

Tata Steel Technical Directive

**R1200101 General and Technical Directive for Elevators
ATVL2020**

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1 Common

Objective ATVL:

based on the legal requirements, supplemented by the experience of TATA-Steel, to give direction to goods and passenger lifts in a technically/economically responsible manner to:

- manufacturing, installation of;
 - repair, of;
 - overhaul, modernize
- and commissioning it.

1.1 **Scope**

The provisions of this ATVL apply to the design, calculation, construction, manufacture and commercial delivery of goods and passenger lifts with regard to:

- new installations
- existing installations in terms of repair, overhaul and modernisation

1.2 **General provisions**

The provisions of this ATVL must be regarded as the minimum set of requirements based on the practice of TATA-Steel IJmuiden, which serves as a supplement to all applicable legal provisions, standards and guidelines. To manufacture and modify the installations mentioned under A, you must have approval from CSPY PTC and/or SPME-ESS-SBO-IPM-BTE

1.2.1 **Contracting/subcontracting**

The contractor may have certain parts of the work subcontracted, provided that tata-steel has obtained prior approval for the selection of these parts and of the subcontractors to be involved.

Nevertheless, the contractor remains fully responsible to TATA-Steel for these parts.

If parts of the work are subcontracted, the contractor must fully inform the subcontractor of the provisions of the specification and the manner of execution.

1.3 **Standards, TATA-Steel standards, TATA-Steel guidelines and other documents**

1.3.1 **NEN- + NEN-EN standards**

By means of this ATVL, the following standards are declared applicable. It is also indicated whether they apply to the situation New Construction (N), Modernization (M).

<<Read pointer: For each project application, it will have to be specified which standards apply to that application>>

Norm:	Title	New construction (N) / Modernisation (M)
- ISO 8100-30	Lifts for the transport of persons and goods - Part 30: Installation of lifts in Classes I, II, III and IV	N
- ISO 4190-2	Lift (US: Elevators) installation - Part 2: Class IV lifts	N
- CHILD-IN-81-20	Safety rules for manufacture and installation of lifts - Lifts for the transport of persons and goods - Part 20: Passenger lifts and passenger-goods lifts	N/M
- CHILD-IN-81-50	Safety rules for manufacture and installation of lifts - Examinations and tests - Part 50: Design rules, calculations, examinations and tests of lift parts	N/M
- CHILD IN 81-1	Safety rules for manufacturing and installation of lifts - Part 1: Electric passenger lifts	M
- CHILD IN 81-2	Safety rules for manufacturing and installation of lifts - Part 2: Hydraulic passenger lifts	M
NEN 1081	Safety regulations for electric passenger and goods lifts with accessible cage	M

CHILD IN 81-28	Remote alarm for passenger and passenger goods elevators.	N/M
CHILD IN 81-80	Rules for increasing the safety of existing passenger and passenger goods elevators.	M(option, according to project specification)
CHILD-IN-81-58	Safety rules for manufacture and installation of elevators - Examination and tests - Part 58: Testing of fire resistance of schachtdeuren	N(option, according to project specification)
CHILD-IN-81-70	Safety rules for manufacture and installation of elevators - Special applications for passenger lifts and passenger-goods elevators - Section 70: Accessibility of elevators for persons including persons with disabilities	N(option, according to project specification)
CHILD-IN-81-72	Safety rules for manufacture and installation of elevators - Special applications for passenger lifts and passenger-goods elevators - Part 72: Fire brigade elevators	N(option, according to project specification)
CHILD-IN-81-73	Safety rules for manufacture and installation of elevators - Special applications for passenger and passenger goods lifts - Part 73: Behaviour of lifts in the event of fire	N(option, according to project specification)
CHILD IN 81-3	Safety rules for the manufacture and installation of elevators- Part 3: Electric and hydraulic small goods elevators	N/M
CHILD-IN-81-31 (in)	Safety rules for the construction and installation of elevators - elevators for the transport of goods only - Part 31: Accessible goods only lifts	N
NEN 1082	Safety regulations for small goods lift	M
CHILD-IN-1570	Safety requirements for lifting tables - Part 2: elevating tables serving more than 2 fixed stops of a building for lifting goods with a lifting speed not exceeding 0,15 m/s	N/M

