

## A Safety Buyers Guide For Scooters THE DANGERS OF DESIGN

Today many buyers assume that scooters are equal in safety; they do not understand or think about safety issues when they purchase a scooter. They buy the one that is glitzy, has the candy apple red paint job or fits in the bathroom. Decision makers need to add safety into the buying equation and understand the consequences and limitations of the design before they buy. **The purpose of this guide is to illustrate the most important safety questions so you, the buyer, can make an informed decision.**

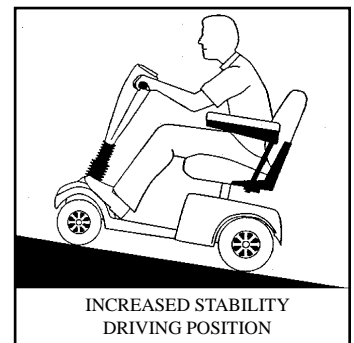
When buying a scooter the most important question is, what is the stability incline rating of the unit. In an independent A.A.R.P. survey of scooter users, one third of them report tipping their scooter over. Today many scooter manufacturers deliberately do not list the stability of their product in the sales literature. Only if you read and understand the owners manual you are given after the sale, do you find out the unit has substandard stability that puts you at risk in your everyday environment. This violates the U.S. ANSI/RESNA national standards duty to inform requirement; also the RESNA test must be used in determining the rating not one that is made up by the manufacturer.

The deadly evidence of this problem comes from the manufacturers' Medical Device Reports (MDR's) and consumer complaint MDR's reported to the Food and Drug Administration found on the Maude Search Website. An MDR is a serious injury report which includes death reports, serious injury reports or consumer complaints.

Manufacturer MDR Report - Scenario: "The customer was traveling up an incline when the unit began to drift backwards." "The customer leaned back in an attempt to get their good hand in position to adjust the power knob." "By shifting their weight they caused the unit to tip backward and struck their head." Some manufacturers today deliberately do not list the incline stability rating in their Sales literature. Their owners manual rates the unit at 5 degrees to 8 degrees and tell them to lean forward to get up an incline. This can be the result. Patient outcome — Death.

MDR Report - Scenario: "User was attempting to climb a steep hill and was unable to get more than half-way up the hill apparently due to a low battery." "User apparently took it out of gear into neutral and attempted to back down the hill when it swerved and struck a curb backward." "The scooter tipped over and the user fell on the curb and sidewalk." "When scooter is in free wheel the scooter has no brake as stated in the owners manual. User passed away." Patient outcome — Death. Two different problems are combined in this report. First, this unit is rated at only 5 degrees. If there is a problem with a 5 degree scooter, it is much less forgiving.

The 5 degree scooter tends to tip backwards which can result in massive head injuries. 15 degree scooters are 3 times more stable. If they do tip, they tend to tip to the side. This can result in less serious wrist, arm and shoulder injuries. Second, if this unit was equipped with modern Push-Too-Fast technology the electronics would have prevented, unlimited speed, freewheel or runaway as the brakes automatically reengage at 3 or 4 mph even if the user has disengaged the brakes. See Push-Too-Fast section.



MDR Report - Scenario: "Customer was traveling up a ramp 18" X 8' and flipped unit." "He struck his head on the concrete sidewalk which resulted in fluid on the brain." "The customer has had several procedures to relieve this condition." "The customer has suffered from hydrocephalus as a result of the injury." This person has permanent brain damage because they went up an 11 degree incline. Patient outcome — Medical intervention.

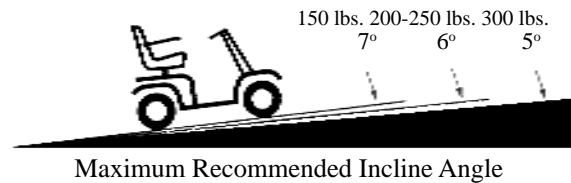
MDR Report - Scenario: "During demonstration the potential customer stated that while riding the unit up an incline, it stalled." "Customer released the disengage activating the

braking system causing him to flip backward.” “Customer struck head on ground.” Again no Push-Too-Fast. Demonstrator clearly did not understand limited stability of the scooter and did not properly warn or supervise the demonstration. Patient outcome - Unknown injuries.

