



Fraunhofer

**TESTED[®]
DEVICE**

LS Cable Ltd.
Factory Automation Cable
Report No. LS 0609-362

DUPLIKAT

Statement of
Qualification

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Manufacturer of object to be tested:

LS Cable Ltd.
555 Hogye-dong, Dongan-gu
Anyang-si, Gyeonggi-do
431-831, Korea

Component tested:

Cabel System

Type:

Factory Automation Cable (PVC Jacket type)

Test parameters of object to be assessed:

Stroke length: 820 mm
Set of parameters 1 : $v_1 = 0.5 \text{ m/s}$; $a_1 = 1.0 \text{ m/s}^2$
Set of parameters 2 : $v_2 = 1.2 \text{ m/s}$; $a_2 = 2.0 \text{ m/s}^2$
Set of parameters 3 : $v_3 = 2.0 \text{ m/s}$; $a_3 = 5.0 \text{ m/s}^2$

Performed tests:

Random check measurements of particle emission (airborne) at representative points.

Test results / classification:

When the below mentioned test piece is being operated at the conditions of the following table, it is suitable for use in cleanrooms fulfilling the air cleanliness specifications according to ISO 14644-1 respectively according to US Fed. Std. 209 E.

Type	Air Cleanliness Class acc. to ISO 14644-1/US Fed. Std 209 E		
	$v_1=0.5 \text{ m/s}$	$v_2=1.2 \text{ m/s}$	$v_3=2.0 \text{ m/s}$
Factory Automation Cable (PVC Jacket type)	ISO Class 1 Class 1	ISO Class 4 Class 10	ISO Class 4 Class 10

Standards used for the qualification:

VDI 2083 Part 1, 4 and 8; ISO 14644-1

Test environment:

Cleanroom of Air Cleanliness Class ISO Class 1 (according to ISO 14644-1)

Air flow velocity: 0.45 m/s

Air flow guidance: vertical unidirectional air flow from ceiling to floor (raised floor)

Temperature: $71.6^\circ\text{F} \pm 0.9^\circ\text{F}$

Relative humidity: $45\% \pm 5\%$

The measuring equipment used for the qualification is regularly calibrated and is based on national and international standards. In the case where no national standards exist, the measuring procedure used corresponds with technical regulations and norms valid at the time of the measurement. The documents drawn up for this procedure are available for viewing.



Fraunhofer Institut
Produktionstechnik und
Automatisierung

Fraunhofer-Institut
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Abteilung Reinst- und Mikroproduktion
Department Cleanroom Manufacturing

Nobelstrasse 12
D-70569 Stuttgart

Stuttgart, Germany, 27th September 2006

Place, date

Signature of person responsible