A television set may fall, causing serious personal injury or death. Many injuries, particularly to children, can be avoided by taking simple precautions such as:

– ALWAYS use cabinets or stands or mounting methods recommended by the manufacturer of the television set.

– ALWAYS use furniture that can safely support the television set.

– ALWAYS ensure the television set is not overhanging the edge of the supporting furniture.

– ALWAYS educate children about the dangers of climbing on furniture to reach the television set or its controls.

– ALWAYS route cords and cables connected to your television so they cannot be tripped over, pulled or grabbed.

– NEVER place a television set in an unstable location.

– NEVER place the television set on tall furniture (for example, cupboards or bookcases) without anchoring both the furniture and the television set to a suitable support.

– NEVER place the television set on cloth or other materials that may be located between the television set and supporting furniture.

– NEVER place items that might tempt children to climb, such as toys and remote controls, on the top of the television or furniture on which the television is placed.

If the existing television set is going to be retained and relocated, the same considerations as above should be applied.

8.6.2 Static stability

8.6.2.1 Test setup

The equipment shall be blocked, if necessary, by means of a stop of the smallest dimensions possible to keep it from sliding or rolling during the test. During the tests, containers, if any, are to contain the amount of substance within their rated capacity that will result in the most disadvantageous condition.

*All doors, drawers, casters, adjustable feet and other appurtenances that are **accessible** to an **ordinary person**, are arranged in any combination that results in the least stability. Equipment provided with multi-positional features shall be tested in the least favourable position based on the equipment construction. However, if the casters are intended only to transport the unit, and if the installation instructions require adjustable feet to be lowered after installation, then the adjustable feet (and not the casters) are used in this test.*

*Where equipment is subject to periodic maintenance or routinely serviced or repaired at its intended use location, the doors, drawers, etc. or any other adjustment means **accessible** to an **instructed person** or **skilled person** shall be arranged in any combination specified by the servicing instructions that results in the least stability.*

The tests of 8.6.2.2 and 8.6.2.3 shall be performed as indicated in Table 36.

8.6.2.2 Static stability test

The equipment shall be subjected to one of the following tests:

– *The equipment is tilted in all directions such that the base of the equipment is at an angle up to and including 10°; or*

– *The equipment is placed on a plane at an angle of 10° from the horizontal and rotated slowly through an angle of 360° about its normal vertical axis; or*

– *The equipment is placed on a horizontal non-skid surface and subjected to a force equal to:*

  - *50 % of the weight of the unit vertical downwards, but not more than 100 N. If, during the test, the supporting surface prevents the equipment from overturning, the test shall be repeated such that the supporting surface is not used to pass the test; and*

- *13 % of the weight in all horizontal directions but not more than 250 N,*

that is applied to the worst case positions on the equipment by means of a suitable test apparatus having a flat surface of approximately 125 mm by 200 mm, in such a way as to produce the maximum overturning moment. The test may be applied at any height not exceeding 1,5 m from the base of the equipment. The test force shall be discontinued if the equipment remains stable after being tilted 10° from vertical.

8.6.2.3 Downward force test

Equipment shall not tip over when a constant downward force of 800 N is applied at the point of leverage for a maximum moment to any point of any surface within 10° of horizontal of at least 125 mm by at least 200 mm, at any height up to 1 m from the base of the equipment. The 800 N force is applied by means of a suitable test apparatus having a flat surface of approximately 125 mm by 200 mm. The downward force is applied with the complete flat surface of the test apparatus in contact with the equipment, however the test apparatus need not be in full contact with uneven surfaces (for example, corrugated or curved surfaces).

Equipment having a shape or a flexibility of the surface that is not likely to be used as a step or a ladder are exempt from the test.

EXAMPLE Products in combination with a cart or stand or products with protrusion or recess where the construction is obviously not to be used as a step or ladder.

8.6.2.4 Compliance criteria

During the tests, the equipment shall not tip over.

8.6.3 Relocation stability

8.6.3.1 Requirements

Equipment shall be stable when it is being relocated. Equipment shall:

– be equipped with wheels having a minimum diameter of 100 mm; or

– comply with the test of 8.6.3.2.

