TEST REPORT

On Behalf of

TMS LITE SDN. BHD.

Direct Illumination-UV375

Model No.: UV375 (Others see model list)

Prepared for :	**TMS LITE SDN. BHD.**
Address:	**8, JALAN CASSIA SELATAN 3/1, TAMAN PERINDUSTRIAN BATU KAWAN, 14110 SIMPANG AMPAT, PULAU PINANG, MALAYSIA**

Prepared by :	**Shenzhen PSI Testing Co., Ltd.**
Address:	**1-2/F., Building 5, Yudafu Industrial Park, No.10, Xingye West Road, Shajing Subdistrict, Bao'an District, Shenzhen, Guangdong, China**

Date of Test:	**December 09, 2025 to January 22, 2026**
Date of Report:	**January 23, 2026**
Report Number:	**psi2511119-C01-R02**
Version Number:	**V0**

TEST REPORT
IEC 62471
Photobiological safety of lamps and lamp systems

Report Reference No.....:	psi2511119-C01-R02
Tested by (name + signature).....:	Jhui Song
Reviewed By (name + signature).....:	Kevin Mei
Date of issue.....:	January 23, 2026
Total number of pages .....:	24 pages
Testing Laboratory.....:	Shenzhen PSI Testing Co., Ltd.
Address .....:	1-2/F., Building 5, Yudafu Industrial Park, No.10, Xingye West Road, Shajing Subdistrict, Bao'an District, Shenzhen, Guangdong, China
Testing location/ procedure .....:	TL ☒ RMT ☐ SMT ☐ WMT ☐ TMP ☐
Applicant's name.....:	TMS LITE SDN. BHD.
Address .....:	8, JALAN CASSIA SELATAN 3/1, TAMAN PERINDUSTRIAN BATU KAWAN, 14110 SIMPANG AMPAT, PULAU PINANG, MALAYSIA
Test specification:	
Standard.....:	IEC 62471:2006
Test procedure .....:	LVD Test report
Non-standard test method.....:	N/A
Test Report Form No.....:	IEC62471B
TRF Originator.....:	VDE Testing and Certification Institute
Master TRF.....:	Dated 2018-08-16
Test item description .....:	Direct Illumination-UV375
Model/Type reference .....:	UV375 (Others see model list)
Model difference.....:	All models are the same except for model name.
Manufacturer .....:	TMS LITE SDN. BHD.
Address .....:	8, JALAN CASSIA SELATAN 3/1, TAMAN PERINDUSTRIAN BATU KAWAN, 14110 SIMPANG AMPAT, PULAU PINANG, MALAYSIA
Trademark .....:	TMS LITE
Ratings .....:	DC24V, 0.3A, 7.2W

Test item particulars	
Tested lamp	☒ continuous wave lamps ☐ pulsed lamps
Tested lamp system	--
Lamp classification group	☐ exempt ☐ risk 1 ☒ risk 2 ☐ risk 3
Lamp cap	N/A
Bulb	--
Rated of the lamp	DC24V
Furthermore marking on the lamp	--
Seasoning of lamps according IEC standard	--
Used measurement instrument	OST-500 system
Temperature by measurement	23 ± 2 °C
Information for safety use	--

Possible test case verdicts:

– test case does not apply to the test object	N/A (Not applicable)
– test object does meet the requirement	P (Pass)
– test object does not meet the requirement	F (Fail)

Testing:

Date of receipt of test item	December 05, 2025
Date (s) of performance of tests	December 09, 2025 to January 22, 2026

General remarks:

The test results presented in this report relate only to the object tested.
This report shall not be reproduced, except in full, without the written approval of the Issuing testing laboratory.
"(See Enclosure #)" refers to additional information appended to the report.
"(See appended table)" refers to a table appended to the report.
Throughout this report a ~~comma~~ (point~~)~~ is used as the decimal separator.
Decision rules for the conclusion of this test report: decision by actual test data without considering measurement uncertainty.
List of test equipment must be kept on file and available for review.

Summary of the test report

The complete report including following parts:

1. All clauses of IEC 62471:2006;
2. Differences between IEC 62471:2006 and EN 62471:2008, see the ATTACHMENT;
3. Appendix 1: Photo Documentation.

Summary of compliance with National Differences (List of countries addressed):

EU Group Differences

☒ **The product fulfils the requirements of EN 62471:2008**

General product information:

1. Product: Direct Illumination-UV375.
2. This product is an UV light, and at the request of the applicant, this report tests normal working status.
3. All models are the same except for model name.
4. All tests were performed on model: UV375.
5. The unit classifications are the Risk Group 2.

RISK GROUP 2
CAUTION UV emitted from this product. Eye or skin irritation may result from exposure. Use appropriate shielding.

Label for Photobiological safety

Note:

The label for Photobiological safety

1) Text and borders should be black on a yellow background

2) The label size should be adapted to the size of the product.

3) Reproductions of all required labels should be included in the user manual.

Model List				
BHC	BHC2	BHC3	BHC4	BHC5
BHC6	BHC7	BHD	BHD2	BHD3
BHD4	BHD5	BHD6	BHD7	BHDQ
BHDQ2	BHDQ3	BHDQ4	BHDQ5	BHDQ6
BHDQ7	BHDS	BHDS2	BHDS3	BHDS4
BHDS5	BHDS6	BHDS7	BHH	BHH2
BHH3	BHH4	BHH5	BHH6	BHH7
BHL	BHL2	BHL3	BHL4	BHL5
BHL6	BHL7	BHLC	BHLC2	BHLC3
BHLC4	BHLC5	BHLC6	BHLC7	BHLQ
BHLQ2	BHLQ3	BHLQ4	BHLQ5	BHLQ6
BHLQ7	BHLR	BHLR2	BHLR3	BHLR4
BHLR5	BHLR6	BHLR7	BHP	BHP2
BHP3	BHP4	BHP5	BHP6	BHP7
BHS	BHS2	BHS3	BHS4	BHS5
BHS6	BHS7	CAL	CAL2	CAL3
CAL4	CAL5	CAL6	CAL7	CAS
CAS2	CAS3	CAS4	CAS5	CAS6
CAS7	CAS20	CAS25	CAS30	CASC
CASC2	CASC3	CASC4	CASC5	CASC6
CASC7	CFF	CFF2	CFF3	CFF4
CFF5	CFF6	CFF7	COB	COB2
COB3	COB4	COB5	COB6	COB7
COE	COE2	COE3	COE4	COE5
COE6	COE7	CTL	CTL2	CTL3
CTL4	CTL5	CTL6	CTL7	D
D2	D3	D4	D5	D6
D7	D-BHLX3	D-BHLX4	D-BHLX5	D-BHLX6
D-BHLX7	D-BHLX8	D-BHLX9	D-CAS	D-CAS2
D-CAS3	D-CAS4	D-CAS5	D-CAS6	D-CAS7
D-F	D-F2	D-F3	D-F4	D-F5

