Amendments to the "Rules for the certification of lifts and escalators for passengers and crew members"

Effective from 1/1/2021

List of amendments:

Chapter/Paragraph amended	Reason
Ch 1, [1.1.1], [1.1.2], [1.1.6], [1.1.7], Ch 2, [2.2.2], [2.3], [2.5] Ch 3, [3.1.1] Ch 4, [4.1.2] to [4.1.4], [4.2.1], [4.3], [4.4.1] to [4.4.3], [4.5.1] Ch 5, [5.1], [5.2], [5.3] deleted, [5.4] renumbered as [5.3] Ch 7, [7.1], [7.2], [7.3.1], [7.3.2], [7.5], [7.12], [7.15.2], Ch 9, [9.1] Ch 10, [10.1] Ch 11, [11.1.1], [11.1.2], [11.2.2] Ch 12, [12.1], [12.2.2], [12.4]	to update the requirements for certification of lifts and escalators for passengers and crew members by: - aligning the technical requirements to those in Standard EN-81; and - improving the requirements relevant to the certification and its validity and tests to be carried out at periodical surveys

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1.1 PREMISE

1.1.1 Field of application and general requirements

These Rules apply to lifts and escalators for passengers and crew members, installed on board ships, with regard to the issue by Tasneef of the certification mentioned under 1.1.2.

Chapters 1 and 2 apply in general to both lifts and escalators, Chapters 3 to 11 apply to lifts, while Chapter 12 applies to escalators.

These Rules also apply to the lifts of ships flying the Italian flag, for the purpose of compliance with the provisions of the Italian "Regulations for the Safety of Navigation and Life at Sea" in force (Decree of the President of the Italian Republic no. 435 of 8 November 1991), if said ships were constructed on or after 21 April 1992, which was the date of entry into force of the above-mentioned Regulations (see Section V, Article 130).

At the discretion of Tasneef and subject to the conditions that will be established in each case, these Rules may also be applied to lifts and escalators installed on drilling platforms or other similar vessels.

Compliance with these Rules for the above-mentioned purposes does not absolve Interested Parties from compliance with any regulations or instructions issued by the Administration of the State whose flag the ship is flying.

These Rules refer to electric lifts and, as far as applicable, to hydraulic lifts, permanently installed on board and consisting of a closed lift car, operated by means of cables, chains or hydraulic rams, sliding within rigid guide rails and used for transferring persons from one deck of a ship to another. The service speed rated speed of the lift car is, in general, not to exceed 1,6 m/s.

For drum drive installations, the service speed rated speed is generally to be limited to not more than 0,63 m/s.

Lifts designed for speeds exceeding 1,6 m/s or of different type, or the application of these Rules to installations on ships or non-self-propelled-craft not classified by Tasneef will be specially considered by Tasneef.

The components of the installations dealt with by these Rules which are permanently connected to the ship's structures, and the ship's structures which are affected by loads deriving from the above-mentioned installations, when in operation, represent a subject of classification and are to satisfy the requirements of Part B of the «Rules for the classification of ships», hereafter referred to simply as the «Tasneef Rules for ships».

Unless expressly stated otherwise, the relevant requirements of the various Parts of the above-mentioned Tasneef Rules for ships and/or those of other Tasneef Rules or Requirements apply, as far as practical.

These Rules deal with the determination of scantlings of lifts and escalators and associated equipment, as well as with the arrangement of safety gear.

The choice of the design criteria and the determination of scantlings of machinery are the responsibility of the Designer, as specified in Chapter 8 and Chapter 12, for lifts and escalators, respectively.

Tasneef tests the machinery, as specified in 1.1.6, and ascertains its suitability by means of working tests on board.

Existing installations for which the Interested Parties apply for the issue of the certification by Tasneef are to comply with these Rules, as far as deemed necessary by Tasneef and according to the procedures mentioned in 1.1.7.

Checks and provisions additional to those specified in these Rules may be required for special installations or for those of novel type.

1.1.2 Certification and its validity

For installations complying with these Rules, Tasneef issues a Qualification Certificate stating the above-mentioned compliance. The validity of the Qualification Certificate is 5 years.

When a three months extension of the period of class has been granted to the ship due to exceptional circumstances (as per [1.2.3] of Part A, Chapter 2, Section 3 of Tasneef Rules for ships), Tasneef may grant an extension not exceeding three months to allow for completion of the renewal survey provided that the lift is attended and the attending Surveyor(s) so recommend(s) after the following have been carried out:

a) Annual survey;
b) Progression of the renewal survey as far as practicable;

The certificate is issued subject to the satisfactory outcome of the initial survey, and its validity over time is subject to the results of the tests and checks mentioned in Chapters 11 and 12 for lifts and escalators, respectively.

In the five-year period of validity, five annual surveys are to be carried out. The first to fourth annual surveys have a six-month window, i.e. from three months before to three months after each anniversary date, while the fifth annual survey has only a three-month window, i.e. from three months before to the fifth anniversary date.

At the request of the Interested Parties, the Qualification Certificate for escalators may include a statement of compliance with Standard EN 115.

A condition for qualification is that the lift or escalator is used in an appropriate manner, and in any case in compliance with the operating prescriptions established by the Designer and/or the Manufacturer, and that the lift/escalator and its components are kept in good operating condition by means of regular maintenance performed by competent personnel.

1.1.3 Equivalence of requirements and exceptions

In general, the criterion of equivalence of requirements is accepted; therefore, requirements as well as design and installation criteria complying with other standards recognised as equivalent to those contained in these Rules may be accepted, except when otherwise provided by national laws or international conventions.

Similarly, equipment complying with national or international standards may, in general, be accepted as equivalent, provided that it is suitably certified.

The judgement on such equivalence pertains exclusively to Tasneef, which reserves the right to require compliance with certain conditions for acceptance, when deemed necessary.

Tasneef may, at its discretion, grant exemption from certain requirements, when they do not appear to be reasonable; any such decision on the part of Tasneef will be final.

1.1.4 Calculation methods

As far as examination of the design plan is concerned, the calculations relevant to the determination of scantlings of structures and of different components (cables, cable terminals, stay bolts, etc) are generally required to be submitted.

Calculations are to be carried out according to methods recognised as suitable in the field of strength of materials.

When, in design calculations, electronic data processing is used, adequate information on programs and criteria adopted is to be supplied, in order to facilitate checking of the design.

1.1.5 Modification of systems and/or installations

When modifications are made to systems and/or installations certified by Tasneef, the Interested Parties are to give timely communication and the relevant work is to be carried out to the satisfaction of Tasneef and under the supervision of its Surveyors. To this end, if deemed necessary by Tasneef, the plans relevant to the modifications, along with a detailed description thereof, are to be submitted to Tasneef for examination.

1.1.6 Testing

As far as the use of materials, objects, devices, machinery, etc is concerned, the requirements of Chapter 2 of Part A of the Tasneef Rules for ships apply, as far as practical.

In general, testing is required for the following components:

(a) materials (plates and/or sections) used for guide rails, for main structural components of the car and of the counterweight frame, for supporting frames of the headroom pulleys and wire terminals (mechanical tests);

(b) starters and electrical panel of lift installations (this consists of checking the suitability for use of type approved components, a voltage application test and an operational test; the voltage application test is to be carried out before installation on board);

(c) fire doors (this consists of checking compliance with the door type required);

(d) hydraulic unit, ram and cylinder in the case of hydraulic lifts. Testing here consists of:

- check of compliance with the approved plans;
- examination of the certificates of origin of materials;
- hydrostatic test;

(e) Wire ropes (according to Pt D, Ch 4, Sec 1 of the Tasneef Rules for ships);

(f) Wire terminals. The testing consists of breaking test on one sample per lot and tension test on each lot item; in the case of a tension test on each lot item certified on the Manufacturer's works' certificate, it is to be repeated as a spot check in the presence of the Tasneef Surveyor.

Internal workshop certificates may be accepted for:

- terminals and winch frame materials;
- pulleys, pulley pins and winch shaft materials;
- electric motor;
- components of hydraulic systems;
- electrical panel for operation of escalators;
- materials for frame of escalators.

1.1.7 Existing installations

(a) Where the Interested Parties apply for the certification of an existing arrangement, the procedure specified in points (1), (2) and (3) below is to be followed.

(1) The calculations relevant to the proposed arrangement are to be submitted to Tasneef, along with working plans necessary to verify such calculations, with specification of the characteristics of materials employed. If the original documentation is not available, plans drawn up based on measurements carried out directly on board may be accepted as an alternative.

(2) Moving parts of the installation are to be subjected to a tensile proof test, as per these Rules.

(3) A complete survey is to be made of the entire arrangement and of the associated surrounding structure. Such survey is generally to include the checks and tests mentioned in Chapters 11 and 12 for lifts and escalators, respectively. It is to be specified on the certificate issued that this is an existing installation.

(b) At the request of the Interested Parties, in the case of existing arrangements Tasneef may carry out checks other than those specified in (a) and issue a special statement declaring the checks carried out and the outcome.

1.2 DEFINITIONS

1.2.1 Administration

For vessels flying the Italian flag, it is the competent Ministry of the government of the Italian Republic; for other vessels it is the government of the flag State.

1.2.2 Buffer

It is a resilient stop at the end of travel, comprising a means of braking using fluids or springs (or other similar means).

1.2.3 Lift

It is permanent lifting equipment serving defined deck landing levels, comprising a car suspended by cables or chains or by cylinder-ram units, whose dimensions and means of construction clearly permit the access of persons, running at least partially between rigid vertical guide rails or rigid guide rails whose inclination to the vertical is less than 15°.

1.2.4 Traction drive lift

It is a lift whose lifting cables are driven by friction in the grooves of the driving sheave of the machine.

1.2.5 Positive drive lift

It is a lift suspended by chains or lifting cables driven by means other than friction.

1.2.6 Re-levelling

It is the operation, after the lift has stopped, to permit the stopping position to be corrected during loading or unloading, if necessary by successive movements.