NEN 3584	Safety requirements for lifting platforms for low-speed passenger transport and limited lifting height.	M
NEN 3585	Safety regulations for electric goods lifts with accessible cage.	M
CHILD-IN-81-41	Safety rules for the manufacture and installation of lifts - Special lifts for the transport of persons and goods - Part 41: Vertically moving lifting platforms intended for use by disabled persons	N/M
NEN 3586	Safety requirements for passenger lifts on hoists hefwerktuigen.	M
- CHILD IN 12015	Electromagnetic compatibility. Emission.	N/M
- CHILD IN 12016	Electromagnetic compatibility. Immunity.	N/M
- CHILD IN 13015	Maintenance of elevators and escalators. Rules for care instructions.	N/M
- IN 12385-5	Steel ropes - Safety - Part 5: Strand cables for lifts	N/M
- ISO 18738	Measurement of the comfort of lift movements	N/M
- ISO/TS 14798	Methodology for risk – analysis	N/M
CHILD IN 627	Specification of data recording and monitoring of passenger lifts, escalators and moving walkways	N/M
- IEC 60227-6	Pvc insulated cables of rated voltages up to and including 450/750 V - Part 6: Cables for lifts and flexible connections	N/M
NEN 1010	Safety provisions for low-voltage installations (in so far as these are low-voltage installations in lift engine rooms and where the production standard of the lift does not apply)	N/M
NEN 3140	Safety regulations regarding work on or in the environment of low-voltage installations and grids.	
NEN-EN 50110-1	Operation of electrical installations - Part 1: General requirements	
NEN 3157	Technical drawings - Symbols for measurement and control technology - Basic symbols for process instrumentation	
NEN 3347	Technical drawings - Symbols for measurement and control technology - Elaborated symbols for process instrumentation	

1.3.2 **TATA-Steel Standards**

The standards applicable with .b the ATVL (mandatory character) are:

Norm:	Title	New construction (N) / Modernisation (M)
S1450401	Execution and inspection of welding work capable	N/M
S1917301	Application of safety colours	N/M
S3105601	Preservation of new and existing steel	N/M
	Constructions	
S3298001	Straight steel stairs, ladders, landings and Handrails.	N/M

1.3.3 **Technical Guidelines TATA-Steel**

The Technical Guidelines applicable with .b the ATVL are:

Norm:	Title	New construction (N) / Modernisation (M)
R1058001	Drawing regulations for TATA-Steel IJmuiden.	N/M
R1058002	TATA-Steel CAD - Drawing regulations	N/M
R1058003	TATA-Steel E - plan Drawing regulations	N/M
R2173201	Control voltages	N/M

1.3.4 **Validity of regulations**

The contractor must ensure that the aforementioned TATA-Steel standards and guidelines are in its possession in a timely manner.

The relevant standards and guidelines can be obtained via www.TATA-Steelveiligheid.nl TATA-Steel IJmuiden - Standardization - 1 TATA-Steel Standards (NL) - Mechanical Engineering / Electrical Engineering / Civil Engineering.

The standards applicable at the time of tendering must be observed at all times.

In all cases, the latest version of the listed documents must be used.

1.3.5 **Other documents**

Other documents with .b to the ATVL are:

<<Read pointer:For each project application, it will have to be specified which standards apply to that application>>

Document:	New construction (N) / Modernisation (M)
Commodities Act Decree on Lifts	N/M
European elevator Directive 2014/33/EU	N/M
95/216/EC: Commission Recommendation of 8 June 1995 on improving the safety of existing elevators	M
Warenwetbesluit machines	N/M
European Machinery Directive 2006/42/EC	N/M
- Building Decree 2012 (only the articles with provisions for elevators)	N/M
- Tata-Steel purchasing conditions, adopted june 2000	
- Explanation of procedure and safety regulations for scaffolding	
- Security policy TATA-Steel	
-	

Tata-Steel's safety regulations do not relieve the contractor of the legal requirements. The TATA-Steel regulations can be obtained from the Environmental Management department (4D.08).