8.6.3.2 Test method and compliance criteria

The equipment is tilted to an angle of 10° from its normal upright position in any direction. If the equipment is such that when it is tilted through an angle of 10° when standing on a horizontal plane, a part of the equipment not normally in contact with the supporting surface would touch the horizontal plane, the equipment is placed on the edge of the horizontal support during the test so that the contact is not made. Alternatively, the equipment may be placed on a plane and is rotated through an angle of 360° about its normal vertical axis while tilted at 10°.

Equipment expected to be moved or relocated by ***ordinary persons*** *shall have:*

– *all doors and drawers not having a positive means of retention and that can be opened inadvertently; and*

– *casters, adjustable feet and the like*

arranged in any combination that results in the least stability.

Equipment expected to be moved or relocated by an ***instructed person*** *or a* ***skilled person****, shall have all doors, drawers, etc., positioned in accordance with the manufacturer's instructions.*

A unit provided with multi-positional features shall be tested in the least favourable position based on the equipment construction.

The equipment shall not tip over during the test.

8.6.4 Glass slide test

The equipment is placed on a clean, dry, glass covered horizontal surface so that only the supporting feet are in contact with the glass. The glass-covered surface is then tilted in the most unfavourable direction through an angle of 10°.

During the test, the equipment shall not slide or tip over.

8.6.5 Horizontal force test and compliance criteria

The equipment is to be placed on a horizontal non-skid surface with all doors, drawers, casters, adjustable feet and other movable parts arranged in any combination that results in the least stable condition. The equipment shall be blocked, if necessary, by means of a stop of the smallest dimensions possible, to keep it from sliding or rolling when subjected to one of the following tests:

– *an external horizontal force of 20 % of the weight of the equipment or 250 N, whichever is less, is applied to that point on the equipment that will result in the least stability. The force shall not be applied more than 1,5 m above the supporting surface; or*
– *the equipment shall be moved through any angle of tilt up to and including 15° from the vertical; or*
– *the equipment is placed on a plane and is rotated through an angle of 360° about its normal vertical axis while tilted at an angle of 15°.*

During the test, the equipment shall not tip over.

8.7 Equipment mounted to a wall, ceiling or other structure

8.7.1 Requirements

Classification of equipment for the purposes of assessing mounting means for attachment to a wall, ceiling or other fixed structure (for example, a pole or tower) is done according to Table 35, line 6.

For MS2 or MS3 equipment:

– If the manufacturer defines specific mounting means, the combination of the mounting means and the equipment shall comply with 8.7.2, Test 1. The hardware used to fix the mounting means to the equipment shall either be provided with the equipment, or described in detail in the user instructions (for example, length of screws, diameter of the screws, etc.).
– If the manufacturer does not define specific mounting means, but the equipment is provided with any part (for example, a hook or threaded hole) which facilitates attaching such mounting means to the equipment, such parts shall comply with 8.7.2, Test 2, as appropriate. The user instruction shall advise on the safe use of such parts (for example, screw size including thread size and length, number of screws, etc.).
– If the equipment is provided with threaded parts for attachment of the mounting means, the threaded parts without the mounting means shall additionally comply with 8.7.2, Test 3.

NOTE The tests are meant to test the fixing of the mounting means to the equipment and not to test the fixing to the wall, ceiling or other structure.

8.7.2 Test methods

If the construction involves thermoplastic materials that have an influence on the strength of the mounting system, the tests shall be performed after the stress relief test of Clause T.8.

Test 1

The equipment is mounted in accordance with the manufacturer's instructions and the mounting means positioned, when possible, to represent the most severe stress on the supports.

A force in addition to the weight of the equipment is applied downwards through the centre of gravity of the equipment, for 1 min. The additional force shall be:

– *three times the weight of the equipment; or*

– *the weight of the equipment plus 880 N,*

whichever is less.

Afterwards, for equipment mounted to a wall or another structure, a horizontal force of 50 N is applied laterally for 1 min.

