

Part III Checklist

3.1 BS EN 1808 checklist

Clause	Requirement	Result
5	Safety requirements and/or measures	
	The SAE shall meet the requirements detailed in clauses 6 to 14. In addition, machines shall comply, as appropriate, with EN 292-1 and EN 292-2 for hazards which are not covered by this standard	Pass. It is in compliance with the requirement.
6	Structural & stability and mechanical calculations	
	6.1 General	
	The calculations shall be carried out in accordance with the accepted calculation codes and engineering practices including if necessary the effect of the elastic deformations. All failure modes of the material shall be considered including fatigue and wear.	Pass. The calculation has been carried out in compliance with the requirement.
	In the absence of a harmonized standard, relevant FEM rules for the method of calculation of lifting equipment are referred to. The load cases are specified in this standard: FEM 9.511 Classification of mechanisms; FEM 9.341 Local girder stresses; FEM 1.001, booklet 2. Classification and loading on structures and mechanisms; FEM 1.001, booklet 3. Calculating the stresses in structures; FEM 1.001, booklet 4. Checking for fatigue and choice of mechanism components.	Pass.
	The design calculations shall be carried out in accordance with the permissible stress method and if the limit state method is used it shall result in the same level of safe	Pass. The design calculations is carried out in accordance with the permissible stress method
6.2	Safety margin allowed within the calculation	
6.2.1	Calculating the stresses in structures See also FEM 1.001 booklet 3.	
	For the three load cases defined in 'Table 2, the calculation of the different members is set out, allowing a safety margin for the critical stresses, taking the three failure modes into account: - yield strength exceeded, - critical load for buckling exceeded; - fatigue limit exceeded.	Pass.
6.2.1.1	Type of steel for which the ratio between the	Pass.

	elastic yield limit σ_E and the breaking limit σ_R is less than 0,7 (where the result is higher than 0,7 refer to FEM 1.001 booklet 2).	
	The calculated stress must not exceed the allowable stress σ_a , obtained by dividing σ_E by a coefficient depending on the load cases set out in table 2 except as otherwise indicated in the standard.	Pass. See the design calculation.
6.2. 1.2	Checks against fatigue	
	For structures subject to fatigue, the conventional number of cycles and load spectrum to take into account are set out in table 3.	Pass.
6.2.2	Calculating the stress in mechanisms Mechanical parts are calculated by checking that they have a sufficient safety margin compared to the failure modes arising from breaking, buckling, fatigue and wear.	Pass. See the design calculation.
6.2.2.1	Check against breaking	
	Verifying the mechanical parts against breaking are carried out by checking that the calculated stress does not exceed the allowable stress taking into account the breaking stress of the material used. The value of the allowable stress σ_a is given in the following formula: $\sigma_a = \sigma_R / V_R$	Pass. See the design calculation.
6.2.2.2	Checks against fatigue and wear	
	For mechanical parts subject to fatigue, the conventional number of cycles and load spectrum to take into account are set out in table 5.	Pass.
6.3	Design loads and forces	
6.3.1	General	
	The rated load (RL) of the platform and the maximum number of persons on the platform are to be stated by the manufacturer.	Pass. The rated load of the platform ZLP100 is 100kg, and that of the platform ZLP 200 is 200kg, ZLP300 300kg, ZLP500 500kg, ZLP630 630kg, ZLP800 800kg, ZLP1000 1000kg. The maximum number of persons on the platform is 2.
	Since TSPs are modular equipment the WLL of the suspension rig and its accessories shall be equal to or greater than the WLL of the hoist(s) which shall be equal to or greater than the reactions transmitted by the suspended platform. There shall be compatibility between the WLL of the hoist(s) and the loading range of the platform. NOTE For purposes of calculations of SAE covered by this	Pass.

	standard it is considered that a mass of 1kg produces a force of 10N.	
6.3.2	Rated load on the platform	
6.3.2.1	Platform for one person: $RL = M_p + M_e + M_m$ (1) Platform for two or more persons: $RL = (n \times M_p) + (2 \times M_e) + M_m$ (2) where: $M_p = 80 \text{ kg}$ and $M_e = 40 \text{ kg}$. NOTE 1 Only two persons are considered for M_e . NOTE 2 The calculation for the RL applies to all types of platform found in this standard.	Pass. See the design calculation for detail.
6.3.2.2	The minimum load capacity of the deck (RF) shall be 200 kg/m ² . The deck shall withstand a load of 100 kg, distributed over an area of (0,2 X 0,2)m.	Pass. See the design calculation for detail.
	6.3.2.3 The RL is calculated according to equation (1) or (2) and distributed over a surface S_a , located on a length T: $S_a = \frac{RL}{RF}$ (3) $T = \frac{RL}{B \times RF}$ (4)	Pass.
6.3.2.4	Single point suspended platform/chair The minimum RL shall be 120 kg.	Not applicable
6.3.2.5	Two point suspended platform	
6.3.2.5.1	To prove the strength of the platform, the RL, distributed over a length shall be applied in the most unfavourable position.	Pass.
6.3.2.5.2	If a two point suspended platform extends beyond an anchor point, a stability coefficient against overturning if _{2,0} shall be applied in the platform design to provide adequate stability, where the load is located on the cantilevered section. Calculation for example in Figure 6: $SWPXLp_i \geq 2 \times WLp_o$ (5) $W = S_a \times RF \leq RL$ (6) where: W shall be not less than 120 kg.	Pass. See the design calculation for detail.
6.3.2.6	Multi-point suspended platform and hinged continuous platform	Not applicable
6.3.2.6.1	The RL is calculated according to equation (1) or (2) and distributed over a surface S_a , as shown in Figure 5.	Not applicable
6.3.2.6.2	For a wide work platform where $T < B$ as shown in Figure 7, S_a is a square area with a side dimension equal to: $T = \sqrt{\frac{RL}{RF}}$ (7)	Not applicable
6.3.2.6.3	For a hinged continuous platform the RL shall be located in the most unfavourable position. An	Not applicable