1.2.7 Maritime authority

For vessels flying the Italian flag, it is the local office of the Administration (Maritime district office, Harbour office, Maritime sub-district office. etc); for other vessels it is the competent port authority.

1.2.8 Lift car (Car)

It is the part of the lift which carries the persons to be transported.

1.2.9 Breaking load of a lifting cable

It is the effective breaking load obtained in a rupture test on a sample of cable following a defined method.

1.2.10 Safety cable

It is an auxiliary cable attached to the car and the counterweight for the purpose of tripping safety gear in case of suspension failure.

1.2.11 Lift well (Well)

It is the space in which the car and the counterweight, if any, travel. This space is bounded by the bottom of the pit, the walls and the roof of the well.

1.2.12 Pit

It is the part of the well situated below the lowest landing level served by the car.

1.2.13 Toe guard (Apron)

It is a protection having a smooth vertical part extending downwards from the sill of the landing or car entrance.

1.2.14 Guide rails

They are the components which provide guiding of the car sling or the counterweight, if any.

1.2.15 Sling

It is the metal framework carrying the cabin or counterweight, connected to the means of suspension. This sling may be integral with the car enclosure.

1.2.16 Interested Parties

They are the parties interested in Tasneef's intervention, such as the Shipowner or his legal representative, the Shipyard or the Manufacturer.

1.2.17 Overspeed governor

It is a device which, when the lift attains a predetermined speed, causes the lift machine to stop, and, if necessary, causes the safety gear to be applied.

1.2.18 Levelling

It is the operation which improves the accuracy of car stopping at landings.

1.2.19 Pulley room

It is a room not containing the machine, in which pulleys are located and in which the overspeed governor or governors and electrical equipment may also be housed.

1.2.20 Lift machine

It is the unit including the motor which drives and stops the lift.

1.2.21 Safety gear

It is a mechanical device for stopping, and maintaining stationary on the guide rails, the lift car or counterweight in case of overspeeding in the downward direction or breaking of the suspension.

1.2.22 Instantaneous safety gear

It is safety gear in which the full gripping action on the guide rails is almost immediate.

1.2.23 Instantaneous safety gear with buffered effect

It is safety gear in which the full gripping action on the guide rails is almost immediate, but the reaction on the car or counterweight is limited by the presence of an intermediate buffering system.

1.2.24 Progressive safety gear

It is safety gear in which deceleration is carried out by a braking action on the guide rails and for which special provision is made so as to limit the forces on the car or counterweight to a permissible value.

1.2.25 Passengers

They are the persons transported by a lift.

1.2.26 Rated load

It is the load for which the equipment has been built and for which normal operation is guaranteed by the vendor.

1.2.27 Machine room

It is the room in which machine or machines and/or associated equipment are placed.

1.2.28 Escalator

It is an electrically powered moving staircase for carrying passengers and crewmembers up or down. For the definitions of parts of escalators see Standard EN 115.

1.2.29 Available car area

It is the area of the car measured at a height of 1 m above floor level, disregarding handrails, if any, which is available for passengers during operation of the lift

1.2.30 Surveyors

They are the Surveyors acting on behalf of Tasneef and entrusted with tasks related to certification.

1.2.31 Vessels

They are ships and non-self-propelled craft. Unless otherwise specified, the term «ship» is intended to mean both ships proper and non-self-propelled craft.

1.2.32 Rated speed

a) in the case of lifts: it is the speed of the car for which the equipment has been built and for which normal operation is guaranteed by the vendor;

b) in the case of escalators: it is the speed in the direction of travel of the steps when the installation is operating without a load, stated by the Manufacturer, and on the basis of which the escalator has been designed to operate.

1.2.33 Unlocking zone

It is the zone, extending above and below the stopping level, in which the car floor must be so as to enable the corresponding landing door to be unlocked.

Cap. 2 – DESIGN CRITERIA OF LIFTS AND ESCALATORS

2.1 GENERAL

The design is to consider both the case of a moving lift/escalator and the case of a stationary lift/escalator.

In service conditions, the following forces are to be considered as acting on the lift/escalator:

(a) the force due to the weight of the car/escalator and the counterweight, if any (only for lifts);

(b) the force due to the mass of persons and their luggage (rated load);

(c) the forces due to ship and lift/escalator motion.

In stationary conditions, the forces acting are:

(d) the forces due to the weight of the car/escalator and the counterweight, if any (only for lifts);

(e) the forces due to ship motion.

Scantlings obtained on the basis of direct calculations performed using criteria other than those given in 2.3, 2.4 and 2.5 may be accepted provided that they are deemed equivalent by Tasneef, at its sole discretion.

2.2 MASSES

2.2.1 General

The load acting on bearing devices is that due to the weight of the car/escalator; such mass is to be clearly indicated on the plans submitted for examination, along with the design load (rated load), and only for lifts, the minimum stopping distance, the type and characteristics of buffers and any other element suitable for the correct interpretation of the design.

2.2.2 Lift installations

The design rated load is, in no case, to be taken less than specified in Table 2.1 depending on the available car area and on the maximum number of persons.

The maximum number of persons that can be transported is the number obtained by dividing the rated load given in Table 2.1 by 75 (the result being rounded down to the nearest whole number) or the number obtained from Table 2.2, whichever is the lesser.

The car area in general shall be measured according to the criteria given in Standard EN-81.

In particular, where there is an available area between the entrance frame uprights, when the doors are closed the following applies:

a) where the area is less or equal than 100 mm deep up to any door panel (including fast and slow doors in the case of multi-panel doors), then it shall be excluded from the floor area;

b) where the area is greater than 100 mm deep, the total available area shall be included in the floor area

2.3 DYNAMIC FORCES

The dynamic forces due to lift/escalator movements and ship motion are those deriving from the accelerations calculated in accordance with Part B, Chapter 5, Section 3 of the Tasneef Rules for ships under the following conditions, assuming ship motions as acting simultaneously:

(a) in the case of moving lift/escalator:

- rolling acceleration α_R, as defined in [2.4.1] of Part B, Ch 5, Sec 3, assuming, ~~assumendo~~ $A_R = 10°$ e $T_R = 10$ s;
- pitching acceleration a_P, as defined in [2.5.1] of Part B, Ch 5, Sec 3, assuming $A_P = 7,5°$ e $T_P = 7$ s;

(b) in the case of stationary lift/escalator:

- rolling acceleration α_R, as defined in [2.4.1] of Part B, Ch 5, Sec 3, assuming $A_R = 22,5°$ e $T_R = 10$ s;
- pitching acceleration α_P, as defined in [2.5.1] of Part B, Ch 5, Sec 3, assuming $A_P = 7,5°$ e $T_P = 7$ s;
- heaving acceleration a_H, as defined in [2.3.1] of Part B, Ch 5, Sec 3.

In addition, in order to take account of dynamic forces due to tripping of safety gear for lift stopping, the weight and the rated load are to be multiplied by a dynamic factor $\mathbf{F}_d$, whose value depends on the speed, minimum stopping distance and buffers employed; such factor is to be clearly specified and justified by the Designer. Tasneef reserves the right to increase the above-mentioned dynamic factor whenever deemed appropriate in relation to the calculations submitted for its determination.

TABLE 2.1

Maximum available car area, in m^2	Maximum number of persons [1]	Rated load, in kg
0,37	1	100
0,58	2	180
0,70	3	225
0,90	4	300
1,10	5	375
1,17	5	400
1,30	6	450
1,45	7	525
1,60	8	600
1,66	8	630
1,75	9	675
1,90	10	750
2,00	10	800
2,05	11	825
2,20	12	900
2,35	13	975
2,40	13	1000
2,50	14	1050
2,65	15	1125
2,80	16	1200
2,90	16	1250
2,95	17	1275
3,10	18	1350
3,25	19	1425
3,40	20	1500
3,56	21	1600
3,88	24	1800
4,36	28	2100
5,00 [2]	33	2500

NOTES:

[1] The maximum number of persons is obtained by dividing the value of the rated load, given in the third column, by 75 and rounding down the result to the nearest whole number.

[2] Over 2500 kg, add 0.16 m^2 for each extra 100 kg.

TABLE 2.2

Capacity in persons	Minimum available car area in m^2	Capacity in persons	Minimum available car area in m^2
1	0,28	11	1,87
2	0,49	12	2,01
3	0,60	13	2,15
4	0,79	14	2,29
5	0,98	15	2,43
6	1,17	16	2,57
7	1,31	17	2,71
8	1,45	18	2,85
9	1,59	19	2,99
10	1,73	20 [1]	3,13

NOTE:

[1] For more than 20 passengers add 0,115 m^2 for each extra passenger.

2.4 STRESSES INDUCED BY DYNAMIC FORCES FOR LIFTS

By way of information, some formulae are given below, which permit approximate assessment of the buckling stresses σ_k, in N/mm^2, in guide rails, caused by tripping of safety gear (during the gripping action of the gear):

– For instantaneous safety gear (not of the captive roller type):

$$\sigma_k = \frac{50\,(\mathbf{P}+\mathbf{Q})\,\omega}{\mathbf{n\,A}}$$

– For instantaneous safety gear of the captive roller type:

$$\sigma_k = \frac{30\,(\mathbf{P}+\mathbf{Q})\,\omega}{\mathbf{n\,A}}$$

– For progressive safety gear:

$$\sigma_k = \frac{20\,(\mathbf{P}+\mathbf{Q})\,\omega}{\mathbf{n\,A}}$$

In the above formulae:

P = value, in kg, given by the sum of the mass of the empty car and the masses of the parts of flexible cables and of compensating gear, if any, supported by the car;

Q = rated load, in kg;

n = number of guide rails;

A = cross-sectional area of the guide rails, in mm^2;

ω = increasing factor, to take account of buckling, depending on the slenderness ratio λ;

λ = **l/i**, where **l** is the maximum span between the fixings and **i** is the minimum radius of inertia of the cross-section of the guide rail.