Test 2

The test force shall be equivalent to the least of the following divided by the number of attachment points in the mounting system:

– *four times the weight of the equipment; or*

– *two times the weight of the equipment plus 880 N.*

Each individual representative point in the mounting system, one at a time, shall be subjected to the following six test forces:

– *a shear force perpendicular to its centre axis for 1 min. The force shall be applied in four directions, one direction at a time, separated by 90°.*

– *an inward directed push force parallel to its centre axis for 1 min.*

– *an outward directed pull force parallel to its centre axis for 1 min.*

Test 3

If the mounting system design relies upon threaded parts, each threaded part, one at a time, shall be subjected to the following test.

The screw is tightened with a torque according to Table 37 and then loosened, for a total of 5 times. The torque shall be applied gradually.

If a corresponding screw fastener is supplied by the manufacturer, it shall be used for the test. If no corresponding screw fastener is supplied by the manufacturer, even though a screw type may be recommended in the user instructions, any screw with the same diameter shall be used for the test.

Table 37 – Torque to be applied to screws

Nominal diameter of screw mm		Torque Nm
	up to and including 2,8	0,4
over 2,8	up to and including 3,0	0,5
over 3,0	up to and including 3,2	0,6
over 3,2	up to and including 3,6	0,8
over 3,6	up to and including 4,1	1,2
over 4,1	up to and including 4,7	1,8
over 4,7	up to and including 5,3	2,0
over 5,3	up to and including 6,0	2,5

8.7.3 Compliance criteria

Compliance is checked by inspection and by the tests of 8.7.2, as applicable. The equipment or its associated mounting means shall not become dislodged and shall remain mechanically intact and secure during the test. Threaded parts shall remain mechanically intact.

8.8 Handle strength

8.8.1 General

A part of the equipment used for lifting or carrying the equipment, regardless of its shape or location or whether the part is intended for lifting or carrying by hand or via mechanical means, is considered to be a handle and shall have adequate strength.

The equipment is classified according to Table 35, line 5.

If equipment having handles is designed, or provided with instructions, for lifting or carrying multiple units together, the class is determined taking into account the weight that may be carried.

Compliance is checked by inspection or by available data, or, where necessary, by the test of 8.8.2. As a result of the test, the handle, its securing means, or that portion of the ***enclosure*** *to which it is secured, shall not break, crack, or detach from the equipment.*

8.8.2 Test method

A weight shall be uniformly applied over a 75 mm width at the centre of the handle, without clamping.

The weight shall be the equipment weight plus an additional weight as specified below:

– *for MS1 equipment with two or more handles, a weight that exerts a force of three times the weight of the equipment;*

NOTE No tests apply to MS1 equipment having only one handle.

– *for MS2 equipment, a weight that exerts a force of three times the weight of the equipment;*

– *for MS3 equipment with a mass 50 kg or less, a weight that exerts a force of two times the weight of the equipment or 75 kg, whichever is greater; and*

– *for MS3 equipment with a mass greater than 50 kg, a weight that exerts a force of the weight of the equipment or 100 kg, whichever is greater.*

The additional weight shall be started at zero and gradually increased so that the test value is attained in 5 s to 10 s and maintained for 60 s. When more than one handle is provided, the force shall be distributed between the handles. The distribution of the forces shall be determined by measuring the percentage of the equipment's weight sustained by each handle with the equipment in the intended carrying position. When MS2 equipment is furnished with more than one handle, and it can be considered capable of being carried by only one handle, each handle shall be capable of sustaining the total force.

8.9 Wheels or casters attachment requirements

8.9.1 General

The equipment is classified according to Table 35, line 5. When equipment is intended to be used with carts, stands and similar carriers provided with wheels or casters, the classification is applied using the combined mass.

The likelihood of MS3 equipment, including carts, stands and similar carriers that support the equipment, from tipping over during movement shall be reduced.

8.9.2 Test method

*Wheels or casters on MS3 equipment, or their supporting cart, stand or similar carrier, intended to be moved as part of its **normal operating conditions**, shall be capable of withstanding a pull of 20 N. The pull force is to be applied by a weight, or a steady pull, to the wheel or caster for a period of 1 min in any direction made possible by the construction.*

During the test, the wheels or casters shall not be damaged or pull free from its securing means.