	example is shown in Figure 8.	
6.3.3	Wind loads	
	All SAE intended to be used outside with personnel and material on board shall be regarded as being affected by wind at a pressure in accordance with Table 6.	Pass. See the design calculation for detail.
6.3.3.1	The full area of one person is 0,7 m ² with the centre of area 1,0 m above the platform floor.	Pass.
6.3.3.2	The exposed area of one person standing on a work platform behind an imperforate section of fencing 1 m high is 0,35 m ² with the centre of area 1,45 m above the platform floor.	Pass.
	The assumed exposed surface area of material on the platform is 2 m ² .	Pass.
6.3.3.3	Wind loads are assumed to act horizontally at the centre of the area of the different parts of a SAE.	Pass.
6.3.3.4	The wind load acting on the platform shall be considered as acting on the suspension points.	Pass.
6.3.3.5	For BMU, an additional calculation is needed for storm wind forces, with the machinery in the parked position.	Not applicable.
6.3.3.6	Calculations shall be made to demonstrate that a suspension rig cannot be moved by wind forces. whether in service or in the parked position. This check is done by assuming a friction coefficient of the wheels with the brakes not applied equal to wheels with the brake applied equal to 0,14 and a movement resistance with the brakes not applied equal to 10 N/kN for wheels with bearings and to 15 N/kN for wheels with bushes. When the trolley can be moved by wind forces, an anchoring device shall be provided. For the calculation of the clamps, a friction coefficient between the clamp and the rail is equal to 0,25.	Pass. See the design calculation for detail.
6.3.4	Forces exerted by persons	
6.3.4.1	The minimum value for the forces exerted by persons on the guard rails or top edge of a rigid side is assumed to be 200 N for each of the first two persons on the platform and 100 N for each additional person acting in the horizontal direction at 500 mm intervals.	Pass. 2x200 N
6.3.4.2	The guard-rail or top edge of a rigid side shall be able to resist without permanent deflection a vertical load of 1 kN located in the most unfavourable position.	Pass.
6.3.4.3	A platform surrounded by open meshed or sheeted sides shall not fracture when a point load of 200 N is applied at any location.	Not applicable.
6.4	Platform structural calculation	
	The strength of the platform is to be proven by calculation for the load cases expressed below:	Pass. See the design calculation for detail.

	<p>Load case 1: 1,25 X (RL + SW), see 6.3.2 + 1,25 X wind loads in operation, see 6.3.3 + 1,25 X forces exerted by persons, see 6.3.4</p> <p>Load case 2: 1,5RL + SW</p> <p>Load case 3: e.g. triggering of the fall arrest device 2,5 X (RL + SW) e.g. collision of the platform with an obstruction during lifting (see Figure 9) or lowering (see Figure 10)</p>	
6.5	Calculation for suspension rig	
6.5.1	General	
6.5.2	Calculation for trolley unit with roof mounted hoist(s)	Not applicable
6.5.3	Calculation for suspension rig working in Conjunction with platform mounted hoist(s)	
6.5.3	Structural calculation	
6.5.3.1.1	The strength is to be proven for the load cases expressed in table 10.	Pass. See the design calculation for detail.
6.5.3.1.2	Taking due account of their intended use, all parts of temporary suspension rig shall be capable of being reused and re-erected and must be designed so as to prevent failure from fatigue or wear. Due regard shall be even to any additional stresses which may be induced in assembly, dismantling, transportation and storage.	Pass. It is in compliance with the requirement.
6.5.3.2	Strength of davit mechanical anchor	
	<p>This chapter applies to davits which are anchored to the roof. The load on the anchors shall be calculated for the following case, where R_v is the ultimate force to which the anchors shall resist.</p> $R_v \times L_s = C_{wr} \times WLL \times L_O + SWR \times L_b$ <p>where: C_{wr} is equal to or greater than 3.</p>	Not applicable
6.5.3.3	Calculation for parapet clamp	
	<p>A parapet clamp is regarded as having adequate strength if the clamp withstands the forces imposed in equation (12). Equations (12) and (13) set out the requirements to check that the strength of the parapet is adequate.</p> $R_h \times L_s = C_{wr} \times WLL \times L_o + SWR \times L_b \quad (12)$ $R_v = C_{wr} \times WLL + SWR \quad (13)$ <p>where: C_{wr} is equal to or greater than 3.</p>	Not applicable
6.5.3.4	Monorail support anchors	
	The load on the anchor shall be calculated for the following case, where R_h and F_s are the ultimate forces to which the	Not applicable

	<p>anchors shall resist.</p> $R_h \times L_s = C_{wr} \times WLL \times L_o + SWR \times L_b \quad (14)$ $FS = C_{wr} \times WLL + SWR \quad (15)$ <p>Where: C_{wr} is equal to or greater than 3.</p>	
6.5.3.5	Stability calculation for counterweighted suspension beam	
	<p>A suspension beam is regarded as adequately stable if, referring to the most unfavourable fulcrum, the stability moment is equal to or greater than three times the overturning moment when the WLL of the hoist is considered as the maximum force in the wire rope.</p> <p>The stability is to be proven by calculation for the following case.</p> $C_{wr} \times WLL \times L_o \leq M_w \times L_i + SWR \times L_b \quad (16)$ <p>Where: C_{wr} is equal to or greater than 3.</p> <p>The fulcrum is the connecting line between the ground contact points of the front supports.</p>	<p>Pass.</p> <p>See the design calculation for detail.</p>
6.5.3.6	Secondary wire rope anchor on rigid structures	
	<p>When secondary wire rope anchor points are attached to a structure having a high rigidity (concrete or metallic structures) the stresses within the anchor points, the SAE and the structure itself must not exceed the yield limit of the material when calculating for the stresses imposed by force equal to:</p> <p>S_d is the actual value according to test B.1.4.</p> <p>If S_d is not higher than 3, no additional requirements apply.</p> <p>If S_d is higher than 3, and lower than 5, it is necessary to incorporate a shock absorber which limits S_d 5.3.</p>	Not applicable
6.6	Calculation for steel wire rope	
	These requirements apply to all suspension and secondary steel wire ropes involved directly or indirectly in supporting the platform.	Pass.
6.6.1	<p>The calculated coefficient Z_p of a steel wire rope is as follows:</p> $Z_p = F_o / S \quad (18)$ <p>where: Z_p is equal to or greater than 8 for a single active rope suspension system; Z_p is equal to or greater than 12 per rope for a double active rope suspension system.</p>	Pass.
6.6.2	Force S in the rope is defined below.	
6.6.2.1	Roof mounted hoist with double active rope suspension system	
	S is equal to the total self-weight of the platform, plus the RL	Not applicable.