D-F6	D-F7	D-HLBQ2	D-HLBQ3	D-HLBQ4
D-HLBQ5	D-HLBQ6	D-HLBQ7	D-HLBQ8	D-IDS5
D-IDS6	D-IDS7	D-IDS8	D-IDS9	D-IDS10
D-IDS11	D-IDT3	D-IDT4	D-IDT5	D-IDT6
D-IDT7	D-IDT8	D-IDT9	D-MLBQ	D-MLBQ2
D-MLBQ3	D-MLBQ4	D-MLBQ5	D-MLBQ6	D-MLBQ7
DM8700DX	MA	MA2	MA3	MA4
MA5	MA-IDD	MA-IDD2	MA-IDD3	MA-IDD4
MA-IDD5	MA-IDD6	MA-IDD7	MA-IDQ	MA-IDQ3
MA-IDQ4	MA-IDQ5	MA-IDQ6	MA-IDQ7	MA-IDQ8
DFR	DFR2	DFR3	DFR4	DFR5
DFR6	DFR7	DLA	DLA2	DLA3
DLA4	DLA5	DLA6	DLA7	DLB
DLB2	DLB3	DLB4	DLB5	DLB6
DLB7	DLC	DLC2	DLC3	DLC4
DLC5	DLC6	DLC7	DLF	DLF2
DLF3	DLF4	DLF5	DLF6	DLF7
DLQ	DLQ2	DLQ3	DLQ4	DLQ5
DLQ6	DLQ7	DLR	DLR2	DLR3
DLR4	DLR5	DLR6	DLR7	DLS
DLS2	DLS3	DLS4	DLS5	DLS6
DLS7	DLW	DLW2	DLW3	DLW4
DLW5	DLW6	DLW7	FIBX	FIBX2
FIBX3	FIBX4	FIBX5	FIBX6	FIBX7
GTL	GLT2	GLT3	GLT4	GLT5
GLT6	GLT7	HBAX	HBAX2	HBAX3
HBAX4	HBAX5	HBAX6	HBAX7	HBBA
HBBA2	HBBA3	HBBA4	HBBA5	HBBA6
HBBA7	HBAQ	HBAQ2	HBAQ3	HBAQ4
HBAQ5	HBAQ6	HBAQ7	HBBC	HBBC2
HBBC3	HBBC4	HBBC5	HBBC6	HBBC7
HBBQ	HBBQ2	HBBQ3	HBBQ4	HBBQ5
HBBQ6	HBBQ7	HBBX	HBBX2	HBBX3
HBBX4	HBBX5	HBBX6	HBBX7	HBF
HBF2	HBF3	HBF4	HBF5	HBF6
HBF7	HBS	HBS2	HBS3	HBS4
HBS5	HBS6	HBS7	HBFS	HBFS2
HBFS3	HBFS4	HBFS5	HBFS6	HBFS7
HBL	HBL2	HBL3	HBL4	HBL5
HBL6	HBL7	HBLQ	HBLQ2	HBLQ3
HBLQ4	HBLQ5	HBLQ6	HBLQ7	HBLP
HBLP2	HBLP3	HBLP4	HBLP5	HBLP6
HBLP7	HBRP	HBRP2	HBRP3	HBRP4
HBRP5	HBRP6	HBRP7	HBQ	HBQ2
HBQ3	HBQ4	HBQ5	HBQ6	HBQ7

HBR	HBR2	HBR3	HBR4	HBR5
HBR6	HBR7	HCAL	HCAL2	HCAL3
HCAL4	HCAL5	HCAL6	HCAL7	HCAS
HCAS2	HCAS3	HCAS4	HCAS5	HCAS6
HCAS7	HCASP	HCASP2	HCASP3	HCASP4
HCASP5	HCASP6	HCASP7	HLBS	HLBS2
HLBS3	HLBS4	HLBS5	HLBS6	HLBS7
HDLB	HDLB2	HDLB3	HDLB4	HDLB5
HDLB6	HDLB7	HDLBQ	HDLBQ2	HDLBQ3
HDLBQ4	HDLBQ5	HDLBQ6	HDLBQ7	HDLQ
HDLQ2	HDLQ3	HDLQ4	HDLQ5	HDLQ6
HDLQ7	HDLR	HDLR2	HDLR3	HDLR4
HDLR5	HDLR6	HDLR7	HHPD	HHPD2
HHPD3	HHPD4	HHPD5	HHPD6	HHPD7
HIDQ	HIDQ2	HIDQ3	HIDQ4	HIDQ5
HIDQ6	HIDQ7	HIDS	HIDS2	HIDS3
HIDS4	HIDS5	HIDS6	HIDS7	HLBD
HLBD2	HLBD3	HLBD4	HLBD5	HLBD6
HLBD7	HLBDQ	HLBDQ2	HLBDQ3	HLBDQ4
HLBDQ5	HLBDQ6	HLBDQ7	HLBRX	HLBRX2
HLBRX3	HLBRX4	HLBRX5	HLBRX6	HLBRX7
HLBSQ	HLBSQ2	HLBSQ3	HLBSQ4	HLBSQ5
HLBSQ6	HLBSQ7	HLLA	HLLA2	HLLA3
HLLA4	HLLA5	HLLA6	HLLA7	HLSQ
HLSQ2	HLSQ3	HLSQ4	HLSQ5	HLSQ6
HLSQ7	HLSW	HLSW2	HLSW3	HLSW4
HLSW5	HLSW6	HLSW7	HLSWP	HLSWP2
HLSWP3	HLSWP4	HLSWP5	HLSWP6	HLSWP7
HPD	HPD2	HPD3	HPD4	HPD5
HPD6	HPD7	HPF	HPF2	HPF3
HPF4	HPF5	HPF6	HPF7	HPFP
HPFP2	HPFP3	HPFP4	HPFP5	HPFP6
HPFP7	HSBT	HSBT2	HSBT3	HSBT4
HSBT5	HSBT6	HSBT7	HMIL	HMIL2
HMIL3	HMIL4	HMIL5	HMIL6	HMIL7
IDD	IDD2	IDD3	IDD4	IDD5
IDD6	IDD7	IDDC	IDDC2	IDDC3

