SHIP

ELECTRIC ARC LAMP

CARBONS

BRITISH MADE

OPERATING DATA BOOK

CINEMA SECTION

CHAS. H. CHAMPION & CO. LTD. 60-66 WARDOUR ST. LONDON, W.I.

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CONTENTS

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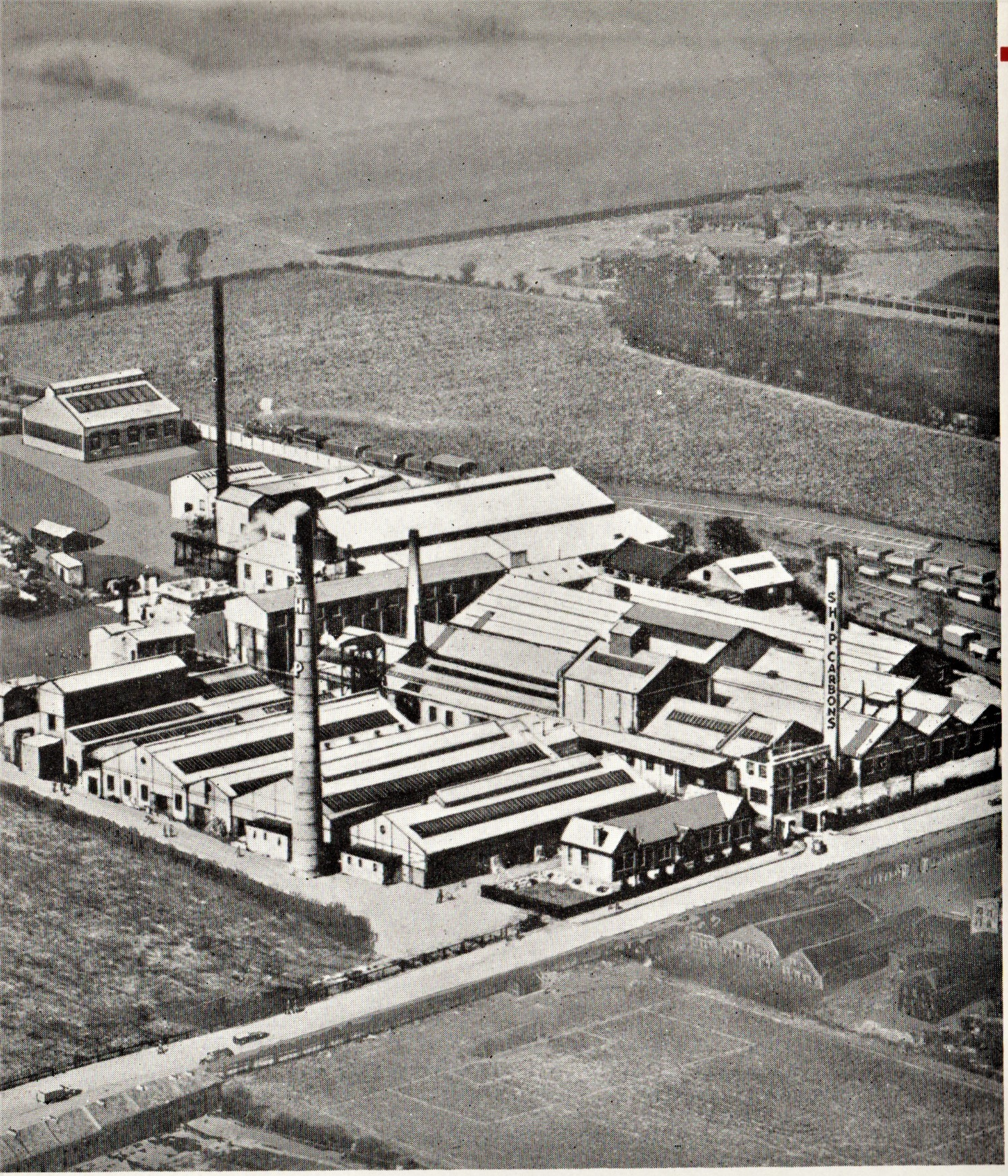


Aerial view of Ship Carbon Works at Chadwell Heath, Essex.