There are many more backward stability MDR reports but this final example best summarizes the problem.

MDR Report - Scenario: “Reportedly the new design is what lead to the reporter’s accident.”

“While going up an incline the front wheels came off the ground but since the anti-tips were so small they failed to prevent the scooter from tipping over and landing on the reportee.” Reporter “states he was confined to bed for two days with pain that extended from his hip to his neck.” The reporter also feels the seat on the new scooter is located too far to the rear which increases the chance of tipping since the weight of the patient is not evenly distributed.” “According to reporter his old model scooter had a picture on it which indicated not to exceed a 15 degree grade.” “The new scooter has no such picture.” “Reportedly, in the owners manual, a sentence states not to exceed a 5 degree grade.” The reporter feels these problems need to be addressed before someone is seriously injured. Patient outcome - Injuries



There is no rocket science here. The greater the distance between the center of the rear axle and the center of the seat post the better the stability. If this is only 4 - 5 inches of steel there between them, you have a 5 degree - 8 degree scooter. If there is 8 - 9 inches between them, you have a 15 degree stability scooter. In the 1980’s the average scooter sold in the United States had an incline stability rating of 15 degrees. Today the average scooter safety stability rating has been reduced by half to two-thirds, but manufacturers blame users for injuries due to failure to follow instructions even when the manufacturer doesn’t warn them before the sale.

### **SIDWAYS TIPPING - WIDER IS BETTER**

In 1995 the A.A.R.P. did a stability test of scooters from 15 manufacturers on grassy, uneven surfaces. Only four units traveled the course without tipping. Most of these 15 scooters were 24” wide. Today the trend of Asian manufactured scooters is to make the unit as small as possible to reduce cost. While there is a need for a 21” wide scooter in trailers or small apartments, you must follow the warnings and never take them off flat, level, hard surfaces. If you plan to garden, plant flowers or go outside with the family, you need something more stable because a simple divot can cause a 21” scooter to tip. Here is an example of the consequences:

MDR Report - . Scenario: “ Reporter, wife, heard a thump and went outside to check on her husband.” “Reporter found her husband about 20 ft. from the garage door lying on the ground with blood coming out of his nose.” “The scooter was found turned over on its side.” “The patient was taken to the hospital where x-ray showed a crushed skull.” The patient was pronounced brain dead.” “Reporter claims that the company that sold them the scooter told them it was safe to use on level ground.” “Patient was riding scooter on level ground at the time of the incident.”

Patient outcome - Death.

MDR Report - Scenario: “The customer was riding his scooter on his lawn and it flipped over on him, puncturing his lung and he subsequently passed away.” “Most of the yard is gently rolling terrain, but there is a steep slope in one part and this is where the accident happened. ”Patient outcome — Death.

If you buy a 5 degree stability rated 21" wide scooter, the unit has 2/3 less safety margin than a 15 degree rated scooter. As you have read, the 5 degree scooter is much less forgiving. Make an informed scooter choice based on how the unit will be used in your environment.

### **PUSH-TOO-FAST**

The most important safety feature in the last three years is Push-Too-Fast. This provides protection to limit the scooter's speed (runaways/freewheels) should the user disengage the braking system. Here are the examples why the Push-Too-Fast should be on the scooter you buy.

Manufacturer MDR Report - Scenario: "The scooter descended the hill at more than three times its normal speed of 10 kph." "The most likely scenario is that the driver inadvertently released the fail safe brake prior to riding the scooter down the hill." Patient outcome - Death.