1.4 **Quotation documents**

1.4.1 **List of materials to be used**

The contractor must hand over a list of materials offered with his offer. The list shall include at least the manufactured product and type.

1.4.2 **Deviation with regard to the specification**

Deviation from the specification and/or associated drawings may only take place after written permission from the client.

Requests for this must be made known in writing by the contractor in good time (to the project leader of CSPY PTC and/or SPME-ESS-SBO-IPM-BTE),so that stagnation in the progress of the implementation by this procedure is prevented.

Where, in the specification, a manufacture is prescribed, but also an equivalent manufacture is permitted, in the case of application of a manufacture other than the one mentioned in particular, the equivalence must be demonstrated by the contractor at his expense.

Additional costs, resulting from the application of deviating manufacture or execution, are not eligible for set-off.

If at any time deviations in the execution of the installations according to the specification are found, for which no written permission has been granted by TATA-Steel, TATA-Steel has the right to still require the contractor to perform according to the specification or the regulations without the right to compensation.

1.4.3 Planning

The contractor must state in his offer:

- Earliest possible time start after assignment
- Lead time assembly in day shift
- Number of technicians during assembly

1.5 Documents after commissioning

1.5.1 Planning

Unless otherwise agreed, the contractor must submit a detailed planning for approval within 12 weeks of the assignment, which at least includes:

- Engineering
- Manufacture
- Pre manufacturing
- On-site mounting
- Commissioning and testing
- Verification of independent inspection body
- commissioning tata-steel

1.5.2 H&S Plan

Unless otherwise agreed, the contractor must submit a detailed H&S plan for approval within 8 weeks of the assignment.

1.5.3 Work, principle drawings and documentation

Unless otherwise stated in the assignment, the contractor must provide the TATA-Steel client with drawing and sparing drawings of the installation(s) within 8 weeks after the assignment has been given.

In addition to electrical and mechanical engineering drawings, floor plans and principle diagrams must be made.

State on the principle diagrams all the necessary information such as

- weight
- Speeds
- brake installation
- determination of exact mass
- determination of various taxes
- traction rate
- engine power or engine data
- controlled drive
- microprocessor
- settings adjustment data
- mechanical data
- ventilation temperatures in cage and engine room
- hydraulics (heat dissipation)

State all the necessary information on the floor plans such as:

- architectural facilities
- spares
- place components
- system loop
- cable loop

The manufacture and assembly of the installation may not be commenced earlier after the final drawings have been approved by TATA-Steel.

To obtain seen, a period of at least 2 weeks must be observed.

1.5.4 Additional requirements with regard to drawing work

1. In bills of materials on drawings fully describe the commodities.
2. The TATA-Steel drawing numbers are available through the client.
3. The titles for the purpose of the drawings must be requested from the client.
4. The electrotechnical drawing shall include:
 - a. Main power scheme
 - b. Control power scheme
 - c. cable block scheme
 - d. Terminal list
 - e. Control box layout
 - f. Material list
5. The hydraulic drawing shall include:
 - a. hydraulic scheme
 - b. Material list

In order to be able to comply with the TATA-Steel drawing regulations, contact can be made with a drawing agency recommended by TATA-Steel through the mediation of the client.

1.5.5 Calculations

The manufacture and assembly of the installation may not be commenced earlier after the calculations have been approved by TATA-Steel.

To obtain approval, a period of at least 3 weeks must be observed.

If TATA-Steel does not respond within the agreed period, the contractor must contact the client.