IDDC4	IDDC5	IDDC6	IDDC7	IDQ
IDQ2	IDQ3	IDQ4	IDQ5	IDQ6
IDQ7	IDS	IDS2	IDS3	IDS4
IDS5	IDS6	IDS7	IDSL	IDSL2
IDSL3	IDSL4	IDSL5	IDSL6	IDSL7
IDT	IDT2	IDT3	IDT4	IDT5
IDT6	IDT7	IPE	IPE2	IPE3
IPE4	IPE5	IPE6	IPE7	LBDQ
LBDQ2	LBDQ3	LBDQ4	LBDQ5	LBDQ6
LBDQ7	LBL	LBL2	LBL3	LBL4
LBL5	LBL6	LBL7	LBM	LBM2
LBM3	LBM4	LBM5	LBM6	LBM7
LBMQ	LBMQ2	LBMQ3	LBMQ4	LBMQ5
LBMQ6	LBMQ7	LBQ	LBQ2	LBQ3
LBQ4	LBQ5	LBQ6	LBQ7	LBQ25
LBQ30	LBQ40	LBQ45	LBRM	LBRM2
LBRM3	LBRM4	LBRM5	LBRM6	LBRM7
LBRP	LBRP2	LBRP3	LBRP4	LBRP5
LBRP6	LBRP7	LBRQ	LBRQ2	LBRQ3
LBRQ4	LBRQ5	LBRQ6	LBRQ7	LBS
LBS2	LBS3	LBS4	LBS5	LBS6
LBS7	LBS25	LBS30	LBS40	LBS45
LBSX	LBSX2	LBSX3	LBSX4	LBSX5
LBSX6	LBSX7	LLA	LLA2	LLA3
LLA4	LLA5	LLA6	LLA7	LLD
LLD2	LLD3	LLD4	LLD5	LLD6
LLD7	LSN	LSN2	LSN3	LSN4
LSN5	LSN6	LSN7	LSNL	LSNL2
LSNL3	LSNL4	LSNL5	LSNL6	LSNL7
LSNT	LSNT2	LSNT3	LSNT4	LSNT5
LSNT6	LSNT7	LSNY	LSNY2	LSNY3
LSNY4	LSNY5	LSNY6	LSNY7	LSQ
LSQ2	LSQ3	LSQ4	LSQ5	LSQ6
LSQ7	LSQF	LSQF2	LSQF3	LSQF4
LSQF5	LSQF6	LSQF7	LSQC	LSQC2
LSQC3	LSQC4	LSQC5	LSQC6	LSQC7
LSW	LSW2	LSW3	LSW4	LSW5

LSW6	LSW7	LTRN	LTRN2	LTRN3
LTRN4	LTRN5	LTRN6	LTRN7	LTRNC
MAL	MAL2	MAL3	MAL4	MAL5
MAL6	MAL7	MBBC	MBBC2	MBBC3
MBBC4	MBBC5	MBBC6	MBBX	MBBX2
MBBX3	MBBX4	MBBX5	MBBX7	MCAX
MCAX2	MCAX3	MCAX4	MCAX5	MCAX6
MCAX7	MD-BHDQ2	MD-BHDQ3	MD-BHDQ4	MD-BHDQ5
MD-BHDQ6	MD-BHDQ7	MD-BHDQ8	MD-IDQ3	MD-IDQ4
MD-IDQ5	MD-IDQ6	MD-IDQ7	MD-IDQ8	MD-IDQ9
MD-ITD3	MD-IDT4	MD-IDT5	MD-IDT6	MD-IDT7
MD-IDT8	MD-IDT9	MD-MLBQ2	MD-MLBQ3	MD-MLBQ4
MD-MLBQ5	MD-MLBQ6	MD-MLBQ7	MD-MLBQ8	MIL
MIL2	MIL3	MIL4	MIL5	MIL6
MIL7	MILX	MILX2	MILX3	MILX4
MILX5	MILX6	MILX7	MLBQ	MLBQ2
MLBQ3	MLBQ4	MLBQ5	MLBQ6	MLBQ7
MLBX	MLBX2	MLBX3	MLBX4	MLBX5
MLBX6	MLBX7	MLLA	MLLA2	MLLA3
MLLA4	MLLA5	MLLA6	MLLA7	MLSW
MLSW2	MLSW3	MLSW4	MLSW5	MLSW6
MLSW7	MTW	MTW2	MTW3	MTW4
MTW5	MTW6	MTW7	LSWC	LSWC2
LSWC3	LSWC4	LSWC5	LSWC6	LSWC7
LLAC	LLAC2	LLAC3	LLAC4	LLAC5
LLAC6	LLAC7	PM	PM2	PM3
PM4	PM5	PM6	PM7	PTL
PLT2	PLT3	PLT4	PLT5	PLT6
PLT7	SWIR	SWIR2	SWIR3	SWIR4
SWIR5	SWIR6	SWIR7	TTL	TTL2
TTL3	TTL4	TTL5	TTL6	TTL7
VLT	VLT2	VLT3	VLT4	VLT5
VLT6	VLT7	DLP	DLP2	DLP3
DLP4	DLP5	DLP6	DLP7	DLT
DLT2	DLT3	DLT4	DLT5	DLT6
DLT7	DLG	DLG2	DLG3	DLG4
DLG5	DLG6	DLG7	F-DLA	F-DLA2