The stresses σ_k are to not exceed the permissible values σ_{amm} mentioned under 2.5.

For the calculation of the bending, buckling and torsional stresses and the calculation of the deflections of the guide rails, the formulae given in Standard EN-81 may be used.

2.5 PERMISSIBLE STRESSES AND DEFLECTIONS

For calculations carried out according to traditional beam theory, the values of the permissible stresses σ_{amm} and τ_{amm}, in N/mm^2, and of the permissible deflection ε_{amm}, in mm, relevant to the two conditions mentioned under 2.1, are the following:

$\boldsymbol{\sigma_{amm}}$ = $\mathbf{R_m/S_t}$

$\boldsymbol{\tau_{amm}}$ = $\boldsymbol{\sigma_{amm}}/(3)^{0.5}$

$\boldsymbol{\varepsilon_{amm}}$ = 0,0017 **L**, for the car;

$\boldsymbol{\varepsilon_{amm}}$ = 0,0025 **L**, but in no case to be taken greater than 5 mm, for guide rails;

$\boldsymbol{\varepsilon_{amm}}$ = 0,00133 **L** mm, for truss of escalators applying a static structural rated load of 5 kN/m^2 to the whole load carrying area (nominal width of escalator multiplied by the distance between the supports);

where:

$\mathbf{R_m}$ = tensile strength of the material, N/mm^2;

$\mathbf{S_t}$ = safety coefficient, which is to be taken as follows:

– 2,25~~ per condizione di carico in esercizio normale~~ for load condition during normal operation,

– 1,8 for load condition during~~ normal operation~~ safety device operation and during navigation with lift out of service,

L = span between ~~bearings of a~~ the support~~sing member~~, in mm.

The above-mentioned permissible stresses apply to steels having a ratio of minimum yield stress to ultimate tensile strength not exceeding 0,7. Steels having values of such ratio exceeding 0,7 will be specially considered by Tasneef.

Cap. 3 – REQUIRED DOCUMENTATION FOR LIFT CERTIFICATION

3.1 LIST OF REQUIRED DOCUMENTS

3.1.1

The documentation listed in the following paragraphs is to be submitted ~~in triplicate~~ for approval:

(a) General arrangement plan of the installation, with specification, inter alia, of the location of the installation on board the vessel, the well top clearances and the pit clearances, the accessible spaces, if any, under the pit, the ventilation openings, the layout of the lift machine space and pulley room, and the minimum distances between the lift car, counterweight and lift well.

(b) Plan of the lift car, with specification of its centre of gravity and point of suspension or of thrust (for direct acting hydraulic lifts) in relation to the position of the guide rails.

(c) Working plan including:

(1) lift car and counterweight guide rails with associated attachments and guide shoes, counterweight frame,

(2) car frame structure,

(3) arrangement and dimensions of pulleys,

(4) attachment device of cables, and components for connection to the structure,

(5) winch supporting frame, diverter pulleys and associated pins,

(6) number and scantlings of suspension cables with indication of the minimum breaking load,

(7) constructional details of the connection of guide shoes and of safety gear to the car frame,

(8) cylinder and hydraulic ram, base of the cylinder (in the case of hydraulic systems);

3.1.2

One copy of the documentation listed in the following paragraphs is to be submitted for information purposes:

(a) Design calculations, with specification of the characteristics of materials employed and all elements needed to verify that the components of the plant and the proposed installation are in compliance with these Rules.

(b) Check of stability in respect of slipping of the cables on the traction sheave.

(c) Calculation of the winch and associated supporting frame.

(d) Calculation of the scantlings of the cylinder, ram and base of the bottom of the pit (for hydraulic systems);

(e) Calculation of maximum pressure (for hydraulic systems).

In addition, the following documents are to be made available for examination by the Tasneef Survey in charge of testing:

1) Scheme of the safety system (safety gear), with relevant technical features.

2) Scheme of electrical and/or hydraulic installations.

3) Calculation of short-circuit currents in significant points, in order to check the characteristics of protection devices.

4) Test certificate for motors.

5) Certificate attesting fire resistance of well enclosure walls and landing doors, if required.

6) Certificate relevant to the adjustment of the safety gear performed according to instructions supplied by the Manufacturer and calculation of spring compression, in the case of instantaneous safety gear with buffered effect.

7) Schemes of safety systems and their descriptive specifications, or, alternatively, certificates relevant to type-recognition issued in compliance with the provisions of Standard EN 81, concerning:

- clamping device,
- safety gear,
- overspeed governor,
- buffers, of the energy dissipation or energy accumulation type with non-linear characteristic,
- control valve (for hydraulic lifts).

The above-mentioned devices are to be constructed using corrosion-resistant materials or materials suitably treated to this end.

4.1 LIFT CAR

4.1.1 General

The car is to be constructed of steel or other material equivalent to steel as far as fire protection is concerned.

The car is to be completely enclosed by walls, floor and roof; the only openings permitted are those listed in the following points:

(a) openings for the normal access of persons;

(b) trapdoors and/or emergency doors;

(c) ventilation openings.

The car floor is to be of anti-slip type.

A suitable handrail is to be fitted within the car.

During service, the car is to be suitably and permanently lighted, or is to be fitted with a system providing for its lighting upon opening of a landing door and until the last person has left the car.

In the event of power loss, emergency lighting is to be ensured.

The car guide shoes may be of cast iron, on condition that an intermediate steel guiding system is provided, suitable to restrain car motions in the event of breaking of one of the guide shoes.

A plate is to be affixed within the car indicating the rated load, in kg, and the maximum number of persons that may be transported.

4.1.2 Strength

All car walls, and doors in closed position, are to be able to resist, without permanent deformation greater than 1 mm and without undergoing an elastic deformation greater than 15 mm, the action of a 300 N force evenly distributed over an area of 500 mm^2, applied at right angles at any point of the walls or doors, from the inside of the car towards the outside.

After the above-mentioned test the door function is to not be affected.

The car roof is to be able either:

1) to support two persons i.e. able to resist a vertical force of 2000 N at any position without permanent deformation and, furthermore, is to provide at one point a clear plane area for standing of at least 0,12 m^2, in which the lesser dimension is to be at least 0,25 m; or

2) to support the maximum number of persons as indicated in Standard EN 81-20 (5.2.5.7.1), i.e. able to resist a vertical force of 2000 N at any position on an area of 0,30 m x 0,30 m without permanent deformation.

4.1.3 Access doors

Access doors are to have ~~the following~~ a minimum ~~dimensions:~~

~~(a)~~ height of 2 m, measured from deck. ~~level 2 m;~~

~~(b) height, measured from sill 1,6 m;~~

~~(c) net width 0,8 m~~.

The car doors, when closed, apart from operating clearances, if any, are to completely close the car entrances. When closed, the clearance between car door panels, or between car door panels and uprights, lintels or sills is generally not to exceed 6 mm. This value, due to wear, may reach 10 mm, with the exception of doors made from glass.

Doors are to be fitted with devices preventing their premature closure or their slamming. Manually operated doors may be two-panel hinged doors or multi-panel horizontally sliding doors.

Perforated panel doors are not allowed. ~~Two~~ multi-panel power operated doors are to be fitted with devices to prevent injury to persons; such devices are to comply with the requirements of the following items:

1) they are to be fitted on the entrance edge of each car and of the landing door;

2) they are to extend over the whole height of the car entrance edge, beginning 25 mm above the sill;

3) the force necessary to manoeuvre such devices is not to exceed 150 N. In the case of dragging of fire doors, the above-mentioned force, if necessary, may be suitably increased;

4) they are to trip immediately the entrance edge of the car or of the doors is obstructed. They must react as soon as the car entrance or the landing doors are obstructed.

5) Necessary measures are to be taken in order to enable the exit of passengers in the event of untimely stopping of the car in ~~way~~ front of a landing.

4.1.4 Clearances between car and inner surface of well, and between car and counterweight

In general, the horizontal distance between the inner surface of the lift well and the framework of the car door is not to exceed 150 mm.

Distances greater than 150 mm may be accepted provided that the car is fitted with a mechanical locking device so that the door can only be opened in the landing door locking zone. Operation of the lift is to be impossible unless the corresponding car door is locked~~, except in the cases foreseen (locking and manoeuvring zone for an auxiliary stop above the landing)~~. This locking is to be controlled by an electrical safety device in compliance with the provisions of Standard EN 81~~-1 and EN 81-2~~.

The distance between the car sill and the sills of landing doors is not to exceed 35 mm.

The horizontal distance between the car door and the landing doors, when closed, is not to exceed 120 mm.

The clearance between car and counterweight is to be at least 50 mm.

4.1.5 Ventilation

Cars having blank doors are to be fitted with upper and lower ventilation openings such as to form a cross-sectional area for air flow not less than 1% of the available car area.

In calculating such flow area, the door clearances may be appropriately considered.

4.2 GUIDE RAILS

4.2.1

Lifts are to be fitted with at least two steel guides, suitably smoothed, which ensure the correct travel of the car and counterweight. The extent of guide rails is to be such as to prevent guide shoes from running out even when the final travel limits are exceeded.

The strength of guide rails, their attachments and connecting arrangements of the components is to be sufficient to resist the forces due to tripping of the safety gear, and resist the bending generated by ~~abnormal~~ eccentric loads and by accelerations of ship; the degree of stresses and deflections is not to exceed the permissible values mentioned in 2.5 of Chapter 2, for the service conditions considered.~~, so that normal lift operation is not affected.~~

4.3 COUNTERWEIGHT

The counterweight is generally to be constructed of a single metal block, or may be composed of different metallic sections, provided that these are firmly connected to the containment structure.

If the counterweight is not constructed of a single metal block, necessary arrangements are to be made in order to prevent the displacement of the different sections, such as the use of a containment frame or, for lifts having a speed not exceeding 1 m/s, the use of at least two tie rods connecting the blocks.