1.5.6 Sparing drawings, architectural facilities and coordination

The spare drawing and other structural facilities must be manufactured by the contractor in a timely manner on the basis of a schedule to be provided by TATA-Steel and offered to TATA-Steel. In the work, the contractor must check whether all openings, deposits, technical rooms and the like required for its installations have been correctly marked or installed. In order to obtain an optimal execution of the installation work, coordination must take place with any other contractors at work.

1.5.7 Advice on spare parts

Before delivery, the contractor must hand over a list of spare parts to be recommended. The list of spare parts shall indicate:

- Manufacture and type number
- Supplier details
- Price and delivery time

1.6 Documents before inspection

Before the inspection, the lift book at TATA-Steel must be adjusted.

Certificates, maintenance instructions and a Dutch manual must also be in the possession of the client.

Upon delivery, the contractor must provide updated electrical drawings (white printing) of the installations to the TATA-Steel client for approval.

1.7 Commissioning and testing

After the contractor is convinced that the elevator is fully operational, the lift must be definitively tested in the presence of an expert appointed by TATA-Steel. (test loads, protections, functionality, etc.)

1.8 Inspection

The contractor is responsible for inspection by an independent inspection body. The type of inspection must be tailored to the work carried out. In the case of new construction, this is a commissioning inspection (such as final inspection, unit inspection). In the case of modernisation and repairs, the nationally determined inspection scheme applies, which is published on the SBCL website.

Within 72 hours after the inspection, a list of inspection points must be sent to the client by e-mail.

The official report must be handed over within 3 weeks.

The inspection points must be remedied after handing over the report as soon a.s.a.p in consultation with the client.

1.9 Delivery

All finishing points determined at the time of delivery are stated by the client on a so-called verbal of delivery.

The finishing points stated on this verbal of delivery must be remedied within an agreed period.

1.9.1 As-Built drawings

After approval of the electrical drawings (white printing), they must be submitted in digital form within 1 month after delivery.

After approval by TATA-Steel, the entire package must be submitted for archiving in digital form according to R1058001.

1.9.2 Software and technical documentation

Immediately after delivery, the contractor must provide any PLC program, software and technical documentation for .b elevator file

PLC program and software must be supplied digitally.

1.9.3 Training and instruction

Before or immediately after delivery, the contractor must instruct at least two employees of the company that carries out the regular maintenance of lift installations for TATA-Steel and remedies malfunctions.

At the prior indication of TATA-Steel, where tata-steel deems necessary, a training program must be offered by the contractor.

Training and instruction must be completed within three months after delivery.

1.10 Warranty period

The work to be carried out by the supplier during the warranty period must be carried out under the requirements for TATA-Steel in general, and the requirements applicable in particular for the department where the installation is located with regard to access, safety and work permit.

1.10.1 Maintenance in the warranty period

The maintenance work to be carried out by the supplier during the warranty period must be notified to the SPME-ESS-SBO-IPM-BTE department at least 14 days prior to the day of execution.

For the performance of maintenance work during the warranty period, an arrangement can be made with the elevator company present on the TATA-Steel site via the SPME-ESS-SBO-IPM-BTE department on request.

1.10.2 Malfunctions in the warranty period

Malfunctions that occur during the warranty period will be reported to the contractor.

The contractor must remedy these malfunctions as soon as possible with due observance of the response times stated below.

Within the maximum reaction time, a mechanic must be present on site.

Storing	Definition	Max. Responsiveness
Urgent	In case of confinement within day shift	1 hour
Urgent	In case of confinement outside day shift	1 hour
Urgent	In the event of a malfunction during a planned standstill within the day shift	1/2 hour
Urgent	In the event of a malfunction during a planned standstill outside day shift	1 hour
Not Urgent	In the event of a malfunction within the day shift	1 hour
Not Urgent	In the event of a breakdown outside of day shift	2 hours

A digital report of each malfunction must be handed over to the client.