F-DLA3	F-DLA4	F-DLA5	F-DLA7	F-DLC
F-DLC2	F-DLC3	F-DLC4	F-DLC5	F-DLC6
F-DLC7	F-DLG	F-DLG2	F-DLG3	F-DLG4
F-DLG5	F-DLG6	F-DLG7	F-DLP	F-DLP2
F-DLP3	F-DLP4	F-DLP5	F-DLP6	F-DLP7
F-DLS4	F-DLS5	F-DLS6	F-DLS7	F-DLS8
F-DLS9	F-DLS10	F-DXX	F-DXX2	F-DXX3
F-DXX4	F-DXX5	F-DXX6	F-DXX7	F-DXXD
F-DXXD2	F-DXXD3	F-DXXD4	F-DXXD5	F-DXXD6
F-DXXD7	MCR	MCR2	MCR3	MCR4
MCR5	MCR6	MCR7	STL	STL2
STL3	STL4	STL5	STL6	STL7
OD-LSQ	OD-LSQ2	OD-LSQ3	OD-LSQ4	OD-LSQ5
OD-LSQ6	OD-LSQ7	OD-LSQF	OD-LSQF2	OD-LSQF3
OD-LSQF4	OD-LSQF5	OD-LSQF6	OD-LSQF7	OD-LLA
OD-LLA2	OD-LLA3	OD-LLA4	OD-LLA5	OD-LLA6
OD-LLA7	OD-LSW	OD-LSW2	OD-LSW3	OD-LSW4
OD-LSW5	OD-LSW6	OD-LSW7	OD-HLBS2	OD-HLBS3
OD-HLBS4	OD-HLBS5	OD-HLBS6	OD-HLBS7	OD-HLBS8
L-HBQ3	L-HBQ4	L-HBQ5	L-HBQ6	L-HBQ7
L-HBQ8	L-HBQ9	L-HBR3	L-HBR4	L-HBR5
L-HBR6	L-HBR7	L-HBR8	L-HBR9	L-HBBQ
L-HBBQ2	L-HBBQ3	L-HBBQ4	L-HBBQ5	L-HBBQ6
L-HBBQ7	L-HBBX	L-HBBX2	L-HBBX3	L-HBBX4
L-HBBX5	L-HBBX6	L-HBBX7	L-HBBC	L-HBBC2
L-HBBC3	L-HBBC4	L-HBBC5	L-HBBC6	L-HBBC7
L-MBBX	L-MBBX2	L-MBBX3	L-MBBX4	L-MBBX5
L-MBBX6	L-MBBX7	L-MBBC	L-MBBC2	L-MBBC3
L-MBBC4	L-MBBC5	L-MBBC6	L-MBBC7	L-HBL3
L-HBL4	L-HBL5	L-HBL6	L-HBL7	L-HBL8
L-HBL9	L-MBL	L-MBL2	L-MBL3	L-MBL4
L-MBL5	L-MBL6	L-MBL7	L-MBQ	L-MBQ2
L-MBQ3	L-MBQ4	L-MBQ5	L-MBQ6	L-MBQ7
L-HLSW	L-HLSW2	L-HLSW3	L-HLSW4	L-HLSW5
L-HLSW6	L-HLSW7	L-MLSW	L-MLSW2	L-MLSW3
L-MLSW4	L-MLSW5	L-MLSW6	L-MLSW7	L-MLLA
L-MLLA2	L-MLLA3	L-MLLA4	L-MLLA5	L-MLLA6

L-MLLA7	L-HIDS	L-HIDS2	L-HIDS3	L-HIDS4
L-HIDS5	L-HIDS6	L-HIDS7	L-HDLR	L-HDLR2
L-HDLR3	L-HDLR4	L-HDLR5	L-HDLR6	L-HDLR7
L-HDLQ	L-HDLQ2	L-HDLQ3	L-HDLQ4	L-HDLQ5
L-HDLQ6	L-HDLQ7	L-HIDQ	L-HIDQ2	L-HIDQ3
L-HIDQ4	L-HIDQ5	L-HIDQ6	L-HIDQ7	L-HBLP
L-HBLP2	L-HBLP3	L-HBLP4	L-HBLP5	L-HBLP6
L-HBLP7	L-HCASP	L-HCASP2	L-HCASP3	L-HCASP4
L-HCASP5	L-HCASP6	L-HCASP7	L-HLSWP	L-HLSWP2
L-HLSWP3	L-HLSWP4	L-HLSWP5	L-HLSWP6	L-HLSWP7
L-MCAX	L-MCAX2	L-MCAX3	L-MCAX4	L-MCAX5
L-MCAX6	L-MCAX7	L-HSBT2	L-HSBT3	L-HSBT4
L-HSBT5	L-HSBT6	L-HSBT7	L-HSBT8	L-HLBD3
L-HLBD4	L-HLBD5	L-HLBD6	L-HLBD7	L-HLBD8
L-HLBD9	L-MLBD	L-MLBD2	L-MLBD3	L-MLBD4
L-MLBD5	L-MLBD6	L-MLBD7	DLRC	DLRC2
DLRC3	DLRC4	DLRC5	DLRC6	DLRC7
FDD	FDD2	FDD3	FDD4	FDD5
FDD6	FDD7	FDL	FDL2	FDL3
FDL4	FDL5	FDL6	FDL7	F-DLR4
F-DLR5	F-DLR6	F-DLR7	F-DLR8	F-DLR9
F-DLR10	F-HPD3	F-HPD4	F-HPD5	F-HPD6
F-HPD7	F-HPD8	F-HPD9	MD	MD2
MD3	MD4	MD5	MD6	MD7
F	F2	F3	F4	F5
F6	F7	F-IDQ	F-IDQ2	F-IDQ3
F-IDQ4	F-IDQ5	F-IDQ6	F-IDQ7	F-IDS4
F-IDS5	F-IDS6	F-IDS7	F-IDS8	F-IDS9
F-IDS10	OD	OD2	OD3	OD4
OD5	OD6	OD7	MSP	MSP2
MSP3	MSP4	MSP5	MSP6	MSP7
L	L2	L3	L4	L5
L6	L7	IP	IP2	IP3
IP4	IP5	IP6	IP7	CASA
CASA2	CASA3	CASA4	CASA5	CASA6
CASA7	CASB	CASB2	CASB3	CASB4
CASB5	CASB6	CASB7	PTM	PTM2

PTM3	PTM4	PTM5	PTM6	PTM7
PTP	PTP2	PTP3	PTP4	PTP5
PTP6	PTP7	A	A2	A3
A4	A5	A6	A7	B
B2	B3	B4	B5	B6
B7	C	C2	C3	C4
C5	C6	C7	E	E2
E3	E4	E5	E6	E7
G	G2	G3	G4	G5
G6	G7	H	H2	H3
H4	H5	H6	H7	MACHINE VISION ILLUMINATION
HMILX	UV375	/	/	/