The counterweight is not allowed in the case of drum winches.

The use of counterweights made of cement blocks is prohibited.

The counterweight is to be guided by at least two rigid steel guide along the whole length of its normal travel and extra-travel, if any, and is to be fixed and supported by means of a special device, in the event of breaking of the suspension system. Alternatively, the well structure is to have such dimensions as to resist the free fall of the counterweight from the highest point of its travel.

Pulleys, if any, on counterweights, are to also be fitted with devices to prevent suspension cables from leaving pulleys, in the event of their becoming slack, and to prevent the introduction of foreign objects between cable and pulley.

The above-mentioned devices are not to hinder examination and maintenance operations of pulleys.

In the case of chain suspensions, similar arrangements are to be provided.

Counterweights are to be installed in the same well as the car and are to be arranged or protected in such a way as to be accessible only to authorised personnel.

4.4 LIFT WELL ENCLOSURES AND LANDING DOORS

4.4.1 Well enclosures

Well enclosures are to be completely closed, except as specified below, and to be suitably ventilated by independent ducts; furthermore, they are to comply, as far as fire protection is concerned, with the relevant requirements contained in Part C, Chapter 4 of the Tasneef Rules for ships.

A lift well enclosure which serves one or more levels situated in the same 'tweendeck (for example lifts in engine rooms, cargo holds, etc.) may be of the ~~open~~ partially enclosed type, provided ~~it is completely enclosed by metal grating or equivalent arrangement~~ that what indicated in Standard EN 81-20 (5.2.5.2.2) is fulfilled.

Within well enclosures, only the equipment necessary for lift operation is allowed; piping, electric conductors and cables are to be suitably protected and installed with the utmost care.

The lift well is to be arranged in such a way that smoke passage from one 'tweendeck to another is prevented.

If, in the same well enclosure, two or more lifts are installed, each car, with its associated counterweight, is to be separated from the other(s) over the whole height of the lift well by suitable metallic partitions.

4.4.2 Landing doors

The openings in the boundary bulkheads of the well enclosure are to be closed by doors of construction equivalent to that of the bulkheads and are to be built in such a way as to prevent water entering the well; openings in way of open decks are to be suitably protected.

After closing, doors are to ensure fire protection at least equivalent to that of the well enclosure.

On well enclosure doors which are not fire doors, a fixed hatch having an area not exceeding 600 cm^2 may be arranged, constructed of armoured glass at least 6 mm thick, in a steel frame, or in a frame of equivalent material.

Power-operated doors ~~are to be two~~ shall be multi-panel doors; when possible, central opening doors are to be preferred; manually operated doors may also be one-panel swing doors ~~of the telescopic type~~; they are to be fitted with devices to prevent accidental closing or opening, or sudden slamming.

Landing doors are to be of steel or other equivalent material. Panoramic doors with glass panels shall be considered on the case by case basis.

Landing doors are to have a suitable height and, in general, such a width that the clear passage does not exceed the car entrance width by more than 50 mm on each side~~,~~.

In general, landing doors are to be horizontally sliding doors, guided both at their lower and upper ends.

A sensitive protection device is to trigger automatic re-opening of the door in the event of a person being struck, or about to be struck, by the door while crossing the entrance during the closing movement.

In doors where closing is carried out under the continuous control of the users (e.g. by continuous pressure of a button), if the kinetic energy exceeds 10 J, the average closing speed of the fastest panel is to be limited to 0,3 m/s.

It is not to be possible, during normal operation, to open a landing door (or one of the panels in the case of a door with more than one panel), unless the car is stationary or is going to stop within the unlocking zone of the door.

The unlocking zone of the door is not to extend by more than 0,2 m above or below the landing level.

However, in the case of a coupled and automatically operated landing door and car door, the unlocking zone may be extended to a maximum of 0,35 m above or below the landing level.

It is not to be possible, in normal service, to operate a lift or keep it operating, if a landing door (or any of its panels, in the case of doors with more than one panel) is open.

Nevertheless, preliminary operations for car movement are allowed.

In case of emergency, and by means of a special key, it is to be possible to open locked doors.

4.4.3 ~~Headroom and pit~~ Extreme position of car, well top and bottom clearances

~~The length of terminal parts of the lift well may be established depending on the type of lift employed, as specified below.~~

The extreme position of car and the well top and bottom clearances are to be in compliance with either:

1) the requirements of the following items (a) to (e); or
2) the requirements of Standard EN 81-20, paragraphs 5.2.5.6, 5.2.5.7 and 5.2.5.8 as applicable.

When the required well top and bottom clearances cannot be met, in both the above cases, alternative devices providing safety spaces can be accepted provided that an equivalent level of safety is maintained (reference can be made to Standard EN 81/21 as far as applicable).

(a) Well top clearances for traction drive lifts

When the counterweight rests on its fully compressed buffers, the following conditions are to be simultaneously satisfied:

1) the car guide lengths are to be such as would accommodate further guided travel, expressed in m, of at least 0,1 + 0,035 $\mathbf{V}^2$, where **V** is the rated speed, in m/s;
2) the free vertical distance between the level of the highest area on the car roof, having the dimensions specified in 4.1.2, and the level of the lowest parts of the roof of the well, situated in the projection of the roof of the car, is to be at least 0,75 m;
3) the free vertical distance, expressed in m, between the lowest parts of the roof of the well and the highest part of the guide shoes or rollers and of the cable attachments, is to be at least 0,1 + 0,035 $\mathbf{V}^2$;
4) the free vertical distance, expressed in m, between the lowest parts of the roof of the well and the highest pieces of equipment fixed on the roof of the car enclosure, except for items detailed in (3), is to be at least 0,3 + 0,035 $\mathbf{V}^2$;
5) above the car there is to be sufficient space to accommodate a rectangular block of at least 0,5 • 0,6 • 0,8 m, resting on one of its faces. For lifts with direct cabling, the suspension cables and their attachments may be included in this space, provided that no cable is at a distance exceeding 0,15 m from at least one vertical surface of the block

When the car rests on its totally compressed buffers, the counterweight guide rail lengths are to be such as would accommodate further guided travel of the counterweight, expressed in m, of at least 0,1 + 0,035 $\mathbf{V}^2$.

(b) Well top clearances for positive drive lifts

The travel of the car upwards from the top floor until it strikes the upper buffers is to be at least 0,5 m. The car is to be guided to the limit of its buffer stroke.

When the upper buffers are totally compressed by the car, the following conditions are to be simultaneously fulfilled:

1) the free vertical distance between the level of the highest area on the car roof, having the dimensions specified in 4.1.2, and the level of the lowest parts of the roof of the well situated in the projection of the roof of the car is to be at least 1 m;
2) the free vertical distance between the lowest parts of the roof of the well and the highest part of the guide shoes or rollers and of the cable attachments is to be at least 0,1 m;
3) the free vertical distance between the lowest parts of the roof of the well and the highest pieces of equipment fixed on the car roof, except for items detailed in (2), is to be at least 0,3 m;
4) above the car there is to be sufficient space to accommodate a rectangular block of at least 0,5 • 0,6 • 0,8 m resting on one of its faces. For lifts with direct cabling, the suspension cables and their attachments may be included in this space, provided than no cable is at a distance exceeding 0,15 m from at least one vertical surface of the block.

When the car rests on its totally compressed buffers, the guide rail lengths of the counterweight, if any, are to be such as would accommodate further guided travel of the counterweight of at least 0,3 m.

(c) Well bottom clearances of electric lifts

The lower part of the well is to consist of a pit, the bottom of which is to be smooth and level, except for any buffer and guide rail bases and bilge wells.

When the car rests on its totally compressed buffers, the following conditions are to be simultaneously fulfilled:

1) sufficient space is to be left in the pit to accommodate a rectangular block not less than 0,5 • 0,6 • 0,8 m resting on one of its faces;
2) the free vertical distance between the bottom of the pit and the lowest parts of the guide shoes or rollers and safety gear blocks is to be at least 0,1 m;
3) the free vertical distance between the bottom of the pit and the lowest portions of the car, except for items detailed in (2), is to be at least 0,5 m.

A switch is to be arranged in the pit to stop the lift and keep it stationary.

(d) Well top clearances for hydraulic drive lifts

When the ram is in its position of maximum extension, the following conditions are to be simultaneously satisfied:

1) the car guide lengths are to be such as would accommodate further guided travel, expressed in m, of at least 0,1 + 0,035 $\mathbf{V}^2$, where **V** is the rated speed, in m/s;
2) the free vertical distance between the level of the highest area on the car roof, having the dimensions specified in 4.1.2, and the level of the lowest parts of the roof of the well, situated in the projection of the roof of the car, is to be at least 0,75 m;
3) the free vertical distance, expressed in m, between the lowest parts of the roof of the well and the highest part of the guide shoes or

rollers and of the cable attachments, is to be at least 0,1 + 0,035 $\mathbf{V}^2$;

4) the free vertical distance, expressed in m, between the lowest parts of the roof of the well and the highest pieces of equipment fixed on the roof of the car enclosure, except for items detailed in (3), is to be at least 0,3 + 0,035 $\mathbf{V}^2$;
5) above the car there is to be sufficient space to accommodate a rectangular block of at least 0,5 • 0,6 • 0,8 m, resting on one of its faces. For lifts with direct cabling, the suspension cables and their attachments may be included in this space, provided that no cable is at a distance exceeding 0,15 m from at least one vertical surface of the block;
6) the free vertical distance between the lowest parts of the roof of the well and the highest parts arranged at the top of a ram extending upwards is to be not less than 0,1 m;
7) in the case of direct acting lifts, the value 0,035 $\mathbf{V}^2$ mentioned in (1), (3) and (4) is not to be taken into account.

When the car rests on its totally compressed buffers, the counterweight guide rail lengths are to be such as would accommodate further guided travel of the counterweight, expressed in m, of at least 0,1 + 0,035 $\mathbf{V}^2$.