The written report shall state at least:

- date and time of the notification
- date and time of arrival
- date and time of departure
- Name(s) of mechanic(s)
- Clear description of the malfunction or complaint
- Clear description of the actions carried out and any follow-up actions.

If the above requirements cannot be met by the contractor, it is possible to make an arrangement with the elevator company present on the TATA-Steel site through mediation by the SPME-ESS-SBO-IPM-BTE department.

2 GENERAL PERFORMANCE PROVISIONS

2.1 Execution

1. The delivery and assembly includes all parts and auxiliary materials that are necessary for the establishment of a good, completely finished and operational installation, even if these are not named or indicated on the drawing.
2. The sizes indicated in the specification are global sizes.
3. Fastenings to concrete structures must be made by means of glue anchors.
4. Load-bearing steel structures may not be welded.
5. Drilling holes and making openings (and sealing them) is part of the contractor's work, unless otherwise stated in the specification.
6. The structure and all moving parts must be easily accessible and controllable for inspection and maintenance.
7. The dimensions must be such that the possibility of exchanging parts with spare parts is guaranteed.
8. Preferably, self-lubricating and water and dustproof bearings should be used. Where no self-lubricating bearings can be used, these bearings must be equipped with lubricating nipples, type based on DIN 17412 page 1.
9. Grease nipples should be collected in easily accessible places.

2.2 Positioning and dimensions

If installation parts are indicated on the drawings accompanying the specification, the approximate location and dimensions are shown.

For ordering and manufacturing parts, the contractor is obliged to take note of the situation on site and must be convinced, with the most recent drawings and any measurements, that placement or assembly thereof will not be able to cause any problems.

2.3 Conflicting information

In the event of ambiguity or difference in the information provided, the contractor is obliged to ask TATA-Steel for the opinion on this before proceeding to execution.

2.4 Encodings

All elements, both in cabinets and outside, must be coded with nameplates.

The text should be executed in black letters/numbers on a yellow background.

Location and size of the nameplates to be determined in consultation with TATA-Steel.

All cables + wires must be properly numbered.

Each wire must be fitted with a sleeve with on it, indelible and UV resistant, indicated:

- Terminalstrip number

- Terminal number
- Cable number

2.5 **E-facilities**

- a) Manufacture and performance PLC and microprocessor in consultation with TATA-Steel client.
- b) Test tableau in the relay box shall be equipped with the possibility to test the lift control. Any necessary service tool, including manual, must be part of the delivery.
- c) The inspection circuit shall include the limit switches for the highest and lowest stopping positions so that, on inspection, the lift cannot operate the emergency end switch.
- d) Perform the ambulance circuit in a switch technical way, whereby the lift drives to the main stop and, if possible, is placed with the door open and can then only be operated via a preferential circuit in the lift cabin.
- e) One call tableau per floor with:
 - signalling "lift out of service"
 - call button with feedback "lift coming".
- f) Position and directional indication must be applied for each floor.

2.6 **Materials**

For materials to be used see Annex 1 (latest version).

Materials shall, where applicable, meet, inter alia, the following general requirements:

- All materials or components used in the lift must be freely available on the market.
- The components used must be certified.

2.6.1 **Responsibility**

The contractor remains responsible for the delivered materials until the moment of transfer. (theft, corrosion, damage, etc. unless otherwise proven)

Released demolition waste and other waste materials remain the property of the client unless otherwise indicated in the specification.

The contractor is responsible for the disposal of the released materials described above.

2.7 **Monitoring system**

- In an office environment, the installations must be equipped with a monitoring system for renovations and new constructions.
- In a factory environment, the installations must be provided with a fault memory during renovations and new construction.
- In a factory environment, the speaking/listening connection must be performed by means of a telephone (duplex traffic) connected to an ISDN connection. The cable for this is supplied by TATA-Steel.
- In the office environments, the speaking/listening connection must be carried out by means of at least one telephone, but preference is given to a gsm unit with alarm notification.

