with a means for ventilation when equipment is installed.

- ▶ Promedica 750t Video Cart Ventilation:

Ventilation Front Doors (Open)	Ventilation Side Panel A	Ventilation Side Panel B	Ventilation Rear Door	TOTAL Ventilation
850.00	0.00	0.00	201.28	1,051.28

- Front Door Opening – 42.50”H x 20”W
- Vent Opening (Cut-out) Rear Door: 256 vents (2.25” x 0.28”): 161.28 sq. in.
- Measurement in square inches

**Risk Assessment and Testing Results for Promedica 750t Video Cart**

**6.5 Wheels / Casters (Ref. UL 1667, Section 13)**

Risk: Casters would become overloaded and not allow cart to move as intended.

Mitigation: Casters are chosen that exceed the requirements of the design.

- ▶ 5" STEINCO Twin Wheel Swivel Caster (Series 550/551). Two with Maxi-Lok™ braking system (simultaneous locking of the wheel and swivel). Gray (RAL 7004) polyamide (hub) casing, precision ball bearing swivel with a screwed axle, non-marking, gray Polyurethane tread.
- ▶ Technical Data:

Wheel Diameter	5"
Tread Width	0.79" each / 1.58" total
Tread Hardness	80 Shore A
Mounting	5/8 - 18 x 1"
Threaded Stem	
Conductivity	Non-Conductive
Caster Offset	1.57"
Load Capacity	242 lbs. Each 968 lbs. Per Cart
Overall Height	5.87"

**7.0 General Performance**

**7.1 Static Tip Stability Test (Ref. UL 1667, Section 16)**

Risk: Under worst-case conditions the combination of the cart and load would tip over at less than 10° tilt and supporting surfaces (shelves) would collapse when overloaded or encounter permanent damage that could result in a risk of injury.

Mitigation: The cart is designed to eliminate this risk and testing is performed to verify that the design requirements are met.

**Load and Tip Stability Testing  
Promedica 750t Video Cart**

**Purpose:**

Test is to establish compliance with the industry standard 10-degree "Tip Stability Test" and "Load Testing".

- ▶ The combination of the cart and the designated load shall meet Tip Stability Requirements.

**Procedure:**

- ▶ Cart Dimensions:
  - Overall: 54"H x 27"W x 27"D
- ▶ The Promedica 750t Video Cart was placed on a 10-degree inclined plane containing both the designated and maximum load.
- ▶ The load, both designated and maximum was uniformly distributed upon the surface area.
- ▶ To ensure that the "worst case scenario" was achieved the casters were arranged in a position most likely to result in the tip over.

**Loading Configuration #1 (see attached "Cart Loading Worksheet")**

Description	Designated	Maximum
Adjustable Shelves (5) ▪ 19"W x 19"D	41 lbs.	81 lbs.
Monitor Top: ▪ Sony CRT	66bs.	66bs.
<b>TOTAL WEIGHT</b>	<b>271lbs.</b>	<b>471lbs.</b>

**Results (Loading Configuration #1):**

- ▶ The Promedica 750t Video Cart was placed in a 10-degree angle with both the designated and maximum weight. As a result the cart passed the Static Tip Stability Test.

**Note(s):**

- ▶ No ballast was required to pass the Static Tip Stability Test.
- ▶ The monitor top was manufactured to accommodate up to a 20" monitor.

**Risk Assessment and Testing Results for Promedica 750t Video Cart**

**Loading Configuration #2 (per Smith & Nephew equipment)**

Description	Designated	Maximum
Shelf #1 Camera (3.0"H x 17"W x 14.35"D)	10 lbs.	NA
Shelf #2 Light Source (4.5"H x 17"W x 16"D)	14 lbs.	NA
Shelf #3 Digital Capture System (6.64"H x 17"W x 18"D)	21 lbs.	NA
Shelf #4 Insufflator (6.9"H x 13.3"W x 14.8"D)	18 lbs.	NA
Shelf #5 HP Printer (7.25"H x 17.9"W x 17.3"D)	20 lbs.	NA
Monitor Top: ▪ Sony CRT	66 lbs.	NA
<b>TOTAL WEIGHT</b>	<b>149 lbs.</b>	<b>NA</b>

**Results (Loading Configuration #2):**

- ▶ The Promedica 750t Video Cart was placed in a 10-degree angle with both the designated and maximum weight. As a result the cart passed the Static Tip Stability Test.

**Note(s):**

- ▶ No ballast was required to pass the Static Tip Stability Test.
- ▶ The monitor top was manufactured to accommodate up to a 20" monitor.

**Loading Configuration #3 (Empty Cart / Worst Case)**

Description	Designated	Maximum
Adjustable Shelves (5) ▪ 19"W x 19"D	00 lbs.	NA
Monitor Top: ▪ Sony CRT	66 lbs.	NA
<b>TOTAL WEIGHT</b>	<b>66 lbs.</b>	<b>NA</b>

**Results (Loading Configuration #3):**

- ▶ The Promedica 750t Video Cart was placed in a 10-degree angle with both the designated and maximum weight. As a result the cart passed the Static Tip Stability Test.