	permitted on the platform and placed on the area Sa located in the most unfavourable position, (see 6.3.2 for calculation of RL and Sa), divided by the number of steel wire ropes or falls on the most loaded suspension point. See load in position +) in Figure 7 and in Figure 8.	
6.6.2.2	Platform mounted hoist	
	S is equal to the WLL of the hoist divided by the number (Nr) of steel wire ropes used in that hoist carrying the suspended load. $s=WLL/Nr$ (19)	Pass. See the design calculation for detail.
6.6.3	Rope terminations	
	Rope terminations shall resist not less than 80 % of the minimum guaranteed breaking load of the rope.	Pass. It is in compliance with the requirement.
6.7	Calculation for restraint system	
	The mullion guide and anchor points shall be adequately attached to the building and capable of withstanding the operational and wind loads imposed upon them with the platform in any position. The members linking the platform to the mullions or anchor points shall be capable of withstanding the operational and wind loads imposed upon them. For the calculation, the minimum value of the effort applied to the restraint system shall be 1 kN.	Pass.
6.8	Working coefficient of chain	
	The working coefficient for chain including chain termination shall be at least 8.	Pass. See the design calculation for detail.
7	Suspended platform	
7.1	Requirements for the platform	
7.1.1	The dimensions shall be sufficient for the number of persons allowed on the platform, and allow for small tools and materials. The lowest crossing dimension on the platform shall be not less than 0,5 m. The working surface shall be at least 0,25 m ² per person.	Pass. It is in compliance with the requirement.
7.1.2	The decking of the platform shall have a sound, slip resistant surface (e.g. latticed or chequer plate). It shall be fixed so that removal shall only be possible by intentional intervention.	Pass.
7.1.3	Any openings in the decking shall be dimensioned so as to prevent the passage of a sphere of 15mm in diameter. Adequate provision shall be made for drainage.	Not applicable.
7.1.4	Guard-rails, intermediate guard-rails and Toe-guards shall be fitted to the perimeter of the platform. The guard-rail height shall be not less than 1 000 mm measured from the upper side of the rail to the surface of the platform decking. The distance between the intermediate guard-rails and either guard-rails and toe-guards shall not exceed 500 mm.	Pass. Guard-rails, intermediate guard-rails and Toe-guards are fitted and in conformity with the requirement.
7.1.5	Toe-guards shall be not less than 150 mm above the surface of	Pass.

	the platform decking.	It is in compliance with the requirement.
7.1.6	Components shall not have sharp edges or angles or protruding parts that may cause injury.	Pass. It is in compliance with the requirement.
7.2	Modular platform	
7.2.1	Component parts shall be designed to ensure that incorrect assembly is not possible and fixing bolts, etc. shall be clearly visible without any dismantling.	Pass.
7.2.2	Components which form joints shall be designed to withstand the stresses they will have to support during use and repeated assembly and disassembly. Once assembled, it shall only be possible to dismantle the connections by intentional intervention.	Pass.
7.2.3	Small parts such as anchor pins and retaining clips shall be attached together by a permanent linking connection.	Pass.
7.3	BMTJ platform	Not applicable
7.4	Platform gates	
7.4.1	Access gates shall not open outwards.	
7.4.2	Access gates shall be constructed to return automatically to the closed and fastened position or shall be interlocked to prevent operation of the SAE until they are closed and fastened. Opening of the access gate shall require intentional intervention	Not applicable. There is no platform gate.
7.5	Multi-deck platforms	Not applicable
7.6	Suspended chair	Not applicable
7.7	Restraint systems	
7.7.1	General	
	For BMUs intended to be used in areas affected by wind where the lifting height is over 40 m, a restraint system shall be used. Where restraint systems are in use, any risk of the trolley traversing, the jib luffing or telescoping shall be prevented in a safe manner, e.g. an electrical interlock system.	Not applicable
	For TSPs with a lifting height over 40 m and intended to be used on locations exposed to wind speed above 14 m/s adequate restraint shall be provided.	Not applicable. Use with the wind speed over 14m/s is prohibited.
7.7.2	Mullion guide systems	Not applicable
7.7.3	Suspension wire rope restraint systems	Not applicable
7.8	Stabilizing device for the platform	
	The platform shall be provided with facade protection resting against the facade, which may take the form of buffer rollers or ship. (See Figure 3.) They have two functions: - to prevent the platform from spinning and	Pass. The stabilizing device is provided.