IEC 62471			
Clause	Requirement + Test	Result – Remark	Verdict
4	**EXPOSURE LIMITS**		P
4.1	General		P
	The exposure limits in this standard is not less than 0,01 ms and not more than any 8-hour period and should be used as guides in the control of exposure		P
	Detailed spectral data of a light source are generally required only if the luminance of the source exceeds 10^4 cd·m^{-2}	See clause 4.3	N/A
4.3	Hazard exposure limits		P
4.3.1	Actinic UV hazard exposure limit for the skin and eye		P
	The exposure limit for effective radiant exposure is 30 J·m^{-2} within any 8-hour period		P
	To protect against injury of the eye or skin from ultraviolet radiation exposure produced by a broad-band source, the effective integrated spectral irradiance , E_S, of the light source shall not exceed the levels defined by:		P
	$E_s \cdot t = \sum_{200}^{400} \sum_{t} E_\lambda(\lambda,t) \cdot S_{UV}(\lambda) \cdot \Delta t \cdot \Delta\lambda \le 30$ J·m^{-2}		P
	The permissible time for exposure to ultraviolet radiation incident upon the unprotected eye or skin shall be computed by:		P
	$t_{max} = \frac{30}{E_s}$ s		P
4.3.2	Near-UV hazard exposure limit for eye		P
	For the spectral region 315 nm to 400 nm (UV-A) the total radiant exposure to the eye shall not exceed 10000 J·m^{-2} for exposure times less than 1000 s. For exposure times greater than 1000 s (approximately 16 minutes) the UV-A irradiance for the unprotected eye, E_{UVA}, shall not exceed 10 W·m^{-2}.		P
	The permissible time for exposure to ultraviolet radiation incident upon the unprotected eye for time less than 1000 s, shall be computed by:		P
	$t_{max} \le \frac{10\,000}{E_{UVA}}$ s		P
4.3.3	Retinal blue light hazard exposure limit		P
	To protect against retinal photochemical injury from chronic blue-light exposure, the integrated spectral radiance of the light source weighted against the blue-light hazard function, B(λ), i.e., the blue-light weighted radiance, L_B, shall not exceed the levels		P

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	defined by:		
	$L_B \cdot t = \sum_{300}^{700} \sum_{t} L_\lambda(\lambda,t) \cdot B(\lambda) \cdot \Delta t \cdot \Delta\lambda \le 10^6$ $J \cdot m^{-2} \cdot sr^{-1}$	for t ≤ 10^4 s $t_{max} = \frac{10^6}{L_B}$	P
	$L_B = \sum_{300}^{700} L_\lambda \cdot B(\lambda) \cdot \Delta\lambda \le 100$ $W \cdot m^{-2} \cdot sr^{-1}$	for t > 10^4 s	N/A
4.3.4	Retinal blue light hazard exposure limit - small source		N/A
	Thus the spectral irradiance at the eye E_λ, weighted against the blue-light hazard function B(λ) shall not exceed the levels defined by:	See table 4.2	N/A
	$E_B \cdot t = \sum_{300}^{700} \sum_{t} E_\lambda(\lambda,t) \cdot B(\lambda) \cdot \Delta t \cdot \Delta\lambda \le 100$ $J \cdot m^{-2}$	for t ≤ 100 s	N/A
	$E_B = \sum_{300}^{700} E_\lambda \cdot B(\lambda) \cdot \Delta\lambda \le 1$ $W \cdot m^{-2}$	for t > 100 s	N/A
4.3.5	Retinal thermal hazard exposure limit		P
	To protect against retinal thermal injury, the integrated spectral radiance of the light source, L_λ, weighted by the burn hazard weighting function R(λ) (from Figure 4.2 and Table 4.2), i.e., the burn hazard weighted radiance, shall not exceed the levels defined by:		P
	$L_R = \sum_{380}^{1400} L_\lambda \cdot R(\lambda) \cdot \Delta\lambda \le \frac{50\,000}{\alpha \cdot t^{0,25}}$ $W \cdot m^{-2} \cdot sr^{-1}$	(10 µs ≤ t ≤ 10 s)	N/A
4.3.6	Retinal thermal hazard exposure limit – weak visual stimulus		P
	For an infrared heat lamp or any near-infrared source where a weak visual stimulus is inadequate to activate the aversion response, the near infrared (780 nm to 1400 nm) radiance, L_{IR}, as viewed by the eye for exposure times greater than 10 s shall be limited to:		P
	$L_{IR} = \sum_{780}^{1400} L_\lambda \cdot R(\lambda) \cdot \Delta\lambda \le \frac{6\,000}{\alpha}$ $W \cdot m^{-2} \cdot sr^{-1}$		N/A
4.3.7	Infrared radiation hazard exposure limits for the eye		P
	The avoid thermal injury of the cornea and possible delayed effects upon the lens of the eye (cataractogenesis), ocular exposure to infrared radiation, E_{IR}, over the wavelength range 780 nm to 3000 nm, for times less than 1000 s, shall not exceed:		P
	$E_{IR} = \sum_{780}^{3\,000} E_\lambda \cdot \Delta\lambda \le 18\,000 \cdot t^{-0,75}$ $W \cdot m^{-2}$	t ≤ 1000 s	N/A

