



TECHNICAL REQUIREMENTS

ELECTRICAL

Document No. OL-TR-ER-000

LOW VOLTAGE MOTORS

Document No. OL-TR-ER-011

05					
04					
03					
02	Update	09-10-2024	EK	ORLEN Lietuva	ORLEN Lietuva
01	Update	28-10-2019	EK	ORLEN Lietuva	ORLEN Lietuva
00	Final Issue	01-Sep-14	D ² RT' <i>engineering</i>	ORLEN Lietuva	ORLEN Lietuva
Rev.	Revision description	Date	Prep. by	Check. by	Appr. by

TABLE OF CONTENTS

1. SCOPE	4
2. REFERENCES	4
3. TERMS AND DEFINITIONS	4
4. GENERAL	5
5. DATA SHEET	8
6. TECHNINĖ DOKUMENTACIJA / TECHNICAL DOCUMENTATION	9

TABLE OF TABLES

<i>Table 1. Motor Voltage</i>	5
-------------------------------------	---

1. SCOPE

The present document is intended to define the technical requirements of the low voltage (LV) motors.

2. REFERENCES

The latest editions of the following publications are to be used with this Technical Requirements as applicable:

Galios elektros įrenginių įrengimo taisyklės

Specialiųjų patalpų ir technologinių procesų elektros įrenginių įrengimo taisyklės

LST EN 60034-6:1999 *Sukiosios elektros mašinos. 6 dalis. Aušinimo būdai (IC kodas) (IEC 60034-6:1991) Rotating electrical machines. Part 6: Methods of cooling (IC Code) (IEC 60034-6:1991)*

LST EN 60034 *Sukiosios elektros mašinos. Rotating electrical machines. Pastaba: Taikyti susijusius šios serijos standartus. Note: Apply the relevant standards of this series.*

LST EN ISO 1680:2014 *Akustika. Sukiųjų elektros mašinų spinduliuojamo ore sklindančio triukšmo tyrimo programa (ISO 1680:2013). Acoustics - Test code for the measurement of airborne noise emitted by rotating electrical machines (ISO 1680:2013)*

OL-TR-GR-000 *General Requirements*

OL-TR-ER-000 *Electrical. General*

3. TERMS AND DEFINITIONS

LV: Low voltage, the voltage from 50V till 1000V AC and from 75V till 1500V DC.

MCC: Motor control centers.

DC: Direct current.

DCS: Distributed control system.

DE: Drive end.

NDE: Not drive end.

MJB: Main Junction Box

AJB: Auxiliary junction box

4. GENERAL

4.1 Motor voltage supply is as shown in Table 1.

Table 1. Motor Voltage

Motor	Voltage
Up to 0,5kW	230V, 1 phase, 50Hz
From 0,75kW to 200kW	400V, 3 phases, 50Hz
201kW and more	6000V, 3 phases, 50Hz

4.2 LV motors the capacity of which from 0,75kW to 200kW, completely enclosed, cooled using air type IC0A1 (IEC 60034-6).

4.3 Outside installed motors should be with ~230V, 1 phase motor anticondense heater.

4.4 PT100/PTC temperature sensors for measuring of the windings and bearings temperature shall be used if it request motor producer or using conditions. The bearing temperature sensors shall be installed for >100kW motors which are used in hazardous area.

4.5 The LV motors should be - 3-phase squirrel-cage induction motors with direct start and with minimum F temperature class of winding insulation.

4.6 Main Junction Box (MJB) should be located at the top of the motor and be adapted for rotation every 90 degree. Other position of MJB shall be agreed with OL.

4.7 Auxiliary junction boxes (AJB) should be used for connection of sensors for measurement of bearing / winding temperature or vibrations (according to the need).

4.8 The LV should be equipped with ball bearings and permanently greased (prelubricated) with frame size up to and including 250.

4.9 The maximal level of noise shouldn't exceed 85 dB, measured acc. to LST EN ISO 1680:2014, from distance 1m.

4.10 Motors starting current rated with nominal current should not exceed the following values - 6.0 – 8.0. If motors aren't in the range as listed above further details have to be agreed with OL.

4.11 Terminals blocks of temperature measurement circuits and vibration measurement circuits should be split into separate AJB.

4.12 Bearing temperature sensors will be used DCS/ESD. Connections of temperature sensors should be into AJB. Explosion proof execution of temperature sensors and AJB for connection of those temperature sensors should fulfil OL'S requirements for instrumentation Section also.