	excessive swaying - to prevent damage to the facade of the building.	
7.9	Platform working on an incline	Not applicable
8	Hoist, secondary device, pulley and wire rope	
8.1	General	
8.1.1	Minimum pitch diameter on pulleys, drums and traction sheaves is defined by the following equation: $D \geq H \times d \quad (20)$ where: H ≥ 20 for power operated hoist; H ≥ 18 for manual operated hoist. For pulleys only the minimum pitch ratio shall be equal to 10 for an unloaded wire rope, or when the deflection angle is less than 5°.	Pass.
8.1.2	Rated speed.	
	The rated speed shall not exceed 0,3 m/s	Pass. The rated speed is less than 0.3m/s.
8.1.3	Mechanical transmission	
	The mechanical transmission between motor, brake, gear box, drum and/or traction system shall be of the positive type and shall not depend upon frictional forces for its operation.	Pass.
8.1.4	Moving parts	
	Any moving parts of the hoist shall be guarded. For guidance, refer to EN 294.	Pass. It is in compliance with the requirement.
8.1.5	Wire rope guides	
	The hoisting system shall be designed so that the wire ropes are guided through the hoist(s), secondary device(s) and pulley(s) to prevent the wire ropes leaving their intended position	Pass. It is in compliance with the requirement.
8.1.6	Service brake	
8.1.6.1	A hoist shall be provided with a service brake, which operates automatically in the event of: - interruption of manual force applied to the crank or lever; - loss of the mains power supply; - loss of the power supply to control circuits.	Pass. It is in compliance with the requirement.
8.1.6.2	An irreversible gear box is not regarded as a brake	Pass.
8.1.6.3	The brake shall be capable of stopping the platform, travelling at rated speed and with 1,25 times the WLL within a distance of 10 cm.	Pass. It is in compliance with the requirement. See the test report.
8.1.6.4	The material used for brake linings shall not be flammable.	Pass.
8.1.6.5	Brake blocks and linings shall be protected by a cover against ingress of lubricants, water, dust or other	Pass. It is in compliance with the

	contaminants.	requirement.
8.2	Manually operated hoist	Not applicable
8.3	Power operated hoists	
8.3.1	Prime mover	
8.3.1.1	A power operated hoist shall be designed to be poweroperated when lifting and lowering.	Pass.
8.3.1.2	The hoist shall be able to lift or lower at least a load equal to 125 % of its WLL.	Pass. It is in compliance with the requirement.
8.3.2	Electro-mechanical service brakes	
	In addition to 8.1.6 the following requirements apply	
8.3.2.1	In service conditions, a continuous flow of current shall be required to hold off the brake. The interruption of this current shall be effected by an independent electrical device. If the brake coils are fed by d.c. current, the independent electrical contact shall be installed on the dc. line.	Pass. It is in compliance with the requirement.
8.3.2.2	When the electric motor of the hoist is likely to function as a generator, it shall not be possible for the electric device operating the brake to be fed by the driving motor. Braking shall become effective within 0,3 s after opening of the brake release circuit.	Pass. It is in compliance with the requirement.
8.3.2.3	The action of the brake shall be exerted by compression springs. The springs shall be supported and shall not be stressed in excess of 80 % of the torsional elastic limit of the material. Band brakes are forbidden.	Pass. It is in compliance with the requirement.
8.3.3	Pneumatic and hydraulic mechanical service brakes	Not applicable
8.3.4	No-power descent	
8.3.4.1	The hoist shall have a manual& operated system which allows controlled descent of the platform in case of power failure.	Pass. There is a manually operated system on the hoist.
8.3.4.1.1	The manual descent shall have a "hold-to-run" action.	Pass. It is in compliance with the requirement.
8.3.4.1.2	In order to control the speed, a centrifugal governor may be used during no-power descent. The controlled descent speed shall be lower than the triggering speed of the secondary device.	Pass. It is in compliance with the requirement.
8.3.4.2	The no-power descent of the roof mounted hoisting mechanism with two independent drives shall be designed to ensure that any inclination of the platform is limited to 14 ⁰ .	Not applicable.
8.3.4.3	If the no-power descent system utilizes a manual crank, provision shall be made to prevent any part of the body being trapped or struck (e.g. solid hand wheel, electrical interlock, power cut-off if manual crank in use).	Pass.
8.3.5	Overload detection device	

8.3.5.1	SAE shall be provided with an overload detection device to avoid danger to persons and damage to machines as a result of overloading. This device shall detect the loads due to persons, equipment and materials on the platform.	Pass. It is in compliance with the requirement.
8.3.5.2	An overload device shall be fitted for each hoist.	Pass. An overload device is fitted for the hoist.
8.3.5.3	For in-service conditions, an overload shall be detected when the platform is lifted, lowered or stationary	Pass. It is in compliance with the requirement.
8.3.5.4	For BMU the overload device(s) shall be triggered at or before reaching a load of 1,25 times the RL of the platform.	Not applicable.
8.3.5.6	For TSP the overload device(s) shall be triggered at or before reaching a load of 1,25 times the WLL of the hoist(s).	Pass. It is in compliance with the requirement.
8.3.5.7	The overload indicator shall continuously, visually or audibly warn the operator(s) on the platform when the overload device(s) is/are activated.	Pass. It can audibly warn the operator(s) on the platform when the overload device(s) is/are activated.
8.3.5.8	The setting elements for the tripping limit of the overload device shall be protected against unauthorized adjustment.	Pass.
8.3.5.9	The overload device shall be designed to operate in such a way that the static and dynamic tests required by this standard are carried out.	Pass.
8.3.5.10	The overload device shall operate in the load range of up to 1,6 times the WLL of the hoist. The overload device shall withstand without permanent damage a static load of three times the WLL of the hoist.	Pass. See the test report for detail.
8.3.6	No load device	
	SAE with roof mounted hoist shall be provided with a device which stops lowering of the platform as soon as a no load situation occurs.	Pass.
8.3.7	End of rope switch for roof mounted hoist	
	End of rope limit switches are required to stop the platform when the minimum length of rope (specified in this standard, 8.4.4 and 8.6.2.3) is reached at the hoist mechanism.	Not applicable.
8.3.8	Maintaining the longitudinal position of the platform (anti-tilt device)	
	Hoisting mechanisms with two or more independent hoists shall be equipped with an automatic device to limit any inclination of the platform to 14° from the horizontal.	Pass.
8.3.8.1	Electrical anti-tilt device	
	When triggered, the electrical anti-tilt device shall: - on lifting, stop the upper hoist's motor - on lowering, stop the lower hoist's motor.	