2.8 Installations in a gas-hazardous environment

If measures have to be taken to protect persons in the lift, the measures to be applied will be determined in consultation with TATA-Steel.

In principle, there is a choice of the following options:

- An escape route through the shaft with emergency doors at multiple locations.
- A system with breathing air in the cage.

In the event of a gas alarm, the lift must be sent directly to the nearest floor and must remain there with unlocked and/or open doors.

3 GENERAL ADDITIONS WITH REGARD TO THE PERFORMANCE OF ELEVATORS

The following additional requirements apply to the situation: new construction

3.1 **Additions to NEN-EN 81 -20**

3.1.1 **Shaft**

If the installation is located in a building where there is no central evacuation and/or fire alarm system, a smoke detector must be installed at the top of the shaft, in an accessible place.

Any evacuation signal must intervene in such a way on the control of the installation whereby the lift performs an evacuation control in accordance with NEN-EN 81-73,

Only after the control system has been reset may the installation come back into operation.

The locks for the inspection hatches are provided by TATA-Steel.

Manufacturer and type: Lips - cylinder padlocks 1557 direction of rotation 2, day bolt with locking, with cylinder 8153 for key 3085.

Place at least 1 lighting fixture in LED per floor in the shaft.

Preference is given to an LED light hose.

3.1.2 **Machineroom en diskroom**

The locks for the doors of the lift engine room and any other space belonging to the lift are provided by TATA-Steel.

Manufacture and type: Lips padlock type S 2551 with 2 pipes, one of which fits on key Z8156 and the other on the key of rayon where the lift is placed.

The engine room must be able to be conditioned (by third parties) whereby the temperature remains between -5 and +_40 and so on depending on the environment.

3.1.3 **Cage, counterweight and balancing weight**

- Cages must be equipped with a cage fan

- All lighting must be made of LED.

- In the case of new construction or renovation of lift control, the cage lighting must be switched off automatically if the lift is not used for at least 1 minute.

3.1.4 Suspension, compensation. speed limiter

The traction cables must be mounted by means of wedge clamps.

The speed limitation device shall be equipped with a two-way contact.

The clamping weight in the pit must be fitted with a switch contact.

3.1.5 Leaders and buffers and emergency end switches

If slates are used, the guide of cage and counterweight should be suitable for the application of Vulkolan slate linings.

- In a factory environment, the cages and counterweight must be equipped with Acla roller sets after renovation or in new construction.

The foundation of the buffers of the counterweight must be divisible and have sufficient height so that elongation in the cable can initially be absorbed.

3.1.6 Protection against electrical defects; controls: priorities

A lock switch (emergency stop) for stopping and keeping the lift out of service, including the driven doors, must always be present in the cage.

Passenger/goods lifts must be equipped with electronic overload monitoring.

3.2 General additions

3.2.1 Machine

In the case of conventional gearheaded motors, the fitting surfaces under motors shall be such that the motors can be pushed backwards so that they are free from the clutch bolts.

Apply approximately 3 mm adjustment fillings under the motors in order to be able to absorb deviations in the height of the axle in spare engines, among other things.

After adjusting the motor, the position of the motor must be marked by, for example, the use of fitting pins.

All mounting surfaces must be machined.

The guards to be intended must be demountable.

The alignment of the engine must be recorded in a measurement protocol.

The exception is the directly transmitted drives, i.e. without a machine (engine room empty lifts).

3.2.2 SHAFT CABLES

Each floor must be equipped with a separate control power cable from the engine room. This must be connected in a terminal box per floor in the shaft. From the terminal box, the door, latch line and shaft tableau are connected separately. The existing ambulance switch can also be connected from this terminal box.

Each floor must be provided with a separate signalling cable from the engine room, which must be connected directly. An exception applies to serial control.

3.2.3 Construction of slate linings

If slate linings are used, they must be fixed in a suspension and hinged construction.

3.2.4 Electric motors

Applied electric motors must be sufficiently heavily dimensioned and preferably equipped with their own ventilation.