THE SHIP CARBON PRODUCTS

THE manufacture of an arc lamp carbon is essentially one of those processes which works backwards from the performance to the design.

The design of a carbon—by which we mean tne grade of materials used, the relative diameters of " core " and " shell," the thickness of copper coating, the temperature and duration of heat treatment, etc.—is determined in your projection room, your studio, your drawing office or your hospital.

It is only when we have acquired an intimate knowledge of the characteristics of the light source required by you that we can apply the technique of carbon manufacture to ensuring that those characteristics are secured.

The light source in a carbon arc may be derived principally from the crater or from the flame ; it may be required to possess special actinic, or spectrographic or curative properties. Intrinsic arc brilliance, or steady burning or slow carbon consumption or polar distribution of light, may each in turn be the important consideration. And it calls for as much specialised knowledge to decide upon the type of light source required in producing given results as it does to translate these requirements into terms of carbon manufacturing technique. The manufacture itself calls for a plant that is both costly and extensive, and a period of six weeks to two months is required between the mixing of the plastic bulk and the finished arc lamp electrodes.

Throughout the many processes through which each carbon passes in course of manufacture a series of unremitting tests is applied, and some idea of what is involved may be gathered from the fact that the factory output amounts to millions of pieces of carbon per month.

For example, each individual carbon is examined by X-ray for the detection of flaws and inconsistencies, each carbon passes through a series of gauges which, between them, automatically reject any carbon which is more or less than the permissible tolerance on nominal diameter, or which is in any way bent or distorted. Each copper-covered carbon undergoes a test which records such data as thickness and uniformity of copper coating, and automatically, rejects any specimen falling below pre-set standards.

Not only so : an elaborate system of recording and compiling test data enables us with accuracy and precision to determine the ingredients selected, the kiln temperatures employed and other conditions which obtained during the manufacture of any individual batch of carbon.

This meticulous care is taken not with a view to compiling impressive statistics, but because experience has shown that it constitutes the only safe and satisfactory method of ensuring progressively higher standards of consistency and excellence. Was our estimate of your requirements in the matter of light characteristics an accurate one ? Were our theoretical calculations borne out in practice ? Only these constant checks and tests can give us the answer to such questions—and only such checks and tests can account for the high prestige of Ship Carbons and ensure continued satisfaction.

SHIP
CINEMA AND STUDIO CARBONS

THE ARC AS A LIGHT SOURCE

For the projection of Cinematograph Films and Slides as well as for Spot Lights and Stage Arcs the efficient utilisation of the light generated depends upon accurate focal adjustment of the light source to the mirror, condenser lens or other optical apparatus employed.
This implies that the light source shall approximate as closely as is expedient to the theoretical " point source " around which optical calculations are centred. While it is true that some portion of the light emitted by a carbon arc must be attributed to the arc flame and the incandescence of the tip of the negative or opposing carbon, the source of emission with which we are here primarily concerned is the crater formed on the electrode presented to the mirror or condenser.
The mechanical means by which this crater is focally located and maintained in focus during the burning away of the carbon are functions of the lamp design.
Our present concern is rather with the formation of the crater itself. Throughout this booklet illustrations are provided wherever feasible showing the crater formation which should be secured when the respective carbons have been burned at correct rating (current and arc volts) and in correct alignment. It is recommended that these end formations be studied attentively and compared with those obtained under working conditions, since to the practised eye any irregularities in burning conditions will inevitably reveal themselves in a corresponding abnormality of end-formation.

HIGH INTENSITY AND LOW INTENSITY TRIMS

The term High Intensity is taken to distinguish those carbons in which the light is derived principally from the rare earths or chemical contained in the core of the carbon.

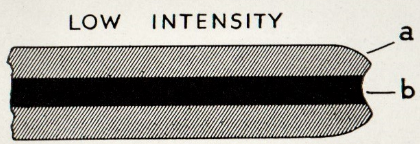


FIG. 1.

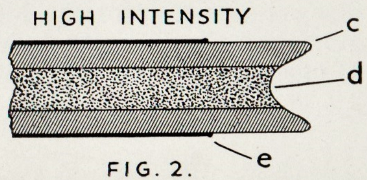


FIG. 2.