8.3.8.2	Mechanical anti-tilt device	
	For SAE with platform mounted hoist(s) a solution is by fall arrest devices which limit automatically the incline of the platform to 14°. These devices are self-sufficient and do not require an electrical signal used in the safety related parts of the control system.	Pass. It is in compliance with the requirement.
8.3.9	Anticollision device	
	SAE shall be provided with an anti-collision device (see Figure 2) which stops lowering of the platform when an obstruction is encountered. This is achieved as follows. a) For BMU an anti-collision device shall be used. b) For TSP a device which engages automatically in case of no load condition and/or in case of inclination of the platform to 14" from the horizontal, and which is self-sufficient, not requiring an electrical signal used in the safety related parts of the control system, shall be used.	Pass. It is in compliance with the requirement.
8.3.10	Lifting and lowering limit switches	
8.3.10.1	Lifting limit switches shall be provided and positioned so that they automatically stop the platform at the highest level; initiation of stopping shall occur before contact with the ultimate lifting limit switches. Lifting limit switches are used in the control system of the SAE to lock or to allow suspension rig slewing, traversing, lifting, jib telescoping or slewing(see 7.7.1).	Pass. It is in compliance with the requirement.
8.3.10.2	Lowering limit switches shall be provided and positioned so that they automatically stop the platform at the lowest level. If the lowest level is ground level or a safe surface, an anti-collision device is regarded as a lowering limit switch. At the lowest level, initiation of stopping shall occur before contact with end of rope switches (see 8.3.7).	Pass. It is in compliance with the requirement.
8.3.10.3	Ultimate lifting limit switches shall be provided and positioned so that the platform will come to a complete stop before reaching the top of the suspension rig. After triggering no lifting or lowering shall be possible until corrective action has been taken by a competent person.	Pass. It is in compliance with the requirement.
8.3.10.4	Separately mounted control devices shall be used for the M g and Ultimate lifting limit switches.	Not applicable.
8.3.10.5	For TSP suspended from a stationary suspension rig, ultimate lifting limit switches are required. For platforms rigged from ground level, lowering limit switches are not required	Pass. It is in compliance with the requirement.
8.4	Drum hoist	Not applicable
8.5	Traction hoist	
8.5.1	Traction force	
	The hoist shall be designed to prevent any slipping or creeping of the wire rope in the traction system during lifting and lowering	Pass. It is in compliance with the

	a load of not less than 1,5 times the WLL (see also 8.9).	requirement.
	A traction hoist shall not use tail line tensioning to develop the necessary traction to lift and lower the load.	Pass. It is in compliance with the requirement.
8.5.2	Traction sheave grooving	
	Traction sheaves shall have grooves which have a standard of smoothness: $R_a = 6,3 \mu\text{m}$. The traction sheave of a hoist shall be designed to suit the type and diameter of the wire rope intended for use with the hoist.	Pass. It is in compliance with the requirement.
8.6	Powered wire rope winder	Not applicable
8.7	Twin capstan drum hoist	Not applicable
8.8	Jaw operated traction hoist	Not applicable
8.9	Secondary device	
	Rope suspension systems and secondary devices shall be installed to provide a coherent system to overcome the hazard of the platform falling. This requirement shall be fulfilled by one of the following:	
	a) a single active rope suspension system installed in conjunction with the fall arrest device which is able to hold the platform in case of failure of the suspension wire rope or the hoist;	Pass.
	b) a double active rope suspension system: in case of failure of one wire rope, the remaining wire rope shall be capable of holding the platform; in case of failure of the hoist, the secondary brake shall be capable of stopping and holding the platform.	
8.9.1	Fall arrest device	
8.9.1.1	The fall arrest device shall automatically engage in the event of a failure of the suspension wire rope, overspeed on lowering the platform ($>0,5 d s$), no load condition on the suspension wire rope or an incline of the platform to 14° .	Pass. It is in compliance with the requirement.
8.9.1.2	The fall arrest device shall be designed to limit the dynamic load coefficient to a value which is as low as possible. The values found in B.1.4 are to be considered as a maximum.	Pass. It is in compliance with the requirement.
8.9.1.3	The fall arrest device shall not be designed to stop the platform in service conditions.	Pass. It is in compliance with the requirement.
8.9.1.4	A fall arrest device shall be engaged mechanically.	Pass. It is in compliance with the requirement.
8.9.1.5	A fall arrest device shall be operational after resetting.	Pass. It is in compliance with the requirement.
8.9.1.6	It shall not be possible to release manually the fall arrest device	Pass.

	under load. However, when activated the fall arrest device shall allow the platform to be lifted by the hoist.	It is in compliance with the requirement.
8.9.2	Secondary brake	Not applicable
8.9.3	The maximum inclination of the platform deck shall be not more than 14°, after the platform has stopped due to the activation of the secondary device.	Pass.
8.9.4	Platform suspended by a single hoist	
	The secondary device shall engage automatically at a maximum speed of not more than 0,5 m/s .	Not applicable.
8.10	Rope pulleys	
8.10.1	Ropes shall be prevented from leaving the grooves.	Pass.
8.10.2	The distance between the edge of the pulleys and the protective components shall be not more than 0,3 times the rope diameter.	Pass. It is in compliance with the requirement.
8.10.3	Rope grooves on pulleys shall have groove radius of between 0,52 to 0,65 times nominal rope diameter.	Pass. It is in compliance with the requirement.
8.10.4	The opening angle of the rope pulleys shall be symmetrical and between 30° and 55°	Pass. It is in compliance with the requirement.
8.10.6	The depth of the grooves shall not be less than 1,4 times the rope diameter.	Pass. It is in compliance with the requirement.
8.10.7	The pulley groove shall have a smoothness of $Ra \leq 6,3\mu m$.	Pass.
8.10.8	The maximum angle of fleet shall not exceed 4° from centre line or shall be calculated in accordance with the geometry of the system.	Pass. It is in compliance with the requirement.
8.11	Wire rope	
8.11.1	General	
	The platform shall be suspended by steel wire ropes which shall be galvanized or offer a similar corrosion resistance.	Pass. It is in compliance with the requirement.
8.11.2	Wire rope diameter	
	The minimum wire rope diameter shall be 6 mm. The secondary wire rope shall have the same or a greater diameter as the suspension wire rope.	Pass. It is in compliance with the requirement.
8.11.3	Wire rope terminations	
	Wire rope terminations shall be formed by means of metal filled sockets, self-tightening wedge type sockets, hand spliced eyes, ferrule secured eyes or any other system with equivalent safety U-bolt grips shall not be used.	Pass. It is in compliance with the requirement.
8.11.4	Inspection facilities	
	Visual examination of steel wire ropes and rope terminations shall be possible without the removal of the ropes or major dismantling of the structural components of the SAE. Suitably	Pass. It is in compliance with the requirement.

