Annex to the certificate concerning the examination of conformity No. CA 298 of 2016-06-27

Industrie Service

1 Scope of application

1.1 Traction drive lifts and indirect acting hydraulic lifts, falling within the scope of validity of the Directive 2014/33/EU (Lifts Directive) or whose rope drive / drive according to EN 81-20:2014 (D), Number 5.9.2.1.1 a) resp. Number 5.9.3.1.1 b) will be renewed.

According the following definitions:

Traction drive lifts according EN 81-20:2014 (D) and EN 81-50:2014 (D)

Traction drive lifts without reduced number of trips	Rope safety factor (S_f) calculated according to EN 81-50:2014, Number 5.12 or equally good
Traction drive lifts with reduced number of trips	Rope safety factor (S_f) determined deviating from EN 81-50:2014, Number 5.12

Indirect acting hydraulic lifts according EN 81-20:2014 (D) and EN 81-50:2014 (D)

Indirect acting hydraulic lifts without reduced number of trips	Predicted number of trips ≥ 600.000
Indirect acting hydraulic lifts with reduced number of trips	Predicted number of trips < 600.000

1.2 Technical Data

Steel wire ropes of type **PAWO 819W** and **PAWO F 7S**

Characteristics of the rope	**Rope type**		**PAWO 819W**	**PAWO F 7S**
	Nominal diameter of the rope	d_{Nom}	6 – 10 mm [1]	
	Minimum breaking load	F_{min}	25,9 kN – 70,3 kN	24,6 kN – 69,5 kN
	construction / type		8x19W + IWRC	
	Tensile strength of the wire	R_0	1570 N/mm² 1770 N/mm²	
Traction sheave	**Minimum diameter** [2]	D_{Tmin}	≥ 120 mm	
		D_T / d_{Nom}	≥ 18.46	
	V-angle in case of V-groove		$\gamma \geq 35°$	
	U-angle in case of semi-circular undercut groove (U-groove)		$\beta \leq 105°$	
Diverting pulleys	**Minimum diameter** [2]	D_{Umin}	≥ 120 mm	
		D_U / d_{Nom}	≥ 18.46	

[1] deviating from EN 81-20:2014 (D), Number 5.5.1.2 a) (< 8 mm)

[2] deviating from EN 81-20:2014 (D), Number 5.5.2.1 (< 40)

2 Conditions

2.1 For the determination of the minimum rope-safety-factor in case of lift installations with reduced number of trips, the document “Determining number of trips, Edition 02“, dated 2016-02-01, with certification stamp of 2016-05-20, must be enclosed to the certificate concerning the examination of conformity no. CA 298 and its annex as support.

2.2 Conditions for traction lifts according EN 81-20:2014 (D)
and EN 81-50:2014 (D)

2.2.1 The intended use of the lift installation must be coordinated between the rope manufacturer, the manufacturer of the lift and the person who makes the purchasing order (in case of new lifts) or operator (in case of modifications of the lift).

Especially a statement must be given with regard to the following points:

- The intended use of the lift
- The expected yearly number of trips
- The expected number of trips up to the moment when having reached the limit at which the steel wire ropes have to be discarded.
- The rope safety factor which is required with respect to the lift installation

These statements and the calculations based on the statements must be documented and must be enclosed to the technical documents.

See number 3.3 of this certificate.

2.2.2 The rope safety factor must be determined

- In case of traction drive lifts without reduced number of trips
  According to EN 81-50:2014, Number 5.12 or equally good

or

- In case of traction drive lifts with reduced number of trips
  Corresponding to “Determining number of trips, Edition 02“, dated 2016-02-01
  with certification stamp of 2016-05-20.

2.2.3 The rope safety factor must be at least $S_f = 12$.

2.2.4 In case of lift installations with reduced number of trips, the trips must be registered by a safe and reliable automatic counter device (e. g. by a power-fail proof, non-resettable electric counter).

When the number of trips after which the ropes have to be discarded is reached, the lift must be safely stopped in the next landing by the control system and the suspension ropes must be replaced.

See number 3.3 and 3.4 of this certificate.

2.2.5 The suspension ropes must be discarded in case of (for all lift installations)

- 26 broken wires within a length of 30 x d or
- 13 broken wires within a length of 6 x d or
- a diameter reduction of more than 6% related to the nominal rope diameter

and (for lift installations with a reduced number of trips)

- When reaching the maximum number of trips which has been determined by calculation.

2.2.6 The rope traction of the suspension ropes must be calculated according to EN EN 81-50:2014, Number 5.11 or equal.

2.2.7 The ratio between the diameter of the traction sheave and the rope diameter must be at least: $\mathbf{D_T / d_{Nom}} \geq 18.46$

2.2.8 The diameter of the traction sheave must be at least $D_T \geq 120$ mm.

2.2.9 The traction sheave must be designed with a semi-circular undercut groove (U-angle $\beta \leq 105°$, hardened or non-hardened) or with a hardened V-groove (V-angle $\gamma \geq 35°$) made of steel or cast iron.

2.2.10 The ratio between the diameter of the diverting pulley and rope diameter must be at least: $\mathbf{D_U / d_{Nom}} \geq 18.46$

2.2.11 The diameter of the diverting pulley must be at least $D_U \geq 120$ mm.

2.2.12 The diverting pulleys must be designed with a semi-circular groove made of steel or cast iron (hardened or non-hardened) or made of plastics.