(e) Well bottom clearances for hydraulic drive lifts

The lower part of the well is to consist of a pit, the bottom of which is to be smooth and level, except for any bases for buffers and the cylinder-ram unit, and for guide rails and bilge wells.

When the car rests on its totally compressed buffers, the following conditions are to be simultaneously fulfilled:

1) sufficient space is to be left in the pit to accommodate a rectangular block not less than 0,5 • 0,6 • 0,8 m resting on one of its faces;
2) the free vertical distance between the bottom of the pit and the lowest parts of the guide shoes or rollers and safety gear blocks is to be at least 0,1 m;
3) the free vertical distance between the bottom of the pit and the lowest portions of the car, except for items detailed in (2), is to be at least 0,5 m;
4) the free vertical distance between the bottom of the pit and the telescopic ram arm under a direct acting lift car is to be not less than 0,5 m.

With the car in its highest position, determined by the complete compression of the buffers in the cylinder-ram unit, the counterweight guide rail lengths, if applicable, are to be such as would accommodate further guided travel of the counterweight, expressed in m, of at least 0,1 + 0,035 $\mathbf{V}^2$.

A switch is to be arranged in the pit to stop the lift and keep it stationary.

4.4.4 Ventilation

For ventilation of the lift well and of the machine room, at least one air inlet through a suitable intake or duct and one forced extraction device are to be foreseen; the air inlet is to be led into the lift well while the air extraction is to be made from the machine room.

Ducts, if any, for forced air inlet and for extraction are to be directly derived from the fan and are not to serve other spaces and/or rooms on the ship, except as stated below.

Ventilation ducts serving a stairway enclosure may also serve lift wells with associated machine rooms, under the following conditions:

(a) lift well enclosures and associated machine rooms are enclosed within stairway enclosures;
(b) landing doors on all decks give direct access to the stairway enclosure;
(c) ventilation ducts of the stairway enclosure and of the lift well are directly derived from the fan and do not serve other spaces and/or rooms on the ship.

4.5 MACHINE ROOM

4.5.1

The machine room, to be considered as part of the lift well, may be situated laterally of, or (preferably) above, or below the lift well and is to be constructed of steel; furthermore, the boundary with the well is not to have holes which are not strictly necessary for lift movement, for ventilation and for escape hatches.

The dimensions of the machine room are to be sufficient to permit easy and safe access to all components, especially the electrical panel.

In particular there are to be provided:

(a) a suitable clear horizontal area of at least 0,5 • 0,7 m, in front of the electrical panels and cabinets;
(b) a clear horizontal area of at least 0,5 • 0,6 m, for servicing and inspection of moving parts where this is necessary and, if need be, for manual emergency operation;
(c) access ways to the clear spaces mentioned under (a) and (b) above, having a width of at least 0,5 m (0,4 m in areas where there are no moving parts).

The clear height of the machine room is to be, in general, at least 1,8 m.

Only lift motors with associated equipment are to be installed in the machine room.

An opening for access to the machine room is to be foreseen, closed by a door fitted with a key-operated locking device; this door is be capable of being ~~able to be~~ opened from inside the room ~~within~~ without the key and to be provided with an automatic closing device.

Lifts without a machine room will be the subject of special consideration and will be examined on a case-by-case basis.

Cap. 5 – SUSPENSION GEAR FOR LIFTS

5.1 REQUIREMENTS FOR SUSPENSIONS

Cars and counterweights are to be suspended from at least two independent steel wire cables or two independent chains with parallel links, or similar, or supported by rams or other direct action devices.

The steel cables must have a minimum diameter of 8 mm; the tensile strength of the wires and the other characteristics (construction, extension, ovality, flexibility, tests, etc.) shall be as specified in Part D of Tasneef Rules for ~~ships. are to be of the flexible type and the tensile strength of the material of individual wires is to be not less than 1570 N/mm^2 or greater than 1770 N/mm^2. Cables with nominal diameter less than 8 mm are not allowed and outer component wires are to be not less than 0,5 mm in diameter.~~

The diameter at groove bottom of traction sheaves, or drums, is to be not less than 40 times the diameter of the suspension cable ~~and not less than 500 times the diameter of the thickest component wires of the cables~~.

In the case of winding up of cables on drums, the drum is to be helically grooved and is to have such dimensions as to have one layer of cable wound on the drum; when the car rests at its lowest position, on its fully compressed buffers, if any, ~~2~~ 1.5 turns of cable are to still remain in the grooves of the drum.

In order that the cable correctly forms the loops, without overlapping, the angle of deflection (fleet angle) of the cables in relation to the drum grooves is not to exceed 4° on either side.

The checking calculation for cables is to be performed for the maximum value of the static tension, and the tensile strength of the cables is to be such as to guarantee a safety factor of at least:

- 12, in the case of traction drive with three cables or more, drum drive with two cables or more and indirect acting hydraulic lifts;
- 16, in the case of traction drive with two cables only.
- 10, in case of chains.

The junction between the cable or chain and the cable or chain terminations is to be able to resist at least 80% of the minimum breaking load of the cable or chain.

In addition, for traction drive installations, the stability in respect of slipping of the suspension cables, as specified in 5.2, is to be ensured.

A plate is to be affixed in a suitable position with complete indication of the characteristics of the cables employed; the latter are, in turn, to be fitted with a small plate, duly secured, bearing the same indication.

The other car components connected to the suspensions are to have a safety factor, in respect of breaking strength of the material with which are made of, of at least 6.

~~The safety factor of suspension chains is to be at least 10.~~

5.2 STABILITY IN RESPECT OF SLIPPING

With regard to stability in respect of slipping, the provisions specified in Standard EN 81-50, paragraph 5.11, are ~~following condition is~~ to be complied with.~~:~~

~~$(T_1/T_2) \cdot c_1 \cdot c_2 \leq e^{f \cdot \alpha}$~~

~~where:~~

~~T_1/T_2 = ratio between the greater and the smaller static force in the portions of cable situated on either side of the traction sheave, and connected to the car and to the counterweight, respectively, in one of the following cases:~~

- ~~car stationary at the lowest landing level with a load increased by 25% in respect of the rated load;~~
- ~~car stationary at the highest landing level, unloaded;~~

~~c_1 = increasing coefficient of the static ratio to take account of inertia forces, whose value is calculated as specified below;~~

~~c_2 = coefficient, taking account of the variation in profile of the sheave groove due to wear, to be taken as follows:~~

- ~~= 1, for semicircular grooves and~~
- ~~= 1,2, for vee grooves;~~

~~e = base of natural logarithms;~~

~~f = friction factor of the cables in the sheave grooves, whose value is calculated as specified below;~~

~~α = angle of wrap of the cables in the traction sheave, in radians.~~

~~The coefficient c_1 may be calculated, with sufficient approximation, by the following formula:~~

~~$$c_1 = \frac{(g + a)}{(g - a)}$$~~

~~where:~~

~~g = acceleration of gravity, in m/s^2~~

~~a = braking deceleration of the car, in m/s^2.~~

~~The following minimum values of c_1 may be permitted:~~

- ~~1,10, for rated speeds $0 < V \leq 0,63$ m/s;~~
- ~~1,15, for rated speeds $0,63 < V \leq 1,00$ m/s;~~
- ~~1,20, for rated speeds $1,00 < V \leq 1,60$ m/s;~~
- ~~1,25, for rated speeds $1,60 < V \leq 2,50$ m/s.~~

~~The friction factor f is obtained from the following formulae:~~

~~(a) for vee grooves with angle of the vee grooves in the traction sheave γ, in radians:~~

~~$$f = \frac{f_0}{\sin\frac{\gamma}{2}}$$~~

~~(b) for semicircular grooves with angle β, of the undercut in the grooves in the traction sheaves, in radians, where α is the angle of wrap of the cables in the traction sheave, in radians:~~

~~$$f = \frac{4 f_0 \cdot (\sin\frac{\alpha}{2} - \sin\frac{\beta}{2})}{\alpha - \beta + \sin\alpha - \sin\beta}$$~~

~~(c) when the angle α may be considered equal to 180°, as commonly occurs in construction, in lieu of the formula specified under (b), the following simplified formula may be adopted:~~

~~$$f = \frac{4f_0 \cdot (1 - \sin\frac{\beta}{2})}{\pi - \beta - \sin\beta}$$~~

~~In the formulae for the determination of **f** mentioned under (a), (b) and (c), f_0 is the friction factor between steel cables and cast iron pulleys and may be taken equal to 0,09.~~

~~No noticeable slip between cables and driving sheave is to occur in either of the above-mentioned loading and stopping conditions.~~

~~5.3 PRESSURE OF THE SUSPENSION CABLES IN THE TRACTION SHEAVE GROOVES~~

~~In relation to the individual characteristics and the conditions of use of the installation, the Manufacturer is to fix the value of the pressure of the suspension cables in the traction sheave grooves.~~

~~Such pressure may be calculated by the following formulae, valid for vee grooves and for semicircular grooves with or without undercut, respectively:~~

~~where:~~

~~**d** = diameter of suspension cables, in mm;~~

~~**D** = diameter of the traction sheave, in mm;~~

~~**n** = number of suspension cables;~~

~~**p** = pressure of the suspension cables in the traction sheave grooves, in N/mm^2;~~

~~**T** = static force, in N, in the suspension cables to the car at the level of the traction sheave, when the car is stationary at the lowest landing with the rated load.~~

~~In no case is the pressure of the suspension cables to exceed the value **p**, in N/mm^2, given by the following formula, with the car loaded at its rated load:~~

~~$$p \leq \frac{12,5 + 4V_c}{1 + V_c}$$~~

~~where V_c is the speed of the cables corresponding to the rated speed of the car, in m/s.~~

~~5.4~~ 5.3 DISTRIBUTION OF LOAD BETWEEN THE CABLES OR THE CHAINS

An automatic device is to be provided for equalising the tension of suspension cables or chains, at least at one of their ends.