	positioned inspection openings to fulfill this requirement shall be provided where necessary.	
9	Suspension rig	
9.1	Drive systems	
	Drive system cover all parts of the installation lowering, slewing, traversing, luffing, etc. Hoisting equipment including pulleys and wire rope winders are covered in clause 8, as well as the current chapter.	Pass.
9.1.1	Travel limits of drive systems	
9.1.1.1	End stops shall be provided and positioned so that they stop the movement before reaching any dangerous position.	Pass. A position limit switch has been fitted.
9.1.1.2	Travel limit switches shall be provided and positioned so that they automatically stop the powered movement at the end of travel. Movement shall stop before contact with the endstops.	Pass.
9.1.2	Brake and secondary device	
	All drive systems shall be provided with a service brake. (See 8.1.6, 8.3.2 and 8.3.3 for requirements for the brake.)	Pass.
	Lifting and lowering drive systems shall be provided with a service brake and secondary device.	Pass.
9.1.3	Manual drive	
	The maximum force applied to the end of the cranks in operation shall not exceed 250 N.	Not applicable
9.1.4	Powered drive	
9.1.4.1	Powered drive systems shall be designed and arranged in such a way that the permissible noise level of 79 dB is not exceeded, measured at a distance of 1 m from the source	Pass. See the test report.
9.1.4.2	If powered and manual drive systems are provided for the same movement, interlocks shall prevent both systems being engaged at the same time.	Pass.
9.1.4.3	SAE powered by battery	Not applicable
9.1.5	Telescopic jib wire rope system	Not applicable
9.1.6	Chain drive systems	Not applicable
9.1.7	Screwjacking systems	Not applicable
9.1.8	Rack and pinion drive systems	Not applicable
9.1.9	Hydraulic drive system	Not applicable
9.2	Permanent suspension rig	Not applicable
9.3	Temporary suspension rig	
9.3.1	General	
	All parts of temporary suspension rig shall be capable of being reused and re-erected. Components shall not have sharp edges or angles or protruding parts that may cause injury.	Pass. It is in compliance with the requirement.
	Small parts such as anchor pins and retaining clips, shall be attached together by a permanent linking connection.	Pass. It is in compliance with the requirement.
9.3.2	Physical size and mass	

	Consideration shall be given to the self-mass and size of the individual components forming part of the suspension rig:	Pass. It is in compliance with the requirement.
9.3.2.1	Parts which are regularly moved and are to be carried by one person: maximum 25 kg.	Pass.
9.3.2.2	Parts which are to be carried by two persons: maximum 50 kg.	Pass.
9.3.3	Counterweighted suspension beam	
9.3.3.1	This type of beam rests on the roof. The length of the inboard and outboard portion is adjustable, and shall require clear assembly and rigging instructions fixed permanently to the beam.	Pass. It is in compliance with the requirement.
9.3.3.2	Counterweights shall be firmly attached to the beam so that they are only dislodged by intentional action. They shall be locked to prevent removal by unauthorized persons.	Pass. It is in compliance with the requirement.
9.3.4	Counterweight	
	All weights used to form the counterweight of a suspension rig shall be of solid construction (maximum weight 25 kg) each with the weight permanently marked.	Pass. It is in compliance with the requirement.
9.3.5	Suspension points	
	Separate suspension points shall be provided for the suspension wire rope and the secondary wire rope (see Figure 21).	Pass
10	Electrical, hydraulic and pneumatic systems	
10.1	Electric system and components shall comply with EN 60204-1, except where otherwise stated in this standard.	Pass. They comply with EN 60204-1.
10.1.1	Measures to monitor three phase systems Means shall be provided to ensure that incorrect phase rotation of the power supply cannot result in an incorrect control response.	Pass.
10.1.2	Main power supply protection	
	Main power supply must be protected by overcurrent protective devices and by a 30 mA residual current device.	Pass.
10.1.3	Wire ropes with integrated electrical conductors	
	The conductors shall be not less than 0,5 mm ² in cross-sectional area and shall be adequately insulated and protected. The voltage used shall not exceed 240 V.	Pass. It is in compliance with the requirement.
10.1.4	Spring loaded or motor-powered cable reeler	
	A limit switch or other system must stop the movement of the machine before the electric cable is completely unwound from the cable reeler.	Pass. It complies with the requirement.
10.1.5	Degrees of protection	
	All electrical equipment shall comply with EN 60529 and when exposed to open air shall have a protection degree of not less than IP 54.	Pass. It complies with this requirement.