4.13 Sensor for temperature measurement of each phase winding (sensors for stator winding temperature measurement should withstand voltage test with voltage value of $2 \times (2 \times U_n + 1 \text{ kV})$). Connections of winding temperature sensors should be routed to

separate junction box. Sensors for winding temperature measurement will co-operate with motor protection system.

- 4.14** Motor winding temperature measurement system consisting of temperature sensors, connecting cables and AJB should be executed in accordance with requirements of motor execution and installation area and generally shall be "increased safety" or "flameproof" type execution.
- 4.15** Anti-condensing heaters: terminals for anti-condensing heaters should be connected to separate junction box or in main terminal box.
- 4.16** Vibration sensors as per OL requirement for instrumentation discipline; terminals for vibration sensors should be connected to separate junction box.
- 4.17** Motors should be appropriate for operation during three year period between two subsequent scheduled maintenance activities.
- 4.18** Manufacturer is obliged to define conditions admitting any motor for 3-year operation period, i.e. indispensable periodical diagnosis possible for execution during normal operation of that motor at its normal working place.
- 4.19** Obligatory Regulations of European Union should be applied (after earlier obtaining of OL acceptance) in the case when economic reasons indicate on solutions different from above mentioned ones (see 2 points before).
- 4.20** Motors should have effective values of own vibration velocity not higher than values of vibration level defined as reduced, in accordance with standard LST EN 60034-14:2004 Rotating electrical machines. Part 14: Mechanical vibration of certain machines with shaft heights 56 mm and higher. Measurement, evaluation and limits of vibration severity (IEC 60034-14:2003).
- 4.21** The motor manufacturer shall indicate the measured motor vibration root-mean-square value in shop testing certificate which providing to OL.
- 4.22** Motor soft start systems or frequency converters should be used if proper operation of driving motors with direct start due to starting current or proper co-operation between motor and driving machine are impossible.
- 4.23** OL reserves the right for final inspection of the motors which are important for the process at premises of motor or motor/driven machine aggregate manufacturers.
- 4.24** LV Motors should be powered from LV Switchgear through cables directly connected to the main terminal box of the motor.
 - 4.24.1** Motor Terminal Boxes should be suitable for chosen cables and cable accessories and they should be located in such a way that easy access to terminals was assured.
 - 4.24.2** Method of cable entering the motor terminal box should consider influence of mechanical vibrations on reliable electrical connection of the motor.
 - 4.24.3** Cable sealing elements in Motor Terminal Boxes should provide easy cable disconnection from motor without damages of cable. The cable sealing elements should be mounted on the removable plate of terminal box.

- 4.25** LV Motors should be powered from LV Switchgear through cables and intermediate junction boxes near the motors. This requirement can be applied in case when motor supply cable size is 95mm² and up.
- 4.26** Connection between intermediate junction boxes and LV motors should be accomplished by means of flexible cable in rubber insulation.
- 4.27** Motor location should assure easy assembly and disassembly of the motor.
- 4.28** Electric motors executed in accordance with the following standards or its equivalents should not be selected for using in hazardous areas:
- LST EN 60079-15** *Electrical apparatus for explosive gas atmospheres. Part 15: Construction, test and marking of type of protection "n" electrical apparatus (IEC 60079-15)*
- LST EN 60079-7** *Explosive atmospheres - Part 7: Equipment protection by increased safety "e"*
- 4.29** All motor shall be at least IE3 efficiency class and suitable for use in C4 corrosive environment.
- 4.30** Control stations near motors must have emergency stop button with possibility to lock button in pushed state.
- 4.31** Electrical motors shall have a possibility to connect bearings temperature sensors to "Bentley-Nevada", DCS and ESD systems.