For chains engaging with sprockets, the ends fixed to the car as well as the ends fixed to the counterweight are to be provided with such equalisation devices.

For chains in the case of multiple return sprockets on the same shaft, these sprockets are to be able to rotate independently.

If springs are used to equalise the tension they are to work in compression.

~~In the case of suspension of the car with cables or chains, an electrical safety device is to be foreseen to cause the lift machine to stop in the event of abnormal relative extension of one cable or chain.~~

Protection in the case of abnormal extension, slack rope or slack chain shall be provided as follows:

a) in the case of two rope or two chain suspension of the car an electric safety device shall cause the machine to stop in case of abnormal relative extension of one rope or chain;

b) for positive drive lifts and hydraulic lifts, if the risk of slack rope (or chain) exists, an electric safety device shall cause the machine to stop when slack occurs.

The devices for adjusting the length of cables or chains are to be made in such a way that they cannot work loose after adjustment.

6.1 GENERAL

6.1.1

In case of emergency, persons are to be able to exit the lift well and the lift car. The car is to reach the landing level automatically or by manual operation. Such operation is to be carried out applying a force on the adopted device not exceeding 400 N.

6.1.2

In the well of lifts intended for crewmembers, a steel ladder is to be fitted, which is to extend over the whole height of the well, and adequate exits are to be foreseen. Such ladder is to be accessible from the escape hatch fitted on the car roof.

6.1.3

For lifts intended for passengers, a suitable ladder, or equivalent means, is to be foreseen, giving free access to the car roof through any open door of the well. The same ladder or another may be used to enter the car through the opening on the car roof. Such opening is to be not less than 0,35 x 0,50 m and capable of being opened only from outside the car, in passenger lifts, and from both sides, in the case of lift cars intended for crewmember service only. The above-mentioned ladders are to be fitted in a room situated in the immediate proximity of the lift. Access to such room is to be allowed for authorised persons only.

For panorama lifts in an open well, the presence and possible arrangements for the ladder and the opening on the car roof will be considered case by case.

6.1.4

All doors of wells, access and emergency openings, car doors and the upper escape hatch from the car are to be fitted with safety contactors preventing car motion when such openings are not closed.

6.1.5

Suitable plates, along with instructions specifying escape sequences, are to be fitted:

- inside the lift car;
- on the roof of the car;
- inside the lift well, in way of any access opening;
- in the machine room.

6.1.6

Lifts intended for crewmembers only are to be fitted with an escape hatch from the well top, having an area of at least 0,24 m^2 and a side not less than 350 mm, which is to be capable of being opened from outside only by means of a key kept in proximity of such hatch.

Cap. 7 – CONTROL AND SAFETY DEVICES FOR LIFTS

7.1 GENERAL

Means are to be provided to ensure control of the speed, direction of motion and stopping of the lift.

In addition, a device is to be provided causing the de-energizing of the machine, and keep it de-energized ~~which stops the car and keeps it stationary~~ if:

(a) after the start of the car, the machine does not operate;

(b) the cabin and the counterweight are hindered in their travel by an object which causes the slipping of the driving system.

Such device is to have the tripping times specified in 7.14 (b) depending on the height of the car travel.

The car position during normal service is to be easily ascertained from inside the car.

Control devices are to be of a type suitable for use on board ships, taking account of the presence of vibrations and of the saline environment.

These devices are to operate satisfactorily even with 10° rolling and pitching conditions, with the lift operating, and are to withstand 22,5° inclinations in all directions with the lift out of service.

In general, the Tasneef rules for Ships relevant to machinery, systems, electrical installations and devices, protection against electrical failures, controls and priorities, as well as to notices and instructions as ~~per Standards~~ EN 81-1 and EN 81-2 are to apply, as far as practical.

7.2 SAFETY GEAR AND OVERSPEED GOVERNOR

~~In the case of electric lifts, t~~The car and the counterweight are to be provided with safety gear controlled by their own overspeed governors capable of operating only in ~~the downward~~ both directions and of stopping a car carrying the rated load and the counterweight, at the tripping speed of the overspeed governor, even if the suspension devices break, by gripping the guide rails, and of holding the car ~~there~~ stationary.

The tripping of safety gear by devices which operate electrically, hydraulically or pneumatically is forbidden.

Depending on the rated speed of the car **V**, the relevant safety gear is to be:

(a) of the progressive type for lifts with rated speed **V** exceeding ~~1~~ 0,63 m/s.

The average delay, in case of tripping with the car in free fall, with the rated load in the car, is to be between 0,2 **g** and 1 **g**;

~~(b) of the instantaneous type with buffered effect, for lifts with **V** not exceeding 1 m/s.~~

~~The buffering system is to be of the energy accumulation type with buffered return movement or of the energy dissipation type, and is to comply with the requirements stated in 7.3;~~

(c) of the instantaneous type for lifts with **V** not exceeding 0,63 m/s.

If the car carries more than one safety gear device, all of them are to be of the progressive type.

The safety gear of the counterweight is to be of the progressive type if the rated speed exceeds 1 m/s.

The release of the safety gear on the car or counterweight is only to be possible by raising the car or the counterweight, respectively.

Tripping of the safety gear of the car is to cause the lift motor to stop no later than the moment of safety gear tripping.

Tripping of the overspeed governor for the car safety gear is to occur at a speed at least equal to 115% of the rated speed and less than:

- 0,80 m/s, for instantaneous safety gear, except for the captive roller type;
- 1 m/s, for instantaneous safety gear of the captive roller type;
- 1,5 m/s, ~~for instantaneous safety gear with buffered effect and~~ for progressive safety gear used for rated speeds not exceeding 1 m/s;
- 1,25 **V** + 0,25/**V**, for progressive safety gear for rated speeds exceeding 1 m/s.

The response time of the overspeed governor before tripping is to be sufficiently short not to permit a dangerous speed to be reached before the moment of safety gear operation.

The tripping speed of an overspeed governor for the counterweight safety gear is to be higher than that for the car safety gear, though not exceeding it by more than 10%.

The tripping of the speed governor or the breakage or even the slackening of a suspension component is to cause the machine to stop automatically.

The tensile force in the overspeed governor cable produced by the governor, when tripped, is to be not less than the greater of the following values:

(a) 300 N;

(b) twice that necessary to engage the safety gear.

The breaking load of the cable of the overspeed governor is to be related to a safety factor of at least 8 times the tensile force produced in the cable when the overspeed governor is tripped.

The cable employed is to be very flexible and is to have a diameter of at least 6 mm; the groove bottom diameter of the pulley of the overspeed governor is to be at least 30 times the diameter of the cable.

The cable is to be tensioned by a guided tensioning pulley.

It is forbidden to use the jaws or safety blocks of safety devices as guide shoes.

In the case of hydraulic lifts, precautions are to be taken against the fall of the car, overspeeding in the downward direction and slow descent, in accordance with the provisions of Standard EN 81-~~2~~.

7.3 BUFFERS

7.3.1 General

Cars and counterweights are to be fitted with buffers at the bottom limit of their travel. If the buffers travel with the car or counterweight, they are to strike against a pedestal at least ~~500~~ 300 mm high at the end of the travel. A pedestal is not required for buffer(s) fixed to the counterweight where a screen is extended to not more than 50 mm above the pit floor.

Positive drive lifts are to be provided with buffers on the car top to function at the upper limit of travel.

In positive drive lifts provided with counterweights, these upper buffers are to not function until the counterweight buffers are fully compressed.

Depending on the rated speed of the lift, the following types of buffers are foreseen:

(a) Energy accumulation type buffers with linear and non-linear characteristic, for lifts with rated speed **V** not exceeding 1 m/s;

~~(b) Energy accumulation type buffers with buffered return movement, for lifts with rated speed **V** not exceeding 1,60 m/s;~~

(~~b~~c) Energy dissipation type buffers, for any rated speed.

7.3.2 Stroke of the buffers

When the buffers mentioned in 7.3.1 (a) ~~or 7.3.1 (b)~~ are employed, the total possible stroke of the buffers **C**, in m, is to be at least twice the gravity stopping distance corresponding to 115% of the rated speed **V**, in m/s, and therefore the following condition is to be satisfied:

$$\mathbf{C} \geq 0{,}135\ \mathbf{V}^2$$

In any event, the stroke is to be not less than 65 mm.

When the buffers mentioned in 7.3.1 (c) are employed, the total possible stroke of the buffers **C**, in m, is to be not less than the gravity stopping distance corresponding to 115% of the rated speed **V**, in m/s, and therefore the following condition is to be satisfied:

$$\mathbf{C} \geq 0{,}0674\text{~~5~~}\ \mathbf{V}^2$$

Buffers are to be designed to cover the stroke defined above under a static load of between 2,5 and 4 times the sum of the mass of the car and its rated load, or of 4 times the mass of the counterweight.

The average retardation due to buffer action on the car with the rated load, in the case of free fall, is not to exceed 1 **g**, and the maximum retardation is not to exceed ~~2,5~~ 6 **g**.

The speed of impact on buffers to be considered is that for which the buffer stroke has been calculated.

7.4 FINAL LIMIT SWITCHES

Final limit safety stops for the car, either in upward or downward service, are to be ensured by a special final limit switch which is to be independent of, or in any case not directly controlled by, the driving system.

7.5 CLOSING AND CONTROL DEVICES

The machine is not to be capable of being started until all landing doors are closed and locked.

In the case of manually operated doors, a device is to be foreseen preventing car movement for a period of at least 2 seconds after car stopping.

Each landing door is to be fitted with a locking device controlled by an electrical safety device preventing its opening until the car is stationary in such a position that its floor is not more than 200 mm above or below the relevant landing access treading floor and until the control components of the winch are disengaged. In the case, however, of mechanically operated car and landing doors operating simultaneously, the unlocking zone may extend to a maximum of 0,35 m above and below the landing level.