8.10 Carts, stands, and similar carriers

8.10.1 General

The equipment shall be stable with the cart, stand or similar carrier. The classifications of Table 35, line 5 are applied using the combined mass of both the equipment and the carts or stands specified with the equipment.

All carts and stands specified for use with the equipment shall be subjected to the applicable tests described in the following subclauses. A cart, stand or carrier shall be subjected to the applicable tests alone and again with the equipment specified by the manufacturer placed on the cart or stand.

MS3 equipment, including their supporting carts, stands and similar carriers that support the equipment, that are not moved as part of its **normal operating conditions**, shall comply with the horizontal force test of 8.6.5.

MS2 or MS3 equipment more than 1 m in height, including equipment mounted on their specified cart, stand or carrier, shall comply with the relocation stability test in 8.6.3 except that the tip angle becomes 15°. If equipment is provided with wheels or casters that allow the equipment to only move in limited directions, the test is only applied in those directions (for example, an electronic white board).

8.10.2 Marking and instructions

A cart, stand or similar carrier that is specified by the manufacturer for use with specific equipment, but is packaged and marketed separately from the equipment, shall be provided with an **instructional safeguard** in accordance with Clause F.5.

The elements of the **instructional safeguard** shall be as follows:

– element 1a: not available
– element 2: “Caution” or equivalent text
– element 4: “This (cart, stand, or carrier) is intended for use only with (manufacturer's name), (model number or series), (equipment name).” or equivalent text
– element 3: “Use with other equipment may result in instability causing injury” or equivalent text

The elements shall be in the order 2, 4, and 3.

The **instructional safeguard** shall be affixed to the cart, stand or carrier, or included in the installation instructions or equivalent document accompanying the equipment.

Equipment only intended and shipped for use with a specific cart, stand or similar carrier, shall be provided with an **instructional safeguard** in accordance with Clause F.5 and be comprised of:

– element 1a: not available
– element 2: “Caution” or equivalent word or text
– element 4: “This (equipment name) is for use only with (manufacturer's name), (model number or series), (cart, stand, or carrier)” or equivalent text
– element 3: “Use with other (carts, stands, or carriers) may result in instability causing injury” or equivalent text

The elements shall be in the order 2, 4, and 3.

The **instructional safeguard** shall be affixed to the equipment or included in the installation instructions or equivalent document accompanying the equipment.

8.10.3 Cart, stand or carrier loading test and compliance criteria

*A cart, stand or carrier shall be constructed so that permanent deformation or damage that is capable of resulting in injury to a person, does not occur when it is subjected to a force of 220 N applied for 1 min to any grippable or leverage point **accessible** to a child.*

To determine compliance, the force is applied through the end of a 30 mm diameter circular cylinder. The force is to be applied to a shelf drawer, dowel rung support, or equivalent part that is within 750 mm from the floor and will support some or all of a child's weight. The force is to be applied for 1 min with the cart or stand at room temperature. The part shall not collapse or break so as to expose sharp edges or produce pinch points that are capable of resulting in injury.

In addition, a cart, stand or other carrier shall be constructed so that permanent deformation or damage that is capable of resulting in injury to persons does not occur when each supporting surface is individually loaded with:

– *the manufacturer’s intended load plus 440 N for the surface intended to support a display with moving images; or*
– *four times the manufacturer's intended load or 100 N, whichever is greater but not to exceed 440 N, is applied to all applicable surfaces.*

A dedicated storage area intended to accommodate specific accessories such as media tapes, discs, etc. shall be fully loaded to the rated load.

The weight is to be applied for 1 min on each supporting surface, with the other supporting surfaces unloaded.

8.10.4 Cart, stand or carrier impact test

When tested as described below, a cart, stand or carrier shall not produce a risk of injury to persons.

A single impact is to be applied to any part of the cart or stand and the test method is to be as described in Clause T.6. However, a cart, stand or carrier made of glass shall instead be tested according to 4.4.3.6.

8.10.5 Mechanical stability

A cart, stand or carrier, including floor standing types, shall be subjected to the applicable tests described in 8.6.3 and 8.6.5 by itself, and where applicable in combination with its intended MS2 or MS3 equipment.