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	For times greater than 1000 s the limit becomes:		P
	$E_{IR} = \sum_{780}^{3\,000} E_\lambda \cdot \Delta\lambda \le 100 \qquad W \cdot m^{-2}$	t > 1000 s	P
4.3.8	Thermal hazard exposure limit for the skin		P
	Visible and infrared radiant exposure (380 nm to 3000 nm) of the skin shall be limited to:		P
	$E_H \cdot t = \sum_{380}^{3\,000} \sum_{t} E_\lambda(\lambda,t) \cdot \Delta t \cdot \Delta\lambda \le 20\,000 \cdot t^{0,25} \qquad J \cdot m^{-2}$		P
5	**MEASUREMENT OF LAMPS AND LAMP SYSTEMS**		P
5.1	Measurement conditions		P
	Measurement conditions shall be reported as part of the evaluation against the exposure limits and the assignment of risk classification.		P
5.1.1	Lamp ageing (seasoning)	Not lamps	N/A
	Seasoning of lamps shall be done as stated in the appropriate IEC lamp standard.		N/A
5.1.2	Test environment		P
	For specific test conditions, see the appropriate IEC lamp standard or in absence of such standards, the appropriate national standards or manufacturer's recommendations.		P
5.1.3	Extraneous radiation		P
	Careful checks should be made to ensure that extraneous sources of radiation and reflections do not add significantly to the measurement results.		P
5.1.4	Lamp operation		N/A
	Operation of the test lamp shall be provided in accordance with:		N/A
	– the appropriate IEC lamp standard, or		N/A
	– the manufacturer' s recommendation		N/A
5.1.5	Lamp system operation		P
	The power source for operation of the test lamp shall be provided in accordance with:		P
	– the appropriate IEC standard, or		N/A
	– the manufacturer' s recommendation		P
5.2	Measurement procedure		P
5.2.1	Irradiance measurements		P
	Minimum aperture diameter 7mm.		P

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	Maximum aperture diameter 50 mm.		P
	The measurement shall be made in that position of the beam giving the maximum reading.		P
	The measurement instrument is adequate calibrated.		P
5.2.2	Radiance measurements		P
5.2.2.1	Standard method		N/A
	The measurements made with an optical system.		N/A
	The instrument shall be calibrated to read in absolute radiant power per unit receiving area and per unit solid angle to acceptance averaged over the field of view of the instrument.		N/A
5.2.2.2	Alternative method		N/A
	Alternatively to an imaging radiance set-up, an irradiance measurement set-up with a circular field stop placed at the source can be used to perform radiance measurements.		N/A
5.2.3	Measurement of source size		P
	The determination of α, the angle subtended by a source, requires the determination of the 50% emission points of the source.		P
5.2.4	Pulse width measurement for pulsed sources		N/A
	The determination of Δt, the nominal pulse duration of a source, requires the determination of the time during which the emission is > 50% of its peak value.		N/A
5.3	Analysis methods		P
5.3.1	Weighting curve interpolations		P
	To standardize interpolated values, use linear interpolation on the log of given values to obtain intermediate points at the wavelength intervals desired.	See table 4.1	P
5.3.2	Calculations		P
	The calculation of source hazard values shall be performed by weighting the spectral scan by the appropriate function and calculating the total weighted energy.		P
5.3.3	Measurement uncertainty		P
	The quality of all measurement results must be quantified by an analysis of the uncertainty.	See Annex C in the norm	P
6	**LAMP CLASSIFICATION**		P
	For the purposes of this standard it was decided that the values shall be reported as follows:	See table 6.1	P

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	– for lamps intended for general lighting service, the hazard values shall be reported as either irradiance or radiance values at a distance which produces an illuminance of 500 lux, but not at a distance less than 200 mm		N/A
	– for all other light sources, including pulsed lamp sources, the hazard values shall be reported at a distance of 200 mm		P
6.1	Continuous wave lamps		P
6.1.1	Exempt Group		N/A
	In the exempt group are lamps, which don't pose any photobiological hazard. The requirement is met by any lamp that does not pose:		N/A
	– an actinic ultraviolet hazard (E_S) within 8-hours exposure (30000 s), nor		N/A
	– a near-UV hazard (E_{UVA}) within 1000 s, (about 16 min), nor		N/A
	– a retinal blue-light hazard (L_B) within 10000 s (about 2,8 h), nor		N/A
	– a retinal thermal hazard (L_R) within 10 s, nor		N/A
	– an infrared radiation hazard for the eye (E_{IR}) within 1000 s		N/A
6.1.2	Risk Group 1 (Low-Risk)		N/A
	In this group are lamps, which exceeds the limits for the except group but that does not pose:		N/A
	– an actinic ultraviolet hazard (E_S) within 10000 s, nor		N/A
	– a near ultraviolet hazard (E_{UVA}) within 300 s, nor		N/A
	– a retinal blue-light hazard (L_B) within 100 s, nor		N/A
	– a retinal thermal hazard (L_R) within 10 s, nor		N/A
	– an infrared radiation hazard for the eye (E_{IR}) within 100 s		N/A
	Lamps that emit infrared radiation without a strong visual stimulus and do not pose a near-infrared retinal hazard (L_{IR}), within 100 s are in Risk Group 1.		N/A
6.1.3	Risk Group 2 (Moderate-Risk)		P
	This requirement is met by any lamp that exceeds the limits for Risk Group 1, but that does not pose:		P
	– an actinic ultraviolet hazard (E_S) within 1000 s exposure, nor		P
	– a near ultraviolet hazard (E_{UVA}) within 100 s, nor		P

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	– a retinal blue-light hazard (L_B) within 0,25 s (aversion response), nor		P
	– a retinal thermal hazard (L_R) within 0,25 s (aversion response), nor		P
	– an infrared radiation hazard for the eye (E_{IR}) within 10 s		P
	Lamps that emit infrared radiation without a strong visual stimulus and do not pose a near-infrared retinal hazard (L_{IR}), within 10 s are in Risk Group 2.		P
6.1.4	Risk Group 3 (High-Risk)		N/A
	Lamps which exceed the limits for Risk Group 2 are in Group 3.		N/A
6.2	Pulsed lamps		N/A
	Pulse lamp criteria shall apply to a single pulse and to any group of pulses within 0,25 s.		N/A
	A pulsed lamp shall be evaluated at the highest nominal energy loading as specified by the manufacturer.		N/A
	The risk group determination of the lamp being tested shall be made as follows:		N/A
	– a lamp that exceeds the exposure limit shall be classified as belonging to Risk Group 3 (High-Risk)		N/A
	– for single pulsed lamps, a lamp whose weighted radiant exposure or weighted radiance does is below the EL shall be classified as belonging to the Exempt Group		N/A
	– for repetitively pulsed lamps, a lamp whose weighted radiant exposure or weighted radiance dose is below the EL, shall be evaluated using the continuous wave risk criteria discussed in clause 6.1, using time averaged values of the pulsed emission		N/A

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Table 4.1	Spectral weighting function for assessing ultraviolet hazards for skin and eye	P