**Note(s):**

- ▶ No ballast was required to pass the Static Tip Stability Test.
- ▶ The monitor top was manufactured to accommodate up to a 20" monitor.

**7.2 Loading Test – Shelf Stress Test (Ref. UL 1667, Section 17)**

**Risk:** The supporting surface would collapse and cause permanent damage to the enclosed medical equipment and/or to the cart itself.

**Mitigation:** The supporting surface was loaded with the "maximum anticipated load" of 81 pounds for one minute (per UL 1667, Section 17). The supporting surface performed effectively thereby passing the "Shelf Stress Test". Plastic (ABS) shelf management system, i.e. wrinkle wall™, exceeds the requirements of the design.

- ▶ **Product Description:** ABS properties include: high impact strength and rigidity, excellent abrasion resistance, excellent moisture resistance and a surface finish that is unaffected by most chemicals. **Common Applications include:** Automotive (interior and exterior), Aircraft (interior trim), Lab Equipment, Telecommunications, Luggage
- ▶ **Physical Properties of ABS:**

Properties	ASTM Method	Units	ABS
Compressive Strength	D695	psi	9,000
Tensile Strength @ break	D638	psi	4,930
Tensile Modulus	D638	psi	341,000
Flexural Strength	D790	psi	9,430
Flexural Modulus	D790	psi	334,000
Rockwell Hardness	D785	-	R103
Izod Impact, Notched 738F	D256	ft-lb/inch of notch	10.0

**7.3 Material Impact Test (Ref. UL 1667, Section 20)**

**Risk:** A cart constructed of metal / plastic could break (totally or in part) or become displaced upon impact and pose a safety hazard.

**Mitigation:** Metal / Plastic material is chosen that exceed the requirements of the design.

**7.4 Glass / Acrylic Parts Impact Test (Ref. UL 1667, Section 21)**

**Risk:** A see-through acrylic/glass part could shatter (totally or in part), break or become displaced upon impact and pose a safety hazard.

**Mitigation:** Acrylic/Glass material is chosen that exceeds the requirements of the design.

- ▶ See-through PETG (Polyethylene terephthalate Glycol) copolyester front door – 0.375” thickness
- ▶ PETG Properties include: durability, good impact resistance, good abrasion resistance, good chemical resistance and excellent clarity
- ▶ Decorative glass parts (i.e. non-structural) must withstand a single impact as described in UL 1667.

Testing Material	UL 1667 Requirement	VIVAK® (PETG) 0.375”
------------------	---------------------	----------------------

Energy to Break (ft. – lb.)	2.5 ft-lbf.	2.5 ft.-lbf. – NB*
Ball Weight	1.18 pounds	2 pounds

- NB\* - No breakage occurred to sample tested

▶ **Physical Properties of PETG:**

Property	ASTM Method	VIVAK® (PETG)
Light Transmittance	D-1003	89%
Tensile Strength		
• Break	D-638	26 Mpa; 3,800 psi
• Yield	D-638	53 Mpa; 7,700 psi
Compressive Strength	D-695	8,000 psi
Shear Strength	D-732	9,000 psi
Rockwell Hardness	D-785	R115
Izod Impact Strength, Notched		
• @ 73°F	D-256	88 J/m; 19.79 ft-lbf.; 1.7 ft-lbf/in.
• @ 32°F	D-256	66 J/m; 14.84 ft-lbf.; 1.2 ft-lbf/in.
• @ -22°F	D-256	39 J/m; 8.77 ft-lbf.; 0.7 ft-lbf/in.
Impact Strength, Unnotched		
• @ 73°F	D-4812	NB
• @ 32°F	D-4812	NB
• @ -22°F	D-4812	NB
Impact Resistance (Puncture) Energy @ Max. Load		
• @ 73°F	D-3763	33J (24 ft-lbf)
• @ 32°F	D-3763	40J (30 ft-lbf)
• @ 14°F	D-3763	42J (31 ft-lbf)
• @ -4°F	D-3763	43J (32 ft-lbf)
• @ -22°F	D-3763	47J (34 ft-lbf)
Drop Dart Impact Test Falling Dart @ 73”	D-3763	83 ft-lbs.
Impact Strength, Falling Dart @ 73”		
	D-5420	10 in/lbs – NB
	D-5420	100 in/lbs. – NB
	D-5420	300 in/lbs. - NB

**7.5 Wheels, Roller or Caster Securement Test (Ref. UL 1667, Section 22)**

**Risk:** Caster would come loose and cause the cart to fall over and pose a safety hazard.

**Mitigation:** The casters are secured with locking hardware.

**7.6 Braking Test**

**Risk:** Parking brakes would not stabilize/secure the cart in fixed position and may pose a safety hazard.

**Mitigation:** The cart is designed with high quality Maxi-Lok™ (simultaneous locking of the wheel and swivel). braking system and every cart is tested for adequate braking prior to shipment.