The operation of the landing levelling device with the landing door open is allowed, within the above-mentioned ~~200 mm tolerance limit~~ unlocking zone, provided that the levelling speed does not exceed 0,3 m/s.

Car doors are to be fitted with safety contacts preventing car movement if car doors are not closed, or stopping such movement if such doors are opened during service.

If the car door is fitted with a mechanical device preventing its opening until the car is facing access to the well, it is permissible for the car door to be able to be opened when the car floor is within ~~a maximum limit of 200 mm above or below the floor~~ the unlocking zone of the landing in front of which the car is to stop.

The operation of the landing levelling device with the car door open is allowed within the above-mentioned ~~200 mm tolerance~~ unlocking zone limit and for the maximum levelling speed specified above.

7.6 CONTROL CIRCUIT CONTACTS

The contacts of car doors and those controlling locking of landing doors are to be by positive separation of the circuit-breaking devices.

The action of safety contacts is to prevent car movement when landing doors are not closed and locked, even if one or more accidental earth contacts occur. If the safety contacts are bipolar, they are to break the two branches of the control circuit of the lifting machine and of the brake contactors; if safety contacts are unipolar, they are to break one branch of the control circuit of the lifting machine and brake contactors, and the other branch is to be earthed.

7.7 CAR UNLOCKING AND EMERGENCY MANOEUVRE

Lifts are to be provided with an arrangement, independent of the lift machine, for unlocking the car in the event of the car stopping in an intermediate position between landings.

All landing doors are to be capable of being opened, independently of the locking and operating system, with a special key given to a specially entrusted person.

The car door is to be capable of being opened from outside, independently of the operating system, when the car is brought in way of the above-mentioned landing doors.

The possibility of starting the car movement is to be excluded even when opening of the landing doors is carried out by means of the above-mentioned special key.

7.8 INDICATING DEVICES

In the case of lifts installed within an enclosed well, when the car is not clearly visible from landings, a device is to be installed signalling, at each landing served by the lift, whether the car is in way of the landing door, if such door is manually operated.

7.9 OPERATING DEVICES

Lift control from outside of the car is to be automatically prevented when the car is occupied, unless a special collective type operating system is foreseen.

7.10 OUT-OF-ORDER LIFTS

In the case of lifts being put out of service for safety reasons, it is to be checked that none of the landing doors can be accidentally opened.

7.11 STOPPING DEVICE AND ALARM SIGNAL

Machinery rooms are to have a general stopping device for each lift to cut off the power supply to the lift on all active conductors. This device is to be capable of cutting off the highest current foreseen for the normal operation of the lift.

For the purpose of obtaining emergency assistance from the outside, the car is to be fitted with a suitable alarm device which is readily identifiable and accessible. This device is to be powered either from the emergency lighting power source or from another source with equivalent characteristics. The alarm is to enable two-way verbal communication and permanent contact with a centralised emergency call out service (see also 9.4).

7.12 RE-ACTIVATION OF LIFT SERVICE

When the lift is out of service, means of access to the well are to be locked.

Re-activation of the installation, after a stop due to any reason whatsoever, is only to be possible by means of intervention by qualified lift service personnel. ~~The above does not apply in the case of stopping caused by a «stop» button within the car~~.

7.13 END OF TRAVEL SAFETY DEVICES

End of travel safety devices are to be fitted, and to be independent and capable of tripping as near as possible to the terminal stopping levels and before the car and counterweight strike the buffers.

7.14 SAFETY DEVICES IN CASE AN OBJECT IS MET DURING DOWNWARD MOTION OF THE CAR OR COUNTERWEIGHT

(a) Positive drive lifts

Positive drive lifts are to be fitted with a device switching off power for lift drive and causing the stopping of the lift motor in the event of slackening of a cable or chain consequent to meeting an object during downward motion of the car or counterweight.

(b) Traction drive lifts and hydraulic lifts

Traction drive and hydraulic lifts are to be fitted with a device causing the stopping of the lift motor and keeping it stationary when:

- the motor does not start after an order;
- the downward motion of the car or counterweight is stopped by an object causing the slipping of cables on sheaves (for traction drive lifts only).

The above-mentioned device is to trip within a time not exceeding the lesser of the two following values:

1) 45 s,
2) the time necessary for complete travel, increased by 10 s, with a minimum of 20 s, if the travel time is less than 10 s.

The above-mentioned device is not to affect car movement during inspection manoeuvres, or during the emergency electrical manoeuvre, if any.

7.15 BRAKING SYSTEM

7.15.1 General provisions

Electric lifts are to be provided with a braking system which operates automatically both in the event of loss of the main power supply and in the event of loss of the power supply for emergency operation.

The braking system is to have an electro-mechanical brake (friction type); other (e.g. electric) means may only be accepted as additional brakes.

7.15.2 Electro-mechanical brake

The electro-mechanical brake on its own is to be capable of stopping the machine when the car is travelling at its rated speed and with the rated load increased by 25%.

In any operating condition, the tripping of the brake is not to cause a retardation of the car exceeding that resulting from operation of the safety gear or from striking the buffers.

All mechanical components of the brake which contribute to the braking action on the brake drum or disc are to be installed in duplicate and are to be of such dimensions that, when one of these components does not operate on the brake drum or disc, a sufficient braking action is exerted to retard the travel of the car loaded with the rated load.

The component on which the brake operates is to be directly ~~and~~ or mechanically coupled to the traction sheave (or drum, or sprocket).

To hold off the brake, in normal operation, a continuous flow of current is required. The interruption of this current is to be effected by at least two independent electrical devices, whether or not they are integral with those which cause interruption of the current feeding the lift machine.

If, when the lift is stationary, one of the contactors has not opened the main contacts, further movement is to be prevented, at the latest at the next change in the direction of motion.

When the motor of the lift is able to function as a generator, it is not to be possible for the electrical device operating the brake to be fed by the driving motor.

Braking is to become effective without supplementary delay after opening of the brake release circuit (the use of a diode or capacitor connected directly to the terminals of the brake coil is not considered a means of delay).

Any machine fitted with a manual emergency operating device is to be capable of having the brake released by hand and to require a constant effort to keep the brake open.

The brake shoe pressure is to be exerted by guided compression springs or weights.

Braking is to be effected by application on the brake drum or disc of at least two shoes, pads or callipers.

Band brakes are prohibited.

Brake linings are to be incombustible.

8.1 GENERAL

The design of machinery is the responsibility of the Designer, as stated in 1.1.1 of Chapter 1.

Machinery is, as far as possible, to comply with recognised standards, to be constructed according to good marine practice and to be designed taking into account the additional loads due to use on board ships.

8.2 DRIVE OF THE CAR AND THE COUNTERWEIGHT

8.2.1 Electric lifts

The drive of the car and the counterweight is to be made:

a) by traction, by use of sheaves and cables;

b) by positive drive if the rated speed does not exceed 0,63 m/s, i.e.:

   (1) either by use of a drum and cables, without counterweight; or

   (2) by use of sprockets and chains.

The calculations of the driving elements are to take into account the possibility of the counterweight or the car resting on their buffers.

Use may be made of belts for coupling the motor or motors to the component on which the electro-mechanical brake operates. A minimum of two belts are to be used.

In the case of use of overhung sheaves or sprockets, necessary arrangements are to be adopted to prevent cables/chains from leaving the pulleys/sprockets, or the introduction of foreign objects between cables/chains and pulleys/sprockets, where machinery is not situated above the well.

The above-mentioned arrangements are not to hinder examination and maintenance operations for pulleys and sprockets.

8.2.2 Hydraulic lifts

The following two methods of operation are permitted:

1) direct acting;

2) indirect acting.

If, in order to raise the lift car, several cylinder-ram units are used, they are to be hydraulically interconnected to ensure that the pressure is evenly distributed.

9.1 GENERAL

Electrical installations of lifts are to comply, as far as applicable, with the following ~~Safety~~ rules for the construction and installation of lifts: ~~and service lifts - Electric lifts (UNI EN 81-1) and Hydraulic lifts (EN 81-2), and~~

- *Lift for transport of persons and goods – Passenger and goods passenger lifts* (UNI EN 81-20) and
- *Examinations and tests – Design rules, calculations, examinations and tests of lift components* (UNI EN 81-50).

~~t~~This is to result from a statement by the Manufacturer, who is to have a Quality System recognised as suitable by Tasneef. In addition to the above, the requirements contained in the following parts of Chapter 9 are to be complied with.

9.2 ELECTRICAL DEVICES

Electrical devices are to comply with the relevant requirements of IEC standards and with IEC Publication 60092 series concerning electrical installations on board ships.

The electronic components for control, protection and alarm are to be constructed to withstand type tests required in IEC Publication 60092-504; a Statement issued by the Manufacturer may be accepted for this purpose.

9.3 SUPPLY CIRCUITS

Supply circuits are not to be automatically disconnected by means of the progressive disconnection system of non-essential users.

9.4 MEANS OF COMMUNICATION

In all passenger lift cars, a telephone or other means of intercommunication is to be permanently installed, and to always be connected to a permanently attended zone. Such means is to be operable even in the event of loss of the main electrical power supply.

9.5 EMERGENCY POWER SUPPLY

In passenger lifts, the installation is to be operable with the emergency power supply for the time necessary to permit the car to reach the nearest landing to allow passengers to exit.

9.6 ALARM DEVICE

In all cars, an alarm device is to be foreseen, to give an optical and acoustic signal in a permanently attended zone. The alarm is to be supplied by the emergency power source or by a dedicated independent power source.

9.7 EMERGENCY LIGHTING

The car, the well and the machine room are to be lighted by emergency lighting, supplied by the emergency power source, which operates automatically in the event of loss of the main power supply.

9.8 ELECTRICAL SAFETY DEVICES

Installations in proximity of or within dangerous spaces, for example pump rooms, will be subject to special consideration by Tasneef, as far as the choice of electrical safety devices is concerned.

