Standard Linear Types

STANDARD SERIES

EXAMPLE : ORDERING INFORMATION

Flashtube	VQ
Xenon	X
Quartz envelope	R
Ref N°	63
Tube end	E2

DIFFERENT TYPES OF SILICA TUBING

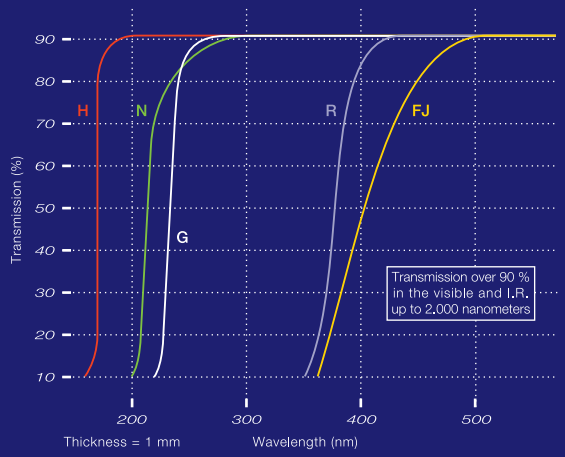
R : Cerium doped silica. Even after extensive use there is pratically no violet coloured absorbtion center near 540 nanometers.
This silica filters pratically all the UV, no deterioration of doped glass rods or reflectors, no ozone formation, and has no damaging effect on the eyes.
Considerable conversion of UV into fluorescence centered at 435 nanometers : particularly recommended for pumping Yag crystals.

N : Natural fused silica with little fluorescence (selection of quartz crystals). After long use, coloured centers appear near 540 nanometers. Robust material.

H : Pure synthetic non-fluorescent silica. No appearance of absorption at 540 nanometers. This silica is mainly used for optical pumping of rubies and for distant UV flash sources.

G : Titanium doped silica (germicidal) absorbing UVC. No ozone formation. Very rapid appearance of coloured absorbtion centers around 540 nanometers.

FJ : Yellow filters stopping all UV, correcting filter for colour photography. Withstands more than 600°C in permanent use, in air. Coated on R silica. No immersion.



FLASHLAMPS Verre & Quartz

Standard Linear Flashtubes Shapes

Standard Plugs

Calculation of maximum critical damping operation energy for linear flashtubes as a function of their structure and environment.

(Mounting equivalent to that provided by "FLASHLAMPS Verre & Quartz" W type tube ends, ceramic with silicone 0 rings on supporting plate, at ambient temperature of 20°C to 80°C).

Maximum energy in joules = $\sqrt{T} \times \ell \times d \times A \times B$
T = total duration (1/3 peak) in µs. ℓ (arc length) and d in mm.

Coefficient A (strength of tube depending on envelope material used)
silica thickness = 1 mm
A = 0,085 for N silica
A = 0,084 for G and H silica
A = 0,078 for R silica
(A = 0,021 for borosilicate)
silica thickness = 0,5 mm
A = 0,051 for N silica
A = 0,05 for G and H silica
A = 0,047 for R silica

Coefficient B (strength of tube end environment).

Air with reflector :
Tube end E3 - WE3 - WDE3 : B = 1
Tube end E1 - E2 - M - WE2 - WDE2 - WE1
O.D. < 8,5 mm : B = 0,9
8,5 < O.D. < 11 mm : B = 0,70
O.D. > 11 : B = 0,45

Water in laser cavity with very tight coupling :
Tube end E3 - WE3 - WDE3 : B = 0,45
Tube end E1 - E2 - M - WE2 - WDE2 - WE1
O.D. < 11 mm : B = 0,44
O.D. > 11 mm : B = 0,39

Calculation of parameters for obtaining flash duration with critical damping.