The essential difference between the two types of carbon is shown by Fig. 1, which depicts a Low Intensity Positive having a pure carbon shell (a) and a carbon core (b), and Fig. 2, which depicts a typical High Intensity Positive having a hard, but relatively thin shell (c), a specially loaded core (d), and a copper coating (e).

In the case of Fig. 1, the purpose of the core is principally that of encouraging the formation of a symmetrical crater. The light source is provided mainly by the crater and the intrinsic brilliance is limited by the volatilising point of pure carbon (3873° Kelvin). In Fig. 2, the core (d) consists of rare earths, the shell (c) serves to contain the core and, by its slower burning rate to encourage the formation of a relatively deep cup-like crater, and the copper coating (e) serves to reinforce the conductivity of the carbon as a whole, thereby permitting a high density of current per square millimetre of crater surface to be secured. Light emission in the case of the H.I. carbon is obtained mostly from the incandescent crater reinforced in temperature by the luminous gases contained therein.

To secure a crater shape favourable to the retention of these gases, magnetic control of the arc flame or, alternatively, the axial rotation of the positive carbon is provided, particularly on lamps of angular arrangement of the carbons. The angle of presentation of the negative carbon and the gap between the carbons are, however, further matters of importance.

OPERATING DATA

In any given pair or trim of carbons the Positive and its Negative are designed relatively to each other in accordance with well-tried and proven formulæ.

There are many factors to be taken into account when determining these formulæ. The Positive must be of a certain diameter ; the " grain " or composition of the core and shell, as well as their dimensions, are matters of careful calculation. Similarly the Negative must be made to an accurate design and its diameter closely related to that of the Positive with which it is to be used. The amount of copper re-inforcement needed also requires careful consideration.

When all these conditions have been satisfied a combination of carbons has been designed to give a known output of light

and a known ratio of burning rate between Positive and Negative when operated within stated limits of current and arc voltage.

It must be clearly apparent that these carefully calculated results will not be secured unless the appropriate Positives and Negatives are burned together at arc characteristics lying within the recommended limits.

For this reason, we give for each type of carbon discussed herein

(*a*) a table of Trims showing recommended current and arc voltage,

(*b*) a view of the arc burning,

(*c*) examples of Positive and Negative end formation,

(*d*) a polar distribution curve showing the distribution of light about the horizontal axis of the Positive Carbon,

(*e*) a light emission curve showing the relation between current loading and light emitted, and

(*f*) a burning rate curve showing the relation between current loading and the consumption of the Positive Carbon.

As space will not permit us to give this information for each and every trim mentioned, a typical trim has been selected from each class of carbon, and the examples given should serve as a guide for other trims in the same class.

SUPPLY CHARACTERISTICS

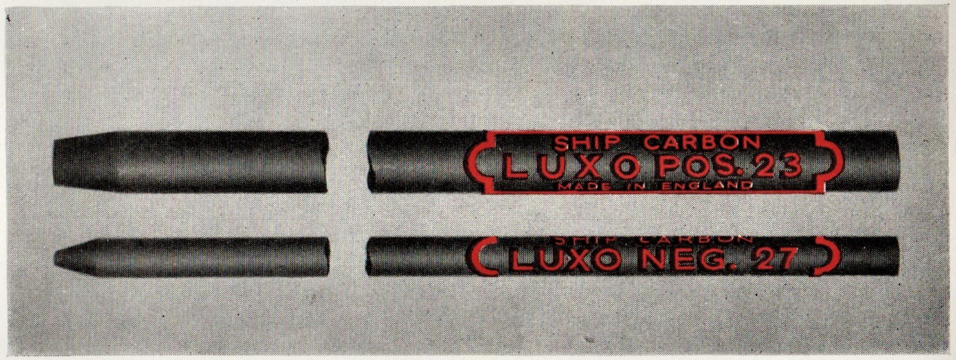
In any arc designed for operation on Direct Current the results secured will depend materially upon the smoothness of the supply and are at optimum value under conditions of straight line D.C.

SHIP SERVICE

It is our wish that you, as the user, should obtain from Ship Carbons the satisfaction you are entitled to expect. The data given in this booklet should serve as a general guide enabling you to derive full benefit from the experience which has governed the design of each trim.