Manufacturer MDR Report - Scenario: "End user alleges the scooter disengaged and the electrical system failed causing the scooter to speed out of control as end user was riding down a hill heading towards end user's destination." "The scooter crashed into a vehicle at the bottom of the hill." "End user sustained broken bones, multiple contusions and abrasions on and about the head and body." Patient out come - Hospitalization.

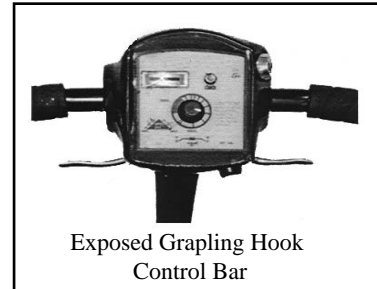
MDR Report - Scenario: "User was attempting to climb a steep hill and was unable to get more than halfway up the hill." "Apparently due to low battery." "User apparently took it out of gear into neutral and attempted to back down the hill when it swerved and struck a curb backwards." "The scooter tipped over and the user fell on the curb and sidewalk." "User died." "When scooter is in free wheel the scooter has no brakes as stated in the owner's manual (For pushing only)." "No device failure." "Not a product malfunction." Patient outcome - Death. Today's state of the art Push-Too-Fast would prevent these run aways. No longer can the manufacturer say it is not a product malfunction because these are now design defects. If this person had been on a 15 degree stability rated scooter not a 5 degree, they probably would be alive today.

## **THROTTLE DESIGN - THE LOST ART**

Most scooters are now made in Asia and the design lessons learned from injuries in the '80's have been lost. Here are the three safety features to look for with throttle design.

### **Snag Guard Throttle Design**

Throttle thumb bars are grappling hooks. They should be nested or surrounded so clothing can not snag them. If you look down at the throttle and you see the thumb bar sticking out that means the thumb bar is not shielded and it is easily hit or snagged by clothing. Here are some FDA MDR's to illustrate the point.



MDR Report - Scenario: "The patient did not shut the scooter off, hit the throttle with their elbow causing the patient to fall off the scooter." "Nurse stated patient broke their leg in an area that was weakened by a pre-existing medical condition and it had to be amputated." Patient outcome - Amputation.

MDR Report - Scenario: "While removing merchandise from the basket to put it on the counter to her left, her clothing caught on the accelerator paddle on the left."

"The clothing pulled the paddle back sending the cart out of control." "In panic she could not dislodge her clothing and the 155 lb. cart careened forward" knocking a person down and proceeded "until it hit another electric cart at about 3,000 FT pounds." "She tore muscles and tendons in her back and shoulder" and was hospitalized repeatedly with six weeks of physical therapy. Patient outcome - Hospitalization

MDR Report - Scenario: "User states that the throttle sits at the edge of the handle bars and in this latest incident the consumer had left the scooter." "The consumer hadn't pulled the key, when she returned to the scooter; consumer's dress caught on the throttle and the consumer was thrown to the floor." "Earlier incident sleeve caught on throttle." "Both times fell onto a carpet area." In each of these reports the user forgot to turn the key off. So when you buy a scooter, make sure the key is in a highly visible obvious place right in front of you to help remind you to turn the key off.

We recommend right on top of the throttle dashboard because as they say "out of sight, out of mind." (1)\*

### **Throttle Moisture Protection**

There are four questions to ask in checking the level of moisture protection. One - Are the throttle openings rubber gasketed to keep moisture out? Two - Are the electronic circuit paths (lands) completely sealed to prevent internal shorting? Three - Are the throttle and controller circuits designed to prevent a runaway should moisture get into the circuits while driving? Four - Have the units passed VA, RESNA or CE moisture protections tests?

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(1)\* Padded keys are used because a few years ago a user of another manufacturer's product made in Asia fell asleep on the unit, fell forward on to the long electrical plug key - severely damaging the eye which took a lawsuit and several surgeries to repair.