9.9 OPENING OF THE EMERGENCY ESCAPE HATCH

Opening of the emergency hatch for escape onto the roof of the car is to trigger the interruption of the safety circuit and is to consequently stop the car. The safety circuit is to remain interrupted until the hatch is closed again. Re-activation of service is only to be possible after manual and intentional restoring of the circuit.

9.10 OPENING OF ESCAPE HATCHES TO THE WELL

Opening of escape hatches to the well is to trigger the interruption of the safety circuit, which is to remain interrupted until the hatch is closed again. Re-activation of service is only to be possible after manual and intentional restoring of the circuit.

9.11 INSTALLATION OF ELECTRICAL CABLES IN THE WELL

Only the electrical cables of the lift are to be installed in the well. The cables are to be protected against mechanical damage. Such protection may be obtained by means of a metal duct, without internal roughness, of such width as to allow passage of the freely suspended bend of mobile cables; the duct is to be provided with an opening with rounded edges for passage of the cable from the car.

Cap. 10 – MATERIALS AND WELDED CONNECTIONS FOR LIFTS

10.1 GENERAL

For construction, materials complying with standards or regulations recognised by Tasneef are to be used; such materials are, in general, to satisfy the requirements and prescriptions relevant to testing laid down in Part D of the Tasneef Rules for ships.

Welded connections are to be carried out in compliance with the requirements of Part B of the Tasneef Rules for ships.

11.1 TESTS TO BE CARRIED OUT AT THE FIRST SURVEY

11.1.1 Electric lifts

After installation, and after any important repair which may affect the safety and strength of the arrangement, following a check of compliance with the plans, the lift is to be subjected, as far as applicable, to the tests and inspections mentioned in ~~Appendix D to Standard EN 81-1~~ Standard EN 81-20, item 6.3 and in particular:

(a) Measurement of the insulation resistance of electric circuits and check of electrical continuity and earthing;

(b) Static test: the car, stationary at its lowest position, is to be subjected to an overload corresponding to 50% in excess of the rated load for at least 10 min;

(c) Test of stopping gear: brakes are to be capable of withstanding an overload of 25%;

(d) Check of grip, by means of the following:

(1) several stops are to be made, with the maximum braking force compatible with the installation, each time making a complete stop of the car.

Stops are to be made:

- in upward motion, with empty car, in the upper part of travel;
- in downward motion, with car loaded with 125% of the rated load; in the lower part of travel;

(2) it is to be ascertained that the empty car cannot be displaced in upward motion when the counterweight rests on its compressed buffers;

(3) the compliance of the ~~compensation~~ balance with the value specified by the lift Manufacturer is to be checked. Such check may be performed by means of the measurement of amperage along with:

- speed measurement, for alternating current motors;
- voltage measurement, for direct current motors.

(e) Car safety gear test: the test is to be performed in downward motion, with held off brake, with rotating winch until slipping or slackening of cables occurs, and in the following conditions:

(1) in the case of instantaneous safety gear or instantaneous safety gear with buffered effect, the car rated load is to be evenly distributed and the grip is to occur at the service speed;

(2) in the case of progressive safety gear, the car is to be loaded with 125% of the rated load evenly distributed, and grip may be effected at reduced speed, e.g. at the self-levelling speed. In order to facilitate the unlocking of the safety gear, it is recommended that the test should be performed in front of a landing door, in order to unload the car.

(f) Counterweight safety gear test:

(1) in the case of instantaneous safety gear or instantaneous safety gear with buffered effect, the counterweight safety gear which is tripped by an overspeed governor is to be tested in the same conditions foreseen for the car safety gear without any load in the car;

(2) the counterweight progressive safety gear which is not tripped by an overspeed governor is to be tested with empty car at the rated speed or a lower speed. After the grip, no failure is to occur which may affect the normal use of the lift (exceptionally, if necessary, all gripping components may be replaced).

(g) Dynamic test (to be carried out subject to the positive outcome of the test under (f)), consisting of the working test with an overload of 10% in respect of the rated load

(h) Working test at the design load, with check of satisfactory tripping of all governing and safety devices (locking devices, electrical safety devices, end of travel safety devices, overspeed governors, alarm devices, etc);

(i) Buffer test:

(1) in the case of energy accumulation buffers, the test is to be carried out as follows: the car loaded with the rated load is to rest on the buffer or buffers; then, cable slackening is to be caused and it is to be checked that the deflection corresponds to that resulting from the characteristic curve;

(2) in the case of energy accumulation buffers with buffered return movement and energy dissipation buffers, the test is to be carried out as follows: the car loaded with the rated load or the counterweight is to be brought into contact with their buffers, at the rated speed, or at the speed for which the buffer stroke has been calculated, in the case of use of reduced stroke buffers with check of retardation. At the end of the test, no failure is to result which might affect the normal use of the lift.

11.1.2 Hydraulic lifts

As far as they are applicable in addition to the tests and inspections listed above, this type of lift is to be subjected to those stated in Standard EN 81-20, item 6.3 ~~Appendix D to Standard EN 81-2~~ and in particular:

a) check of stopping of the ram with buffered effect;

b) measurement of maximum pressure;

c) check of the correct calibration of the overpressure valve;

d) check of the stop valve;

e) check of the clamp device;

f) check of the cleat device:

- dynamic test,
- visual examination,
- check of the stroke of the buffers,

g) check of the control valve;

h) pressure test;

i) slow descent test.

At the discretion of Tasneef, the tests mentioned in item 11.1.1 (c), (d), (e), (f), (h) and (i) and in item 11.1.2 (a), (b), (c), (d), (e), (f), (g) and (i) may be carried out directly by the firm performing the installation and certified by the appointed Tasneef Surveyor.

11.2 TESTS TO BE CARRIED OUT AT PERIODICAL SURVEYS

11.2.1

Every five years, for the purpose of the renewal of the Qualification Certificate, lifts are to be subjected to the tests mentioned in 11.1.

11.2.2

Lifts are to be surveyed annually for the purpose of ascertaining the satisfactory condition of all components and the correct operation of the devices.

In particular:

(a) it is to be ascertained that the arrangement of suspensions corresponds to that indicated in the plans and that plates are affixed with the correct indication of lift performance;

(b) a careful examination is to be carried out of all mobile components, with disassembly, if necessary, at the discretion of the appointed Tasneef Surveyor, the extent of which will depend on the degree of maintenance of the installation as a whole;

(c) the tripping of safety devices connected to operation of car and landing doors, and of overspeed devices is to be checked, and the operation of brakes and, in general, of all the above-mentioned devices is to be verified;

(d) the condition of the well in respect of its integrity, fire resistance and ventilation is to be checked;

(e) the integrity of all fixed bearing components and guide rail components is to be checked;

(f) the practicability of the means of escape and the efficiency of emergency devices are to be checked;

(g) the overload brake test and the lift working test are to be carried out, if deemed necessary, depending on the checks carried out.

At the discretion of Tasneef, the checks mentioned in (a) and (c) may be:

- carried out directly by the Manufacturer of the installation or by the competent person responsible for maintenance (either authorised by the above-mentioned Manufacturer or approved service supplier or appointed by the owner); and
- certified by the appointed Tasneef Surveyor, also at times other than when the latter performs the other inspections required.

Such checks may also be performed outside the six-month survey window foreseen for the annual survey. In any event, the competent person in charge is to leave on board the relevant record, which will be verified and collected by the Tasneef Surveyor appointed to conduct the next round of checks.

Cap. 12 – CERTIFICATION OF ESCALATORS

12.1 APPLICABLE STANDARDS

For the purpose of the issue of the voluntary Qualification Certificate, installations are to comply with the requirements in these Rules and, as far as applicable, those in Standard EN 115 “Safety rules for the construction and installation of escalators and passenger conveyors”, together with the design criteria laid down in items 2.3 and 2.5 of Chapter 2.

12.2 REQUIRED DOCUMENTS

12.2.1

The following documents are to be submitted to Tasneef in triplicate for approval:

- plan of the layout of the escalator, with specification of its location on board the ship;
- drawings of the escalator truss;
- drawing of the intermediate support, if any.

12.2.2

For information purposes, one copy of the design calculations, is to be submitted to Tasneef with specification of the characteristics of materials employed and all elements needed to verify that the components of the plant and the proposed installation are in compliance with these Rules, specifically:

- calculation of the truss (or the model of reference with the limits of application);
- technical characteristics;
- list of safety contacts;
- calculation of step chain and main chain;
- calculation of brake and braking distance;
- chain resistance certificate;
- step test certificate;
- certificate for glass in the balustrade, if any;
- test certificate for electrical panel of operation issued by the Manufacturer with specification of the tests performed in accordance with the provisions of the Tasneef Rules for ships.

12.3 SAFETY DEVICES AND MACHINERY

The safety devices and machinery are to be provided with test certificates issued, respectively, by a suitable testing laboratory and by the Manufacturer, the latter being responsible for the construction of the machinery.

Safety equipment is to be suitable for use in a marine environment.

12.4 ELECTRICAL SYSTEM

The relevant criteria, as far as applicable, are those in Chapter 9 as well as those in Part C, Ch 2 of the Rules.

However, as far as concerns the electrical panel of operation, internal workshop certificates may be accepted.

12.5 MATERIALS AND WELDED CONNECTIONS

The materials and welded connections used for the construction of escalators are to be in accordance with the relevant internal workshop certificates provided that the latter conform to standards or requirements recognised by Tasneef.

12.6 TESTS AND INSPECTIONS ON BOARD

The tests and inspections to be performed upon installation on board are those laid down in Paragraph 15 of the foregoing Standard EN 115 for assemblies ashore.

12.7 CERTIFICATION

Subject to the satisfactory outcome of the tests and inspections referred to above, Tasneef will issue a Qualification Certificate.

At the request of the Interested Party, the Certificate will make specific mention of the installation’s compliance with Standard EN 115.