We have endeavoured to provide a margin of flexibility in each trim adequate to cover the wide range of lamps, supply characteristics, ventilation conditions, angles of rake and other variants that can affect arc behaviour.

LOW INTENSITY CARBONS



SPECIFICATION

A range of Low Intensity Carbons designed to meet the Low Loading characteristics of certain equipment in use overseas. Not available on British Home Market.

POSITIVE No. 23 SPECIFICATION

Shell : Hard fine-grained pure carbon.
Core : Soft round pure carbon placed centrally, adjusted to give maximum light output at lower ranges of amperages used in L.I. lamps.

NEGATIVE No. 27 SPECIFICATION

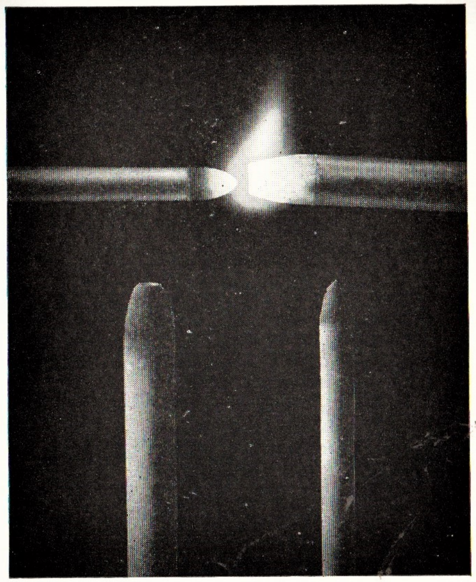
Solid clean burning fine grained carbon.

BURNING RATES AND COMBINATIONS

Type of Carbon	Rated Current Carrying Capacity (Amperes)	Diam. Positive mm.	Diam. Negative mm.	Average Burning Rate in Inches Per Hour: At Normal Current of Amps.	Positive	Negative	Arc Volts
Luxo No. 23 Positive	7–10	9	6	9	1·8	2·1	51–53
Luxo No. 27 Negative	10–13	10	7	12	1·9	1·8	51–53
	12–16	11	8	14	1·65	1·5	51–53
	15–20	12	8	18	1·75	1·75	51–53
	20–25	13	9	23	1·7	2·1	50–52
	25–30	14	10	28	1·85	2·0	50–52

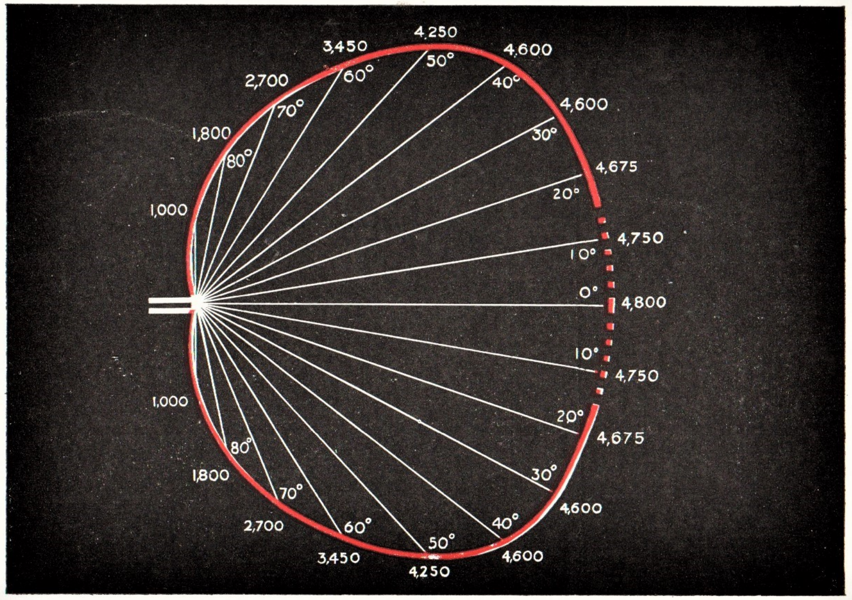
LUXO (LOW LOADING)