**Risk Assessment and Testing Results for Promedica 750t Video Cart**

**7.7 Moving Parts Test**

Risk: Moving Parts, i.e. articulating arms, drawers, doors, pullout shelves, would not function properly causing the cart to become inoperable or pose a safety hazard.

Mitigation: All moving parts, i.e. articulating arms, drawers, doors, pullout shelves, are 100% tested/inspected prior to shipment to minimize the potential for failure.

**7.8 Velcro Strap Securement Test**

Risk: Velcro straps would fail and equipment, i.e. monitors, gas bottles, would fall off of the cart posing a safety hazard.

Mitigation: Equipment containment straps are provided.

- ▶ A monitor, gas bottles etc. (or simulation) must remain secure using containment strap
- ▶ Velcro Specifications – Hook and Loop
- ▶ “Heavy-duty” rating with “High” cycle life – 8.0 mil Nylon monofilament with over 300 hooks per square inch – 2 inches in width
- ▶ VELCRO® Brand Closure Performance:

Shear Strength Length-Wise P.S.I. Average	Shear Strength Length-Wise P.S.I. Average	Tension or Latching Effect P.S.I. Average	Peel Strength Length-Wise P.I.W. Average	Temp. Range Based Upon 1,000 hours of exposure
14.0	10.5	6.5	1.20	-70°F to 200°F

Velcro Strap Strength Test (CRT Monitor)

- ▶ Purpose – to ensure that the monitor is held in place during the full range of operation.
- ▶ Materials used – 70 pound SONY Monitor
- ▶ Tilt Test – the Velcro strap did not fail when the cart was tilted passed its point of stability on both axis. To include 10° from front to back and 14° from side to side. The Velcro strap secured the monitor in both cases.

Pull Test to Point of Failure

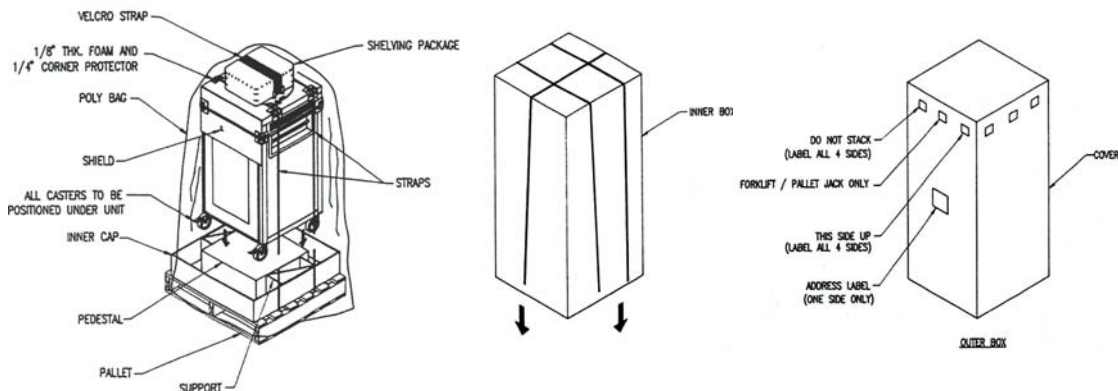
- ▶ Purpose – to determine the point of failure for the 72” Velcro strap used to secure a video monitor to the top of the cart.
- ▶ The Velcro strap was placed under constant load until it failed. 240 pounds of pressure was required to break the strap. The point of failure was the plastic buckle. The Velcro material did not break or separate (peel apart).

**8.0 Ship Testing**

Risk: Improperly designed/specified packaging materials would allow for excessive damage to the carts during transit through the various shipping methods utilized

Mitigation: Every Promedica manufactured cart is robustly packaged to the following specifications.

- ▶ Packaging specifications:



- ▶ Shipping Methods:
  - Air
  - Freight (LTL)
    - Watkins Motor Lines
    - R&L Carriers
    - Yellow Freight Systems

**8.1 Historical Shipping Results - OEM Customers (Custom Manufactured Carts)**

- ▶ While incidences of damages have been reported from shipments to OEM customers (9,806 carts during the past three-years), all were attributed to carrier mishandling or accidents.

<b>Year</b>	<b>Total # of Carts</b>	<b>% of reported shipping damages</b>
2000	3,267	0.7%
2001	3,178	0.6%
2002	3,361	0.8%

**8.2 Summary - Shipping Results**

- ▶ Promedica has never recorded a single complaint over the past three years in our complaint systems. Nor have we ever been held liable for a single claim or have we reworked a product due to shipping damages incurred as a result of our packaging.