2.2.13 All additional requirements of EN 81-20:2014 (D) regarding rope drives must be kept, e.g. like:

- junction of the rope termination (80% of the minimum breaking load)
- distribution of load of suspension
- protections at traction sheaves and pulleys (bracket against derailing of the rope, nip guards)
- visual examination on the traction sheave is guaranteed

2.3 Conditions for indirect acting hydraulic lifts according EN 81-20:2014 (D) and EN 81-50:2014 (D)

2.3.1 The intended use of the lift installation must be coordinated between the rope manufacturer, the manufacturer of the lift and the person who makes the purchasing order (in case of new lifts) or operator (in case of modifications of the lift).

Especially a statement must be given with regard to the following points:

- The intended use of the lift
- The expected yearly number of trips
- The expected number of trips up to the moment when having reached the limit at which the steel wire ropes have to be discarded.
- The rope safety factor which is required with respect to the lift installation

These statements and the calculations based on the statements must be documented and must be enclosed to the technical documents.

See number 3.3 of this certificate.

2.3.2 The rope safety factor must be at least $S_f = 12$.

2.3.3 In case of lift installations with reduced number of trips reps. with a pulley made of plastic (at the piston), the trips must be registered by a safe and reliable automatic counter device (e. g. by a power-fail proof, non-resettable electric counter).

When the number of trips after which the ropes have to be discarded is reached, the lift must be safely stopped in the next landing by the control system and the suspension ropes must be replaced.

See number 3.3 and 3.4 of this certificate.

2.3.4 The suspension ropes must be discarded in case of (for all lift installations)

- 26 broken wires within a length of 30 x d or
- 13 broken wires within a length of 6 x d or
- a diameter reduction of more than 6% related to the nominal rope diameter

and (for lift installations with a reduced number of trips)

- When reaching the maximum number of trips which has been determined by calculation.

2.3.5 The ratio between the diameter of the diverting pulleys and rope diameter must be at least: $\mathbf{D_U / d_{Nom}} \geq 18.46$

2.3.6 The diameter of the diverting pulley must be at least $D_U \geq 120$ mm.

2.3.7 The diverting pulleys must be designed with a semi-circular groove made of steel or cast iron (hardened or non-hardened) or made of plastics.

2.3.8 All additional requirements of EN81-20:2014 regarding rope drives must be kept, e.g. like:

- junction of the rope termination (80% of the minimum breaking load)
- distribution of load of suspension
- protections at pulleys (bracket against derailing of the rope, nip guards)
- visual examination on the traction sheave is guaranteed

3 Remarks

3.1 A sign with particulars for identification, containing the name of the manufacturer and the type specification must be attached at the product, to be able to check the conformity of the examined product with the series production.

3.2 The certificate concerning the examination of conformity may be used only in connection with the pertinent Annex.

3.3 The following installations will be regarded as lifts with a reduced number of trips.

3.3.1 Traction lifts according EN 81-20:2014 (D) and EN 81-50:2014 (D) with a deviating rope safety factor (smaller than the rope safety factor which is defined in EN 81-50:2014 (D), Number 5.12.

The deviant rope safety factor (smaller than the rope safety factor which is defined in EN 81-50:2014 (D), Number 5.12) is the result of the determined maximum number of trips, after which the steel wire ropes has to be discard.

In the case of a change of the intended use of the lift installation (using the lift more frequently), a improvement of the lift installation may become necessary.

3.3.2 Indirect acting hydraulic lifts according EN 81-20:2014 (D) and EN 81-50:2014 (D) with a determined maximum number of trips of less than 600.000 trips, after which the steel wire ropes has to be discarded.

In the case of a change of the intended use of the lift installation (using the lift more frequently), a improvement of the lift installation may become necessary.

3.4 Each change of direction is regarded as a trip which shall be registered by the automatic counting device.

Re-levelling movements as far as possible should be avoided. Re-levelling movements exceeding the range of $l/d_{Nom} > 10$ (bending length ratio = *bending length / nominal diameter of the rope*) – in case of a preceding change of direction – must be evaluated as a trip.

3.5 The following equivalent number of traction sheaves will be taken as basis:

$N_{equiv\,(t)}$	V-groove with groove angles γ of								
	35°	36°	38°	40°	42°	45°	50°	55°	60°
	18.5	16	12	10	8	6.5	5	3.7	3
	Semi-circular groove with undercut and undercut angles β of								
	0°	70°	75°	80°	85°	90°	95°	100°	105°
	1	2.3	2.5	3	3.8	5	6.7	10	15.2

Deviating from EN EN 81-50:2014 (D), Number 5.12 table 2 some additional V-grooves (V-angle γ = 55° and 60°) and Semi-circular grooves with undercut (U-angle β = 70°) will be used, the corresponding equivalent number of traction sheaves $N_{equiv(t)}$ has been determined by extrapolation.

3.6 The test results refer to the test specimen and the corresponding examination of conformity only.

3.7 The list of safety components (annex III of Directive 2014/33/EU) doesn't contain rope drives. For that reason no EU-type examination certificate according to annex IV part A (EU-type examination for safety components for lifts) of the Directive 2014/33/EU, can be issued for that.

3.8 This certificate is based on the state of the art, which is documented trough the current harmonized standards. Changes resp. extensions of these standards or a further development of the state of the art may make a revision of this report necessary.

3.9 If new knowledge should occur, the test laboratory reserves the right, to give additional conditions concerning the use of the rope drive, or to modify existing conditions.

3.10 The certificate about an examination of conformity number CA 298 can be added to the required reading technical dossier as a help for decision of the notified body.