For the purposes of these tests, the weight shall be considered as the total weight of the equipment plus the weight of the cart, stand or carrier. The equipment shall be installed according to the manufacturer's instructions and the horizontal force shall be applied to either the cart, stand or carrier or intended equipment to produce a maximum overturning moment on the equipment at a point up to a maximum height of 1,5 m above the floor level.

If during the tests of 8.6.3 and 8.6.5 the equipment starts to slide or tip relative to the cart, stand or carrier, only the horizontal force test shall be repeated by reducing the force to 13 % of the weight of the equipment alone, or 100 N, whichever is less.

The equipment and cart or stand shall not tip over.

8.10.6 Thermoplastic temperature stability

An equipment, cart, stand or carrier using thermoplastic materials in its construction shall withstand the test of Clause T.8 without any shrinkage, warpage, or other distortion of the thermoplastic materials that results in the equipment failing to comply with 8.10.3, 8.10.4 and 8.10.5.

8.11 Mounting means for slide-rail mounted equipment (SRME)

8.11.1 General

This subclause specifies requirements for horizontally mounted slide-rails to reduce the likelihood of injury by retaining the SRME in a stable position and not allowing the slide-rails to buckle, the means of attachment to break, or the SRME to slide past the end of the slide-rails.

The requirements below apply to the mounting means of MS2 and MS3 SRME that is:

– installed in a rack and that is intended to be extended on slide-rails away from the rack for installation, use or service; and
– SRME that extends the full width of the rack; and
– having a top installation position more than 1 m in height from the supporting surface.

The requirements do not apply to:

– equipment subassemblies; or
– other equipment fixed in place in the rack; or
– equipment that is not intended to be serviced while extended on slide-rails.

The mechanical mounting means for the SRME are referred to as slide-rails. The SRME may be the actual product configured in its worst case mechanical loading, or a representative **enclosure** with weights to simulate worst case loading.

NOTE 1 Slide-rails include bearing slides, friction slides or other equivalent mounting means.

NOTE 2 Subassemblies of the end product (for example, removable modules, component drawers, pull out paper/heater trays in copiers/printers) are not considered to be SRME.

8.11.2 Requirements

Classification of products for the purposes of assessing equipment stability is to be done according to Table 35, line 5.

NOTE For assessing equipment stability, see 8.6.

Slide-rails shall retain the SRME and have end stops that prevent the SRME from unintentionally sliding off the mounting means.

The slide-rails shall be installed in a representative rack with the SRME, or in an equivalent setup in accordance with the manufacturer's instructions.

Slide rails with a single extended position shall comply with the downward force test of 8.11.3.1 in the extended position.

Slide rails having a service position and an installation position shall comply with the downward force test of 8.11.3.1 in the service position.

All slide rails shall comply with the tests of 8.11.3.2 and 8.11.3.3 in both the service position and the installation position.

Following each test, the slide-rails and the SRME may be replaced before conducting the next test.

A multi position slide rail shall not extend automatically to any of the extended positions. The SRME shall only be able to go to the service position when pulled out. A latch or other means shall be provided to stop the SRME in the service position. Any service position and installation position shall be explained. An **instructional safeguard** shall be provided for the installer. The elements of the **instructional safeguard** shall be as follows:

– element 1a: not available
– element 2: Stability hazard
– element 3: "The rack may tip over causing serious personal injury"
– element 4: the text below or equivalent text

Before extending the rack to the installation position, read the installation instructions. Do not put any load on the slide-rail mounted equipment in the installation position. Do not leave the slide-rail mounted equipment in the installation position.

8.11.3 Mechanical strength test

8.11.3.1 Downward force test

With the SRME in its extended position, a force in addition to the weight of the SRME is to be applied downwards through the centre of gravity for 1 min.

The additional force applied to the SRME shall be equal to the greater of the following two values, with a maximum of 800 N:

– *50 % of the SRME weight plus a force of 330 N; or*

– *50 % of the SRME weight, plus an additional weight, where the additional weight is equal to the SRME weight or a force of 530 N, whichever is less.*

NOTE This additional force is intended to take into account other items or devices that are stacked on top of the installed SRME while in the extended position during installation of other SRME.