## **Controller Moisture Protection**

Moisture on the controller is a very serious issue in a scooter. The largest recall in scooter history (which is still going on) was caused by locating the controller in a tub in the rear section where moisture spray from the rear tires causes fires. Scooters with controllers located under the seat have been used in this environment for a decade without problems. Here are some reports from the manufacturers:

**MDR Report** - Scenario: "Fire at user's residence may have been caused by scooter." "Residence and car were destroyed by fire. Manufacturer reported misuse of device." "Did not follow owner's manual."

"Usage in an area containing high salt concentrations/cold temperatures accompanied by the misuse of device caused a short in the controller board." "Preliminary report - user taken to hospital for treatment of smoke inhalation." "He was O.K." "Wife got out of house unharmed." "House and car destroyed." "Estimated Damage - \$160,000.00."

Patient outcome - Hospitalization. **Moisture from the tires caused this fire.**

**MDR Report** - Scenario: "Scooter caught on fire. Misuse of device caused short in the controller board." "A) Man has cerebral palsy, B) woke up in the middle of the night and saw a glow from the bottom of the scooter, C) got up and went past the scooter to get to the front door of his apartment, D) when he opened the door, E) the rear patio doors blew out. There was approximately \$41,000.00 worth of damage incurred, F) Scooter owner was taken to the hospital, treated for smoke inhalation and released, then readmitted for anxiety related symptoms." Patient outcome - Hospitalization.

**Moisture from the tires caused this fire.**

Unfortunately, **many Asian manufacturers still locate controllers next to the rear tires to save money.** An American company's MDR, who started importing an Asian made scooter last year, reported "manufacturers receive report from a dealer that after picking up the scooter for repairs and leaving the scooter in the company van overnight. The scooter allegedly caught fire causing damage to the van and to the scooter." "While a dealer losing a van is bad, losing a home is much worse." What should you, the buyer, look for. One - Is the controller away from the moisture sources like rear tires? Some manufacturers put the controller under the seat not in the rear section next to the tires. Two - Are the controller and wiring connections completely enclosed in a metal box? These cost money and its not glitzy but the peace of mind is worth it. If water can get on micro amp controller leads the unit will malfunction. Water on high amp battery leads can cause fire. A metal box provides some protection for the wiring connections for the controller and contains fires. Isolating the controller away from any water source is the best design.

## **Transaxles**

There are critical differences in design. Some Asian made units have brake rods in the gearbox that disengage the gears between the motor brake and the drive axle. This disengages all braking systems so the scooter can runaway with deadly results (see Push-Too-Fast). Forgiving systems disengage the parking brake so the gears remain connecting the axle and the motor brake. This allows these units which feature the Push-Too-Fast controller system to limit your speed to a controllable 3 - 4 mph. So do you want a scooter that goes 3 - 4 mph in freewheel or one that can runaway to 30 mph. Transaxles can break. If you drop the transaxle on its end, you can bend the axle. On some lesser quality Asian units the same drop will completely fracture the housing. Transaxles break internally. The unit's bearings can disintegrate which locks the unit up. If transaxle gears break which causes loss of all speed control and braking, the result can be death. One of the large scooter companies is currently involved in the second largest scooter recall of over 10,000 transaxles.

These are two of the many MDR reports.

MDR Report - Scenario: "Witness's statement on the police report." "I was making a right turn from one street onto the other." "I finished my turn and I was going up the street when I saw a wheelchair coming down the hill." "At this time I saw the wheelchair rocking from side to side. I knew it was going to tip over, so I stopped." "As the wheelchair went by us it flipped and the driver was thrown off." "I got out of my truck and called the fire department." "Operator #1 was pronounced dead at the scene at 15:57 hours by a paramedic." The wheelchair was actually a scooter.

Patient outcome - Death.

MDR Report - Scenario: "The customer stated that he was riding the scooter and heard a whining noise in the drive train." "He was moving on a street with a downhill incline and realized that the brake was not working." "When he realized that he was not going to be able to stop, the customer stated that he steered the unit into the ditch (curb) as a result of this he suffered bruised and torn ligaments in one knee and was treated by his doctor." "The drive train was replaced." "Upon inspection of the failed unit it was noted that the gears were stripped preventing the brake from functioning."