10.2	Hydraulic and pneumatic power systems and components shall comply with EN 982 and EN 983 respectively	Not applicable.
11	Control systems	
11.1	SAE shall be provided with hold-to-run controls.	Pass.
11.2	The direction and the movement of all operations shall be clearly indicated on or near the controls by words or symbols.	Pass. It is in compliance with the requirement.
11.3	All controls shall be arranged in a logical sequence. The possibility of operators wearing gloves shall be taken into account. The minimum diameter of control buttons shall be 10 mm.	Pass. It is in compliance with the requirement.
11.4	Controls shall be located on the platform. For SAE, where the suspension rig is powered, emergency duplicate controls shall be provided on the suspension rig. Such emergency duplicate controls shall be protected from unauthorized operation by a selector device which is lockable in the selected position.	Pass. It is in compliance with the requirement.
11.5	Multideck platforms shall be provided with controls located on the upper deck. An additional control shall be mounted on the lower deck(s) which must be actuated to allow operation of the platform.	Not applicable
11.6	Emergency stop equipment	
	Emergency stop equipment shall be designed and supplied according to EN 418 category O and shall be located at each operator control station and other places where an emergency stop device may be required. All emergency stop devices shall be operative irrespective of the control station in operation.	Pass. Category 0 emergency stop applies.
11.7	Control of jib	
	Where the jibs move independently of each other, the control circuit shall ensure correct movement, so that the platform cannot be inclined more than 14° in any direction.	
	Movement beyond the working position shall be limited by limit switch, operated by a key switch system during the parking operation of the machine.	Pass. It is in compliance with the requirement.
11.8	Safety related parts of control systems for power operated equipment	
	The control system shall comply with EN 954-1. The following information is given in this standard about safety-related parts: - the category selected; - the functional characteristics and function in the SAE protective measures.	Pass. It is in compliance with EN 954-1.
12	Verification of the safety requirements	
12.1	Type verification	
	Type verification is carried out on SAE and or SAE components (one or several representative samples) before launching	Pass. Type verification has been carried out

	series production. In the case of modular equipment, examination is done on the most unfavourable configuration. Type verification shall consist of: - design check (see 12.1.1); -type tests (see 12.1.2).	in compliance with this requirement.
12.1.1	Design check	
	The design check shall verify that the SAE is designed in accordance with this standard. It will include inter alia the check of the following documents:	
	a) drawings containing the main dimensions of the SAE;	Pass. See Annex overall drawing in the TCF.
	b) description of the SAE with necessary information about its capabilities;	Pass. See the TCF.
	c) information about the materials used,	Pass. See the TCF.
	d) diagrams of the electrical, hydraulic and pneumatic circuits,	Pass. See Annex electrical diagrams in the TCF.
	e) operating instructions	Pass. See Annex Instruction manual in the TCF.
	The above documents shall give all necessary information to enable: - the stability calculations to be checked (see clause 6); - the structural calculations to be checked (see clause 6).	Pass. Sufficient documents have been provided.
	The trolley unit test shall be performed according to annex D.	Pass. See the test report.
12.1.2	Type tests	
	The type tests are explained in annexes A, B and C. The type tests shall be made to check that: - the SAE is stable; - the SAE is structurally sound - all functions work correctly in accordance with the criteria set out in this standard The type tests shall be executed on the complete installation. if safety components are available on the market as separate components, they shall be tested separately.	Pass. See type test report for detail.
12.2	Manufacturing check	
	The manufacturing check shall be fulfilled where the manufacturer has achieved EN ISO 9002 certification otherwise the manufacturing check shall verify that:	
	- the SAE is manufactured in accordance with the design	Pass.

	documents;	
	- the components are in accordance with the drawings;	Pass.
	- test certificates are available for each type of rope, chain (including their terminations) and hydraulic or pneumatic hose. These certificates shall indicate the minimum breaking load or bursting pressure as appropriate;	Pass.
	- construction and installation of safety devices are in accordance with this standard.	Pass.
	- welding has been performed by qualified operatives in accordance with the relevant welding procedures;	Pass.
	- construction and installation of safety devices are in accordance with this standard.	Pass.
12.3	Verification before first use	
	The objective is to perform a static and dynamic load test, to check that the equipment is correctly assembled and that the safety devices are operating correctly The static and dynamic coefficients are 1,5 and 1,1 respectively.	Pass
12.3.1	For BMU the verification is done on the complete installation in its configuration for use and is carried out by the manufacturer or an authorized representative on site.	Not applicable.
12.3.2	For TSP the verification of each individual hoist and secondary device shall be carried out by the manufacturer. A competent person shall verify the complete TSP on site.	Pass. The manufacturer has been done the verification.
13	Marking and warning	
13.1	General	
	The manufacturer shall make available to the user the following information on one or more durable signs or plates mounted on the stirrup, on the inward side of the platform.	Pass.
13.1.1	For all types of SAE: - name and address of the manufacturer - designation of series or type; - serial number (if existing); - year of construction.	Pass.
13.1.2	For BMUs: - rated load of the platform and the maximum number of persons.	Not applicable
13.1.3	For TSPs:	
	- a table showing the RL of the platform and the maximum number of persons, according to the platform dimensions;	Pass.
	- if applicable, the maximum safe working load on the cantilevered deck and maximum length of the cantilevered deck;	-

	- WLL of the hoist(s) to be compatible with the platform;	Pass.
	- if applicable, a diagrammatic label showing the different platform configurations.	-
13.2	For TSP where separate components are put on the market additional information on one or more durable signs or plates mounted on the component itself shall be made available by the manufacturer.	
13.2.1	Platforms: - name and address of the platform manufacturer; - all other markings as per 13.1.1 and 13.1.3.	Pass.
13.2.2	Manual hoist: - WLL, - diameter and specification of wire rope.	Not applicable.
13.2.3	Powered hoist:	
	a) WLL	Pass
	b) diameter and specification of wire rope;	Pass
	c) rated hoist speed;	Pass
	d) power supply information if the prime mover is an electrical motor. 1) voltage(V); 2) current (A), frequency (Hz); 3) power(kW); 4) motor rated speed (r/min);	Pass
	e) power supply information if the prime mover is a pneumatic motor. 1) working pressure when lifting the WLL (bar); 2) air flow (dm ³ /s); 3) motor rated speed (r/min);	Pass
	f) power supply information if the prime mover is a hydraulic motor or cylinder 1) working pressure when lifting the WLL (bar); 2) fluid flow (dm ³ /s); 3) motor rated speed (r/min); 4) cylinder travel speed (cds).	Pass
13.2.4	Secondary device:	Not applicable
13.2.5	Suspension rig:	
	a) The WLL of the hoist(s) to be compatible with the WLL of the suspension rig.	Pass
	b) If the stability is provided by counterweights, sketches and tables showing the number of counterweights and their weights according to: 1) the WLL of the hoist; 2) the length of outboard portion (Lo); 3) the length of inboard portion @).	Pass