Wavelength[1] λ, nm	**UV hazard function $S_{UV}(\lambda)$**	**Wavelength λ, nm**	**UV hazard function $S_{UV}(\lambda)$**
200	0,030	313*	0,006
205	0,051	315	0,003
210	0,075	316	0,0024
215	0,095	317	0,0020
220	0,120	318	0,0016
225	0,150	319	0,0012
230	0,190	320	0,0010
235	0,240	322	0,00067
240	0,300	323	0,00054
245	0,360	325	0,00050
250	0,430	328	0,00044
254*	0,500	330	0,00041
255	0,520	333*	0,00037
260	0,650	335	0,00034
265	0,810	340	0,00028
270	1,000	345	0,00024
275	0,960	350	0,00020
280*	0,880	355	0,00016
285	0,770	360	0,00013
290	0,640	365*	0,00011
295	0,540	370	0,000093
297*	0,460	375	0,000077
300	0,300	380	0,000064
303*	0,120	385	0,000053
305	0,060	390	0,000044
308	0,026	395	0,000036
310	0,015	400	0,000030

[1] Wavelengths chosen are representative: other values should be obtained by logarithmic interpolation at intermediate wavelengths.
* Emission lines of a mercury discharge spectrum.

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Table 4.2	Spectral weighting functions for assessing retinal hazards from broadband optical sources	N/A

Wavelength nm	**Blue-light hazard function B (λ)**	**Burn hazard function R (λ)**
300	0,01	
305	0,01	
310	0,01	
315	0,01	
320	0,01	
325	0,01	
330	0,01	
335	0,01	
340	0,01	
345	0,01	
350	0,01	
355	0,01	
360	0,01	
365	0,01	
370	0,01	
375	0,01	
380	0,01	0,1
385	0,013	0,13
390	0,025	0,25
395	0,05	0,5
400	0,10	1,0
405	0,20	2,0
410	0,40	4,0
415	0,80	8,0
420	0,90	9,0
425	0,95	9,5
430	0,98	9,8
435	1,00	10,0
440	1,00	10,0
445	0,97	9,7
450	0,94	9,4
455	0,90	9,0
460	0,80	8,0
465	0,70	7,0
470	0,62	6,2
475	0,55	5,5
480	0,45	4,5
485	0,40	4,0
490	0,22	2,2
495	0,16	1,6
500-600	$10^{[(450-\lambda)/50]}$	1,0
600-700	0,001	1,0
700-1050		$10^{[(700-\lambda)/500]}$
1050-1150		0,2
1150-1200		$0{,}2 \cdot 10^{0{,}02(1150-\lambda)}$
1200-1400		0,02

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Table 5.4	Summary of the ELs for the surface of the skin or cornea (irradiance based values)	P

Hazard Name	Relevant equation	Wavelength range nm	Exposure duration sec	Limiting aperture rad (deg)	EL in terms of constant irradiance $W \cdot m^{-2}$
Actinic UV skin & eye	$E_S = \sum E_\lambda \cdot S(\lambda) \cdot \Delta\lambda$	200 – 400	< 30000	1,4 (80)	30/t
Eye UV-A	$E_{UVA} = \sum E_\lambda \cdot \Delta\lambda$	315 – 400	≤1000 >1000	1,4 (80)	10000/t 10
Blue-light small source	$E_B = \sum E_\lambda \cdot B(\lambda) \cdot \Delta\lambda$	300 – 700	≤100 >100	< 0,011	100/t 1,0
Eye IR	$E_{IR} = \sum E_\lambda \cdot \Delta\lambda$	780 –3000	≤1000 >1000	1,4 (80)	$18000/t^{0,75}$ 100
Skin thermal	$E_H = \sum E_\lambda \cdot \Delta\lambda$	380 – 3000	< 10	2π sr	$20000/t^{0,75}$

Table 5.5	Summary of the ELs for the retina (radiance based values)	P

Hazard Name	Relevant equation	Wavelength range nm	Exposure duration sec	Field of view radians	EL in terms of constant radiance $W \cdot m^{-2} \cdot sr^{-1}$)
Blue light	$L_B = \sum L_\lambda \cdot B(\lambda) \cdot \Delta\lambda$	300 – 700	0,25 – 10 10-100 100-10000 ≥ 10000	$0,011 \cdot \sqrt{(t/10)}$ 0,011 $0,0011 \cdot \sqrt{t}$ 0,1	$10^6/t$ $10^6/t$ $10^6/t$ 100
Retinal thermal	$L_R = \sum L_\lambda \cdot R(\lambda) \cdot \Delta\lambda$	380 – 1400	< 0,25 0,25 – 10	0,0017 $0,011 \cdot \sqrt{(t/10)}$	$50000/(\alpha \cdot t^{0,25})$ $50000/(\alpha \cdot t^{0,25})$
Retinal thermal (weak visual stimulus)	$L_{IR} = \sum L_\lambda \cdot R(\lambda) \cdot \Delta\lambda$	780 – 1400	> 10	0,011	6000/α

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Clause	Requirement + Test	Result – Remark	Verdict

Table 6.1	Emission limits for risk groups of continuous wave lamps								P
Risk	Action spectrum	Symbol	Units	Emission Measurement					
				Exempt		Low risk		Mod risk	
				Limit	Result	Limit	Result	Limit	Result
Actinic UV	$S_{UV}(\lambda)$	E_s	$W \cdot m^{-2}$	0,001	-	0,003	-	0,03	4.365e-3
Near UV		E_{UVA}	$W \cdot m^{-2}$	10	-	33	-	100	2.177e1
Blue light	B(λ)	L_B	$W \cdot m^{-2} \cdot sr^{-1}$	100	-	10000	-	4000000	1.258e1
Blue light, small source	B(λ)	E_B	$W \cdot m^{-2}$	1,0*	-	1,0	-	400	-
Retinal thermal	R(λ)	L_R	$W \cdot m^{-2} \cdot sr^{-1}$	28000/α	-	28000/α	-	71000/α	6.297e1
Retinal thermal, weak visual stimulus**	R(λ)	L_{IR}	$W \cdot m^{-2} \cdot sr^{-1}$	6000/α	-	6000/α	-	6000/α	0.000e0
IR radia-tion, eye		E_{IR}	$W \cdot m^{-2}$	100	-	570	-	3200	0.000e0

* Small source defined as one with α < 0,011 radian. Averaging field of view at 10000 s is 0.1 radian.
** Involves evaluation of non-GLS source
α= 0.0695 radian.