(rise time = decay time)

$$C = 10^2 \sqrt[3]{\frac{2E\alpha^3 t^2}{Ko^4}} \qquad L = \frac{t^2}{C}$$

$$Ko = \frac{Kc\,\ell}{d}$$

With : Kc = 1,225 for E3, WE3, WDE3 tube ends
Kc = 1,279 for other tube ends

$$V = 10^3 \sqrt{\frac{2E}{C}}. \qquad T = 3t\ (\alpha = 0{,}8)$$

T = total duration (1/3 peak) in µs. E in joules. V in volts. C in µF. L in µH. ℓ (arc length) and d. in mm.
Ko in $\Omega\ A^{1/2}$.
For different operating energies, modify parameters values as shown. (with α unchanged) :

Parameters of previous calculation (same time)	E (j)	U (V)	C (µF)	L (µH)
Value of energy requiered $\left(Y = \sqrt[3]{\frac{E'}{E}}\right)$	E'	U'=YxU	C'=YxC	L' = $\frac{L}{Y}$

Example : VQX R 1320 E3 : 500µs
E = 1320 J U = 2441 V C = 443 µF L = 63 µH
E'= 660 J U'= 1937 V C'= 352 µF L' = 79 µH

Operation above calculated maximum energy can bring about fast deterioration of flashtubes (explosion).
Maximum operating temperature for lamps not fitted with W type ends at 50% of recommended typical energy, in non-oxidizing atmosphere : 400°C.
Maximum operating temperature for continuous use in oxidizing atmosphere (dry air) for all types of tube end : 200°C.

Note 1

Operating parameters for obtaining a critical damping discharge for 500 µs, (at 1/3 peak light intensity), with recommended typical energy and standard tube ends.

Note 2

Maximum operating frequency : 1 Hz in air, 2 Hz in water. For higher frequencies please see section : "Stroboscopic Xenon Flashtubes".

Note 3

In water : use only demineralized, or preferably distilled water, at maximum temperature of 40°C.

Note 4

a) GAS FILL (third letter of flashtube reference).
Standard : XENON (X)
On request : KRYPTON (K) or ARGON (A)
Pressure of pure gas in standard flashtubes varies, according to length, from 300 to 600 torr. Other pressures on request.
b) TUBE MATERIAL (fourth letter of flashtube reference).
Standard : R
On request : N - H - G
c) OPTIONAL TUBE ENDS DEPENDING ON TUBE DIAMETER (last letter and figure of flashtube reference).
O.D. > 11 mm : E2 - E1 - E3 - M - WD
WE3 - WDE3 - WDE2
WE1 (standard E3).
O.D. < 11 mm : E2 - E1 - M - WE2 - WDE2
WE1 (standard E2).
d) OTHER TUBE DIAMETERS
Non standard, on request : I.D. from 7 mm to 19 mm.
High voltage insulation flexible leads with specific lengths available : TS, TS M… :
- Ø 3mm ext : Temperatures -70°C +250°C, Insulation 22 kV
- Ø 6mm ext : Temperatures -70°C +250°C, Insulation 37 kV

Specifications are subject to change without notice.

STANDARD SERIES *Note 4* ORDERING CODE												
VQX R . . .	**63**	**65**	**6P3**	**7P3**	**7P4**	**85**	**88**	**8P4**	**815**	**820**	**1010**	**10P8**
Tube end	**E2**	**E2**	**E2**	**E2**	**E2**	**E2**	**E2**	**E2**	**E2**	**E2**	**E2**	**E2**
d (I.D. ± 0,2 mm)		**4**			**5**				**6**			**8**
O.D. (Outer Diameter) (mm)		**6**			**7**				**8**			**10**
***ℓ Arc length** (mm)*	30	50	76	76	101	50	80	101	150	200	100	203
***Δ (± 0,1)** (mm)* ***F** (mm)*	3	3	3	3	3	3	3	3	3	3	3,5	3,5
C (± 0,1 mm) ***Ø** of hole in flashtube supporting plate*	7,7 8	7,7 8	7,7 8	7,7 8	7,7 8	8,7 9	8,7 9	8,7 9	8,7 9	8,7 9	10,2 11	10,2 11
Max. Average Power** (W)* *Note 2* — ***Air	40	60	90	110	150	90	140	180	270	360	240	490
Max. Average Power** (W)* *Note 2* — ***Forced Air	110	180	270	340	460	270	430	550	810	1080	720	1460
Max. Average Power** (W)* *Note 2* — ***Water *Note 3*	250	400	560	700	940	550	900	1120	1700	2200	1500	3000
Voltage** (V)* — ***Min.	400	450	600	600	700	450	600	700	850	1050	650	1100
Voltage** (V)* — ***Max.	1200	1350	1800	1800	2100	1350	1800	2100	2550	3150	1950	3300
***Max. Peak Current** (A)*	500	500	500	800	800	1100	1100	1100	1100	1100	2000	1100
Trigger Voltage** (kV)* ***Typical Transformer	15-22 TB2	15-22 TB2	15-22 TB2	15-22 TB2	15-22 TB2	16-22 TB2	16-22 TB2	16-22 TB2	18-22 TB2	18-22 TB2	17-22 TB2	18-22 TB2
Flash Duration 500 µsec. 1/3 peak *Note 1* — ***C** (µF)*	575	342	225	327	247	667	421	335	224	173	548	274
Flash Duration 500 µsec. 1/3 peak *Note 1* — ***L** (µH)*	48	81	123	85	113	42	66	83	124	161	51	101
Flash Duration 500 µsec. 1/3 peak *Note 1* — ***V** (Vdc)*	527	871	1332	1236	1635	774	1213	1544	2274	3003	1376	2766
Flash Duration 500 µsec. 1/3 peak *Note 1* — ***E** (J)*	80	130	200	250	330	200	310	400	580	780	520	1050