5. DATA SHEET

ELEKTROS VARIKLIO DUOMENŲ LAPAS

PAGRINDINIAI TECHNINIAI REIKALAVIMAI KEY TECHNICAL REQUIREMENTS		PILDO TIEKĖJAS FILL SUPPLIER
SUMONTAVIMO VIETA / LOCATION		
KIEKIS / QUANTITY		
EKSPLOATAVIMO APLINKA / OPERATING ENVIRONMENT		
EKSPLOATAVIMO TEMPERATŪRA / AMBIENT TEMPERATURE		
TIPAS / TYPE		
MONTAVIMO BŪDAS / METHOD OF INSTALLATION		
AUŠINIMAS / COOLING		
AŠIES AUKŠTIS / FRAME SIZE		
DARBO REŽIMS / OPERATING MODE		
ĮTAMPA / VOLTAGE		
GALIA / POWER		
GREITIS / SPEED		
IP		
APVIJŲ IZOLIACIJOS KLASĖ / INSULATION CLASS		
PALEIDIMAS / START-UP		
SPROGOSAUGA / EXPLOSION SAFETY		
SUKIMOSI KRYPTIS / ROTATION DIRECTION		
KABELIŲ PRIJUNGIMO DĖŽĖ / CABLE CONNECTION BOX		
KABELIŲ SANDARIKLIŲ PLOKŠTĖ / CABLE GLAND FIXING PLATE		
KABELIŲ ĮVADAI / CABLE ENTRY		
KABELIS / CABLE		
KABELIŲ SANDARIKLIAI / CABLE GLAND		
ŠILDYTUVAS / HEATER		

6. TECHNINĖ DOKUMENTACIJA / TECHNICAL DOCUMENTATION

6.1 Pardavėjas/Tiekėjas pateikia dokumentus, pažymėtus „x“ simboliu. Vendor (bidder) shall furnish documents for all items indicated by an „x“.

Dokumentai pateikiami su pasiūlymu [*Documents supporting proposal*]

▼ **Dokumentai pateikiami su įranga (prietaisu)** [*Documents furnished together with equipment (device)*]

		DOKUMENTŲ APRAŠYMAS [<i>DESCRIPTION OF DOCUMENTS</i>]
X	X	1. Techniniai duomenys ir specifikacijos [<i>Technical data and specifications</i>]
	X	2. EB atitikties deklaracija (pagal ATEX (Potencialiai sprogios aplinkos) 94/9/EC) [<i>EC Declaration of Conformity (under ATEX (Potentially explosive atmospheres) 94/9/EC)</i>]
	X	3. EB tipo tyrimo sertifikatas (pagal ATEX Potencialiai sprogios aplinkos) 94/9/EC) [<i>EC-type examination certificate (under ATEX (Potentially explosive atmospheres) 94/9/EC)</i>]
	X	4. Montavimo (įrengimo, pajungimo) instrukcija [<i>Installation manual</i>]
	X	5. Techninės priežiūros (aptarnavimo ir remonto, surinkimo ir išardymo) instrukcija [<i>Maintenance (repair) manual (assembly/desassembly)</i>]
	X	6. Eksploatavimo (naudojimo) instrukcija [<i>Operation manual</i>]
	X	7. Gamyklinių bandymų ir matavimų protokolai [<i>Manufacture test reports</i>](ROUTINE TEST)
	X	8. Elektros variklio apvijų duomenys [<i>Motor windings data</i>]
	X	9. Elektros variklio veleno brėžinys [<i>Motor rotor shaft dimensional drawing</i>]
	X	10. Elektros variklio skersinio pjūvio brėžinys su išvardintomis dalimis [<i>Motor cross-section sketch with parts names</i>]
	X	11. Elektros variklio sprogosaugos elementų išdėstymo brėžinys su nurodytais leistinais tarpelių dydžiais [<i>Motor explosion protection gaps drawing/map with gaps dimensions (for eexd type)</i>]
X	X	12. Brėžiniai su matmenimis [<i>Dimensional drawing</i>]

6.2 Reikalavimai instrukcijoms [*Requirements for manuals*]:

- Instrukcijos turi būti pateikiamos lietuvių ir anglų kalba, ir, jeigu yra parengta, rusų kalba. Papildomai instrukcijos rinkmena turi būti pateikiama teksto formate (DOC (TXT)) ar PDF formate (diskelyje, kompaktiniame diske ar atsiunčiama elektroniniu paštu). [*Manuals shall be furnished in Lithuanian and English language, and in Russian if available. Manuals may be provided in electronic version in text (DOC (TXT)) or PDF format with floppy disk, compact disk.*]
- Instrukcijose turi būti pateikti įrengimui (prietaisui) naudoti, eksploatuoti, kontroliuoti, tikrinti veikimo tinkamumą, remontuoti būtini brėžiniai ir schemos kartu su naudingais nurodymais, ypač dėl saugos. [*The instructions shall contain diagrams and drawings necessary for commencing, supervising, controlling the work, checking for correct operations, information of relevant equipment repair centers, other useful instructions, especially related to safety.*]