Patient outcome - Required medical intervention.

Note that in most reports there is a noticeable increase in the type and volume of noise from the unit prior to failure. Just as with your car should the noise suddenly change you should stop riding and get the unit checked immediately. Probably the best way to judge transaxles is by warranty. Some are warranted for one year, some are warranted for five years. Replacing a transaxle will easily cost several hundred dollars.

**One important comment - Scooters cost less to buy and maintain and are more durable and reliable than power wheelchairs.** In power wheelchairs there are major problems. Two of these problems, One large power wheelchair company is currently doing the second largest recall in power wheelchair of over 70,000 units because the units wiring catch fire. The person on the unit is incinerated and dies.

The second is a major power wheelchair seller is recalling 123,000 two piece Asian made plastic rims. The rim is designed for 30 psi. The tire says inflate to 50 psi. The rims are exploding, putting out eyes, fracturing hands, fingers, thumbs, breaking legs and tearing tendons and muscles requiring plastic and orthopedic surgery.

In conclusion, the worst thing a buyer can do is walk into a dealer and say, "I want the 'red one'." Today many manufacturers are putting their money in style and glitz and not safety. As with cars you need to ask questions. **Are you buying an Asian Yugo?** If it is most important for you to have a short and narrow scooter to go into the bathroom, then you also must accept you can't use it outside safely without putting yourself at significant risk. **Insist on knowing important safety features: incline stability ratings, moisture protection, run-away protection and throttle protection.**

# Users Buyer's Guide

## 1. Defining Your Needs

From the start, take time to understand what you expect from a scooter, and where and how you will use it. Write down your answers to the following questions and discuss them when you talk to your local professional dealer. Some vital points are:

### How accessible is my home or living quarters?

- What is the width of the narrowest door I will go through?
- What are the dimensions of any tight or confined areas that I might need to operate in?
- How tall are any thresholds or steps that I might have to navigate?

### Where will I use my scooter?

- Primarily indoors? Both indoors and outdoors?
- Primarily outdoors? Daylight only, or night and day?

### Will I transport my scooter from one place to another?

- Yes  No
- From my living quarters to someone else's?
- From my living quarters to a commercial location?
- From my living quarters to an outdoor location?

### Will I transport my scooter frequently? Infrequently?

### How will I transport my scooter?

- By car, van, or truck (make & model)?
- By public transportation, airplane, or train?

### How much will I use my scooter?

- \_\_\_\_ Hours per day.      \_\_\_\_ Day per week.

### What is my height & weight?

- \_\_\_\_ feet/inches      \_\_\_\_ pounds.

### Any special dexterity or transfer needs or considerations?

### What types of accessories and options might I like?

- A canopy for rain or sun? A power seat lift?
- Cupholders, baskets, bags, etc?

### How do I anticipate paying for my scooter?

- I expect to pay cash for it (cash, check, or credit card).
- I will seek third-party payment (Medicare, private insurance, HMO, PPO, etc.).

If you anticipate seeking third-party payment, complete the next two sections.

### What type(s) of insurance do I have?

## 2. Selecting A Local Professional Dealer

Local professional dealers provide many vital functions. To name a few, they provide you with information; they have a selection of scooters to choose from; they will demonstrate scooters to you; and most importantly they provide you with local service. Scooter manufacturer's are happy to recommend local professional dealers to you.

Some important questions follow. A professional dealer will openly answer these and all of your questions. If the answer to any of these questions is NO, you should seek an explanation.

### Does the dealer have a selection of scooters in stock?

- Yes  No
- You should be able to evaluate an assortment.

### Will the dealer let me ride the scooters? Yes No

You should be able to take any scooter for a "test drive".

### Will the dealer come to my home to demonstrate the scooter?

- Yes  No
- You should know if the scooter will meet your needs.