Unless otherwise indicated, the number of switch-ons per hour will be 120-150.

The starting torque of the lift motor shall not exceed 2 - 2,2 times the nominal torque in a full-load situation.

All engines shall comply with:

- degree of protection IP55
- insulation class F, but only to be used up to a maximum of insulation class B

The lift drive motor shall:

- have a thermocouple in the windings (pt100) to detect overheating.

ADDITIONS WITH REGARD TO THE PERFORMANCE OF FACTORY Elevators

The following additional requirements apply to the situation: new construction

3.3 **Additions to NEN-EN 81-20**

3.3.1 **Shaft**

Shaft doors of heavy industry quality should preferably be revolving doors with fall valve protection.

Shaft doors that are in contact with the outside air must be tectylated internally and comply with the TATA-Steel Standard S3105601.

When using revolving doors, door bounces must be applied.

At least 3 hinges per door should be used that are equipped with a lubricating groove and lubricating nipple.

When using horizontally movable cage and shaft doors, this must be applied **in accordance with the EN 81-71:2005 standard (anti-vandal)**. Preferably from the brand Wittur.

The doors must be provided with a corrosion-resistant paint.

In addition, several holes must be installed in the lower sill to be able to remove pollution.

3.3.2 **Cage, counterweight and balancing weight**

The cage must consist of a steel support structure coated with at least 1.5 mm of steel sheet.

When using vertically closing cage doors, preferably type iXus of the manufactured LTF should be used. An equivalent make and/or type may only be used after approval by TATA-Steel, confirmed in writing

3.4 **General additions**

3.4.1 **Position and directional indication**

The position, direction and door "open" indication must be mounted in the factory environment behind a 6 mm thick Lexan.

3.4.2 Controlbox

Control and controller must be placed in a steel, dustproof cabinet (at least IP54) in a factory environment. The cabinet must be able to be adequately ventilated. The temperature in the cabinet should not exceed the maximum value of 35 degrees Celsius.

Preferably, a Kollmorgen control is used in the factory environment with a Zetadyn frequency converter

4 MATERIALS LIST

For all the manufactures mentioned, these should preferably be used. After approval by the client, equivalent manufactures may be used.

If requested, the contractor must be able to demonstrate the equivalence of the manufacture offered as an alternative.

Definition	:	Manufacture and Type
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4.1 Shaft

Automatic doors	:	Industrial doors Wittur
Door latches when using revolving doors	:	Schmersal of Kronenberg of Thijssen
Positioning system	:	APS Kollmorgen
Shaft panels superstructure	:	in fabriekomgeving Stahl EX
Push buttons	:	in fabriekomgeving Stakl EX of Schneider 900 serie
Signals	:	in fabrieksomgeving Stahl EX
Elevator guidance	:	in fabrieksomgeving rollen Acla
Buffers	:	Acla
Cage lighting	:	LED-slang of LOKOLED armaturen
Effectors	:	IFM
Cage switches	:	Kronenberg, of Schmersal
Vulkolan-slate linings	:	Acla

4.2 Elevator cage

Operation tableau surface mounted	:	in fabriekomgeving Stahl EX
Push buttons	:	in office environment dependent supplier in fabrieksomgeving Stahl EX
Switchkeys	:	in fabrieksomgeving Schneider 900 serie/ Steel
Signaling	:	Office environment dependent supplier in fabrieksomgeving Wittur
Lightpole switches	:	Sensorpartners
Photoswitches	:	Sick of Sensorpartners

4.3 **Drive and control**

Control	:	Kollmorgen
Controlboxes	:	Rittal
Limitswitches	:	Siemens/ Schmersal / Kronenberg/ Schneider

4.4 **Engine room**

Lighting	:	LED fittings LOKOLED
Emergency lighting	:	LED noodverlichtingsunit LOKOLED continubrandend

4.5 **Various**

Emergency Stopswitch	:	slagdrukknopschakelaar Schneider 900 series
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