For slide-rail mounted shelves, the shelf shall be tested with a weight of 125 % of the maximum weight that is intended to be placed on the shelf.

A marking shall be provided on the shelf to indicate the maximum weight that can be added to the shelf.

8.11.3.2 Lateral push force test

A 250 N static push force is applied laterally, in both directions at or near the end of the SRME with the slide rails in their fully extended (service) position for a period of 1 min. The applied weight need not be in full contact with uneven surfaces (for example, corrugated or curved surfaces) but shall be concentrated within 30 mm of the end of the SRME.

8.11.3.3 Integrity of slide rail end stops

To test the integrity of the end stops, a 250 N static pull force is applied at the front of the fully extended rail on the SRME for a period of 1 min, in an attempt to cause the SRME to come off the slide-rail. The SRME is then returned to the (installed) use position and then placed back in the fully extended position. The test is performed 10 times.

8.11.4 Compliance criteria

Compliance is checked by inspection and available manufacturer's data. If data is not available, then the tests according to 8.11.3 are conducted.

Following each test, the SRME and its associated slide-rails shall remain secure for one complete cycle of travel on its slide-rails. If the mounting means is not able to perform one complete cycle without binding, a force of 100 N shall be applied horizontally to the front of the SRME at its centre point with the intent to completely retract the SRME into the rack.

The mounting means shall not bend or buckle to any extent that could introduce an injury. End stops shall retain the SRME in a safe position and shall not allow the SRME to slide past the end of the slide-rails.

8.12 Telescoping or rod antennas

A telescoping or rod antenna shall be provided with a minimum 6,0 mm diameter button or ball on the end. An antenna end piece and the sections of a telescoping antenna shall be secured in such a manner as to prevent removal.

Compliance is checked by inspection and the test of Clause T.11.

9 Thermal burn injury

9.1 General

To reduce the likelihood of painful effects and injury due to thermal burns, **accessible** parts shall be classified and when necessary provided with the **safeguards** specified in Clause 9.

NOTE Electric burns due to radio frequency (RF) energy sources are a special case in this document. They are controlled by limiting accessibility above a specified frequency. These limits and conditions are defined in the notes [d] and [e] defined in Table 4.

9.2 Thermal energy source classifications

9.2.1 TS1

TS1 is a class1 thermal energy source with temperature levels:

– not exceeding TS1 limits under **normal operating conditions**; and
– not exceeding TS2 limits under:
  - **abnormal operating conditions**; or
  - **single fault conditions**.

9.2.2 TS2

TS2 is a class 2 thermal energy source where:

– the temperature exceeds the TS1 limits; and
– under **normal operating conditions**, **abnormal operating conditions** or **single fault conditions** the temperature does not exceed the TS2 limits.

Where the malfunction of the equipment is evident, no limits apply.

9.2.3 TS3

TS3 is a class 3 thermal energy source where the temperature exceeds the TS2 limits in Table 38 under **normal operating conditions** or under **abnormal operating conditions**, or under **single fault conditions**.

9.3 Touch temperature limits

9.3.1 Requirements

Except as noted below, touch temperatures of **accessible** parts shall comply with Table 38.

An **accessible** part that, while in contact with the body, is likely to drop in temperature upon touch can be evaluated under the limits of Annex A in IEC Guide 117:2010. An appropriate and reproducible test methodology is determined by the manufacturer with due regard to the test method in IEC Guide 117.

9.3.2 Test method and compliance criteria

The temperature tests are run with the room ambient conditions as defined in B.1.5 and B.2.3, except that the room ambient temperature shall be 25 °C ± 5 °C.

If the test is performed at a temperature between 20 °C and 25 °C, the results are adjusted to reflect a value of 25 °C.

NOTE 1 For an explanation of why the test is done at 25 °C without adjusting results for higher ambient temperatures, see IEC TR 62368-2.

*The equipment shall be operated in a manner the manufacturer determines likely to result in elevated thermal conditions of **accessible** surfaces and parts.*

NOTE 2 This may not be the condition of maximum input current or wattage but the condition that delivers the highest thermal level to the part in question.

*Compliance is checked by measuring the steady state temperature of **accessible** surfaces.*