### Is the dealer reputable? Yes No

Does the dealer seem established by a visible commitment to the business?  
While they might be new, they shouldn't be "fly-by-night".

### Is the dealer listed in the "Yellow Pages" directory?

- Yes  No
- This is a great indicator of a dealer's legitimacy.

### Does someone answer the phone when I call? Yes No

An answering service is not necessarily bad, but a happy human indicates a commitment to the business.

### Does the dealer offer both sales and service? Yes No

Be sure that you know that you can benefit from prompt local service if needed.

### Is the dealer factory-trained by the scooter manufacturer?

- Yes  No

### Does the dealer listen to me instead of talk at me?

- Yes  No
- A professional dealer spends time understanding your needs.

### Does the dealer respond favorably to my organized shopping approach? Yes No

A professional dealer will welcome your questions and organization.

Are the sales personnel knowledgeable about their products?

Yes  No

Are they able to match my needs with the appropriate scooter.

Will the dealer advise me on third-party payer information?

Yes  No

Do they give me honest information?

Will they help me submit reimbursement claims?

### 3. Selecting Your Scooter

As they are considered medical devices, scooters are manufactured to meet or exceed the standards of the U.S. Food and Drug Administration Good Manufacturing Practices (FDA-GMP). In addition, in 1982, the ANSI/RESNA Wheelchair (also addresses scooters) Standards Committee was formed to develop standard procedures for testing and comparing scooters and wheelchairs. The combination of these assures that scooters must be built to meet rigorous quality requirements, and that their performance claims should be readily compared.

It is very important that you know all you can about scooters. Be sure to understand both the fundamental strengths and weaknesses of scooters, and the validity of the information source. Professional sales people are able to answer the majority of your questions.

You should also talk with the Service Personnel, as they have intimate knowledge about the reliability and durability of scooters.

What are the two or three main features of each manufacturer's products?

These are the fundamental strengths of each manufacturer's scooters.

What are the safety, reliability, and comfort features of each model?

Gather this core information to ensure your ability to make a valuable comparison.

What is the manufacturer's warranty?

Accept no fewer than three years, and be sure that it covers the important parts, like motors, transaxle, and electronics.

Are extended warranties available?

Does the scooter manufacturer inspect every scooter prior to shipment?  Yes  No

Does the scooter's electronic's contain Electro-Magnetic Interference (EMI) shielding?

Yes  No

EMI shielding protects the scooter operation and you from external interference from 2-way radios, garage door openers, etc.

How stable is each scooter?

What is the Maximum Incline Stability Rating?

Under no circumstances should it be less than 5° at the scooter's weight capacity.

Does the scooter's top speed promote instability?

How reliable are the scooters?

In addition to the sales person's experience, speak to Service Department personnel.

Ask them which units they feel have the lowest repair incidence.

How durable is the scooter's exterior?

Most scooters are painted, and will develop scratches and dings through normal everyday use. They can be repainted, but at considerable expense. Scooters with 'molded-in' color retain their neat appearance for many years, are easy to maintain, and do not require repainting or retouching.

Is the scooter seat comfortable & resilient?

Does it fit me, feel good today, and is it built to last?

Does the scooter separate (disassemble and reassemble) easily?

A simple and clean separation system makes for easy transportation of the scooter.

Ask for a demonstration.

Where is the scooter manufactured?

Will parts always be readily available?

Is the manufacturer's sales literature complete?

Demand to look at the Owner's Manuals of all scooters and confirm that all important specifications in the Owner's Manual mirror claims made in the sales literature.

Are the seat and tiller adjustable to fit my needs?

Ask for a demonstration.

Are a broad range of options and accessories available?

Ask to see literature and samples.

### Conclusion

Three and four wheel scooters are fun and reliable products that can assist you in increasing your mobility, and allow you to increase your independence. Be sure to have this completed Buyer's Guide with you when you shop for a scooter. Most importantly, ask your local professional dealer questions, and be comfortable with the answer to your questions.