IEC62471B ATTACHMENT			
Clause	Requirement + Test	Result – Remark	Verdict

ATTACHMENT TO TEST REPORT IEC 62471
EUROPEAN GROUP DIFFERENCES AND NATIONAL DIFFERENCES
Photobiological safety of lamps and lamps systems

Differences according to.....: EN 62471:2008

TRF template used..... : IECEE OD-2020-F2:2020, Ed. 1.1

Attachment Form No. .....: EU_GD_IEC62471B

Attachment Originator.....: OVE

Master Attachment .....: Dated 2021-04-29

	CENELEC COMMON MODIFICATIONS (EN)		
4	**EXPOSURE LIMITS**		P
	Contents of the whole Clause 4 of IEC 62471:2006 moved into a new informative Annex ZB		—
	Clause 4 replaced by the following:		P
	The original Clause 4 of IEC 62471:2006 contains provisions governing limiting values for the exposure of persons falling within the area of the health and safety of workers. Within Europe those limiting values are already covered by the Artificial Optical Radiation Directive (2006/25/EC). Thus, the limits of the directive have to be applied instead of those fixed in IEC 62471:2006.	See appended Table 6.1	P
	There are no differences in EN 62471:2008 regarding the classification of lamps according Clause 6 of IEC 62471:2006.		—
4.1	General		N/A
	Delete the first paragraph.		—

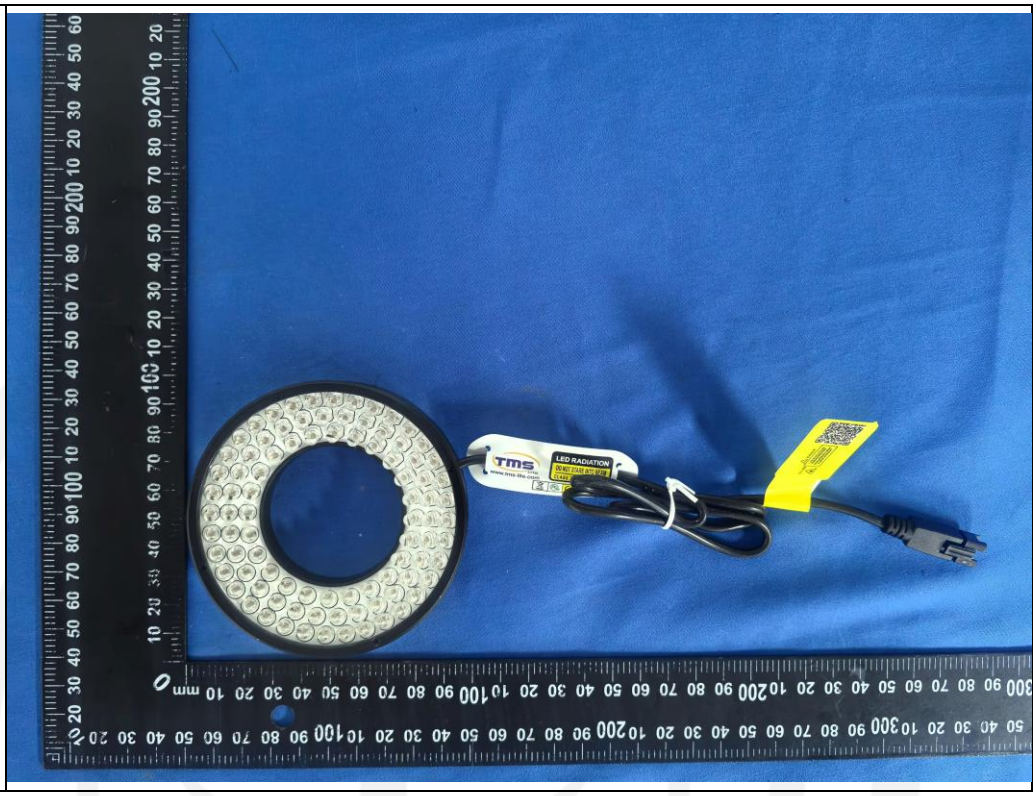
IEC62471B ATTACHMENT			
Clause	Requirement + Test	Result – Remark	Verdict

Table 6.1	Emission limits for risk groups of continuous wave lamps (based on EU Directive 2006/25/EC)								P
Risk	Action spectrum	Symbol	Units	Emission Measurement					
				Exempt		Low risk		Mod risk	
				Limit	Result	Limit	Result	Limit	Result
Actinic UV	$S_{UV}(\lambda)$	E_s	$W•m^{-2}$	0,001	-	0,003	-	0,03	8.523e-3
Near UV		E_{UVA}	$W•m^{-2}$	0,33	-	33	-	100	1.192e1
Blue light	B(λ)	L_B	$W•m^{-2}•sr^{-1}$	100	-	10000	-	4000000	1.181e1
Blue light, small source	B(λ)	E_B	$W•m^{-2}$	0,01	-	1,0	-	400	-
Retinal thermal	R(λ)	L_R	$W•m^{-2}•sr^{-1}$	28000/α	-	28000/α	-	71000/α	6.683e1
Retinal thermal, weak visual stimulus**	R(λ)	L_{IR}	$W•m^{-2}•sr^{-1}$	545000 0,0017 ≤ α ≤ 0,011	-				
				6000/α 0,011 ≤ α ≤ 0,1	3.468e-1				
IR radia-tion, eye		E_{IR}	$W•m^{-2}$	100	-	570	-	3200	3.263e-2

* Small source defined as one with α < 0,011 radian. Averaging field of view at 10000 s is 0.1 radian.
** Involves evaluation of non-GLS source

NOTE The action functions: see Table 4.1 and Table 4.2
The applicable aperture diameters: see 4.2.1
The limitations for the angular subtenses: see 4.2.2
The related measurement condition 5.2.3 and the range of acceptance angles: see Table 5.5.
α= 0.0565 radian.

Appendix 1
Photo Documentation

Photo 1 View: [√] front [ ] rear [ ] right side [ ] left side [ ] top [ ] bottom [ ] internal	
Photo 2 View: [ ] front [√] rear [ ] right side [ ] left side [ ] top [ ] bottom [ ] internal	

-End of report-