	c) For parapet clamp, sketch and table showing the supports reaction according to: 1) the WLL of the hoist; 2) the length of outboard portion (Lo); 3) the length between the supports (ls).	Pass
13.3	Warnings	
	The following warnings shall be given on a durable label on the platform: - only authorized, properly trained and physically fit personnel shall operate SA& - before using the equipment, read and fully understand the handbook; - serious injury to personnel may result if the instructions are not strictly followed; - maximum wind speed in service (km/h); - frequency of inspection.	Pass
14	Accompanying documents	
14.1	General	
	An instruction handbook shall be provided with the SAE. This section refers to EN 292-2 and gives specific instructions for SAE to be included in the handbook.	Pass. The operating instruction is provide. It is in compliance with the requirement.
14.2	The content of the warning shall include the following:	
	- advice about the exclusions (see 1.3);	Pass.
	- restrictions on the use by operators;	Pass.
	- instructions on the need to read and understand the instruction handbook	Pass.
	- information about hazards relating to working at height and the importance of following the instructions;	Pass.
	- information about regular inspection;	Pass.
	- information about weather conditions: maximum wind speed, range of temperature, lightening;	Pass.
	- advice about checking for obstructions along the travel of the platform;	Pass.
	- advice about checking that the TSP is correctly counterweighted;	Pass.
	- advice about trapping hazards when clearance between the building and trolley unit is too small.	Not applicable
14.3	Information relating to transport and handling of the SAE:	
	- total mass of the equipment and of the main parts which can be dismantled for transport;	Pass.
	- indications for handling (e.g. drawings indicating points for hoisting equipment).	Pass
14.4	Information relating to the installation, commissioning and (re)assembly of the equipment:	

	- where track and restraint systems are used negotiations shall take place between the interested parties to determine the design;	Pass
	- maximum load imposed by the suspension rig on the building;	Pass
	- rail fixing/anchoring requirements;	Pass
	- assembly and disassembly instruction,	Pass
	- information shall be given to prevent mixing of inappropriate components;	Pass
	- space needed for the use and maintenance of the SAE;	Pass
	- instructions regarding the power supply;	Pass
	- wire rope rigging instructions;	Pass
	- instructions to ensure that suspension rig is directly above the platform;	Pass
	- instructions for verification by a competent person before use;	Pass
	- need for protection regarding hazardous areas around the SAE.	Pass
14.5	Information relating to the SAE itself:	
	- the limitations of use, e.g. height, wind speed in service and out of service and temperature range;	Pass
	- detailed description of the equipment and its safety devices. The text shall be illustrated with pictures or sketches;	Pass
	- comprehensive range of examples of applications for which the equipment is intended, including prohibited usages if any, and foreseeable misuse;	Pass
	- schematic representation of safety functions as defined in EN 292-1;	Pass
14.6	information relating to the use of the equipment:	
	a) description of manual controls;	Pass
	b) means for stopping (especially emergency stop);	Pass
	c) to instruct the operator that he shall stop working and notify the supervisor if faults, damage or other circumstances may jeopardize safety,	Pass
	d) description of how to operate the no-power descent;	Pass
	e) instructions concerning actions the operator shall take if the secondary device is activated;	Pass
	f) information about means of communication between the platform and a competent person;	Pass
	g) how to prevent undue swaying of the platform;	Pass
	h) instructions for fault identification and location, for remedying and for re-starting after intervention, in table form comprising three columns (fault, foreseeable cause, remedy);	Pass
	i) where necessary, instructions on personal protective equipment to be used;	Pass
	j) information about the residual risks which cannot be	Pass

	eliminated by design and information on safely	
	k) instructions on daily inspections;	Pass
	l) for TSPs, the following additional checks are required: 1) each day, before the TSP is put into use, the operator shall check that the operating devices, brakes, secondary devices and emergency switches function correctly; 2) the condition of all trailing cables, limit switches, structural platform parts and wire ropes shall also be checked; 3) check security of suspension rig and ensure that no counterweights have been removed; 4) ensure that the suspension rig is directly above the intended position of the platform mounted hoist in order to avoid excessive horizontal forces on the suspension rig; 5) ensure that any snow, ice, debris or surplus material does not accumulate on the platform; 6) ensure that objects, which could come into contact with the platform, do not project outside the facade; 7) when the work is finished, the operator shall bring the platform into the "out-of-service" position, switch off and isolate from mains supply to prevent unauthorized use; 8) the fall arrest device shall not be used to stop the platform in service conditions,	Pass
	m) instructions for the owner to keep a logbook which contains the following - name of the competent person in charge of the SAE; - date and name of operator(s) using the SAE; - for TSP, serial number of hoist(s) and secondary device(s); - number of hours SAE in service; - specification of wire rope; - number of hours wire rope in use; - record of any incident and action taken; - dates of periodic inspection and record of outcome;	Pass
	n) use at specific locations where limitations of use may be required;	Pass
	o) parking the SAE in the "out-of-service" position.	Pass
14.7	Information for maintenance	
	- maintenance may only be carried out by a competent person;	Pass
	- recommendations by the manufacturer concerning the nature and frequency of inspection for each component;	Pass
	- maintenance and repair records shall be kept in the logbook;	Pass
	- drawings and diagrams enabling maintenance personnel to carry out their task;	Pass
	- wire rope specification prescribed by the manufacturer;	Pass
	- certificates of wire ropes shall be kept;	Pass
	- warnings shall be given regarding the dismantling of spring	Pass

	loaded reelers or winders;	
	- information about replacement criteria for wire ropes and all components subject to wear;	Pass
	- checks on the integrity of the seal on the setting element of the overload or secondary device.	Pass