STANDARD SERIES *Note 4* ORDERING CODE												
VQX R . . .	**1310**	**1315**	**1320**	**13P9**	**13P15**	**13P30**	**1515**	**1520**	**15P12**	**2015**	**2020**	**2030**
Tube end	**E3**	**E3**	**E3**	**E3**	**E3**	**E3**	**E3**	**E3**	**E3**	**E3**	**E3**	**E3**
d (I.D. ± 0,2 mm)					**11**				**13**			**17**
O.D. (Outer Diameter) (mm)					**13**				**15**			**20**
***ℓ Arc length** (mm)*	100	150	200	229	381	762	150	200	305	150	200	300
***Δ (± 0,1)** (mm)* ***F** (mm)*	4	4	4	4	4	4	4	4	4	4	4	4
C (± 0,1 mm) ***Ø** of hole in flashtube supporting plate*	13,2 14	13,2 14	13,2 14	13,2 14	13,2 14	13,2 14	15,2 16	15,2 16	15,2 16	15,2 16	15,2 16	15,2 16
Max. Average Power** (W)* *Note 2* — ***Air	330	500	660	760	1260	2510	580	780	1190	770	1020	1530
Max. Average Power** (W)* *Note 2* — ***Forced Air	990	1490	1980	2270	3770	7540	1750	2340	3570	2300	3060	4590
Max. Average Power** (W)* *Note 2* — ***Water *Note 3*	2020	3040	4050	4630	7710	15420	3590	4780	7300	4700	6300	9400
Voltage** (V)* — ***Min.	650	850	1050	1200	1800	3300	850	1050	1500	850	1050	1450
Voltage** (V)* — ***Max.	1950	2550	3150	3600	5400	9900	2550	3150	4500	2550	3150	4350
***Max. Peak Current** (A)*	3000	3000	3000	3000	3000	3000	3000	3000	3000	3000	3000	3000
Trigger Voltage** (kV)* ***Typical Transformer	20-22 TB2	19-22 TB2	20-25 TB4	20-22 TB4	25-30 TB4	25-30 TB4	20-25 TB4	20-25 TB4	25-30 TB4	23-30 TB4	23-30 TB4	25-30 TB4
Flash Duration 500 µsec. 1/3 peak *Note 1* — ***C** (µF)*	1060	712	538	470	286	148	941	711	471	1372	1037	697
Flash Duration 500 µsec. 1/3 peak *Note 1* — ***L** (µH)*	32	48	64	73	120	232	36	48	73	20	27	40
Flash Duration 500 µsec. 1/3 peak *Note 1* — ***V** (Vdc)*	1160	1731	2297	2632	4350	8554	1636	2173	3303	1550	2059	3076
Flash Duration 500 µsec. 1/3 peak *Note 1* — ***E** (J)*	710	1070	1420	1630	2710	5420	1260	1680	2570	1650	2200	3300