LUXO HORIZONTAL ARC 23-27

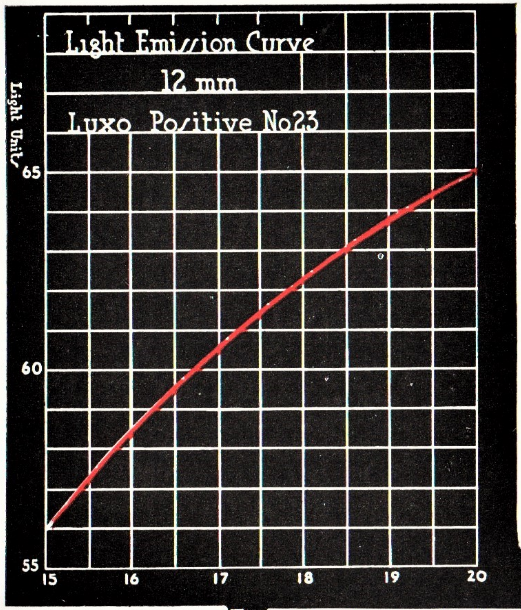


The appearance of Positive and Negative ends, Luxo 23 and Luxo 27 when correctly burned in a horizontal lamp.

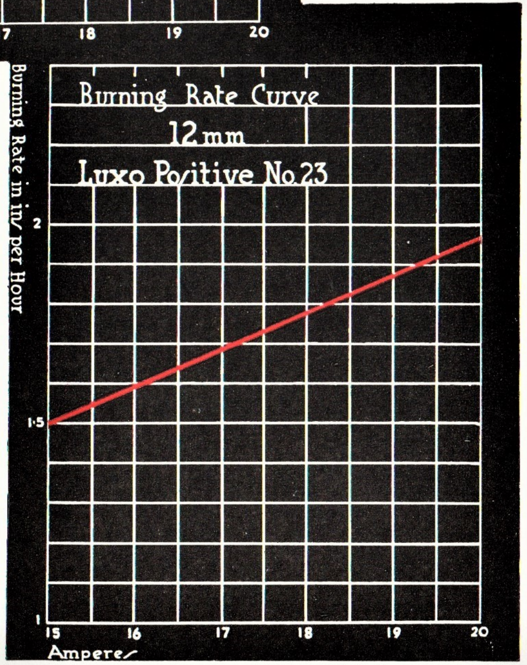
The horizontal distribution of candlepower about the axis of a Luxo 23 Positive Carbon. In practice the negative carbon and its holder will obscure some of the light as indicated by the dotted line on the curve.



LUXO HORIZONTAL ARC 23-27

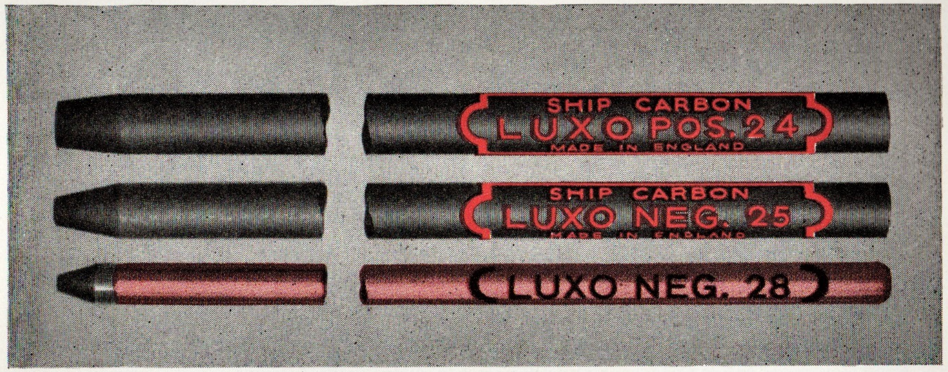


The Light Emission in arbitrary units plotted against current density for the 12 mm. Luxo 23 Positive Carbon.



The average Burning Rate in inches per hour for currents within the range of the 12 mm. Luxo 23 Positive Carbon.

LUXO HORIZONTAL ARC 24-25-28



SPECIFICATION

Ship Luxo Carbons, specifically designed for use in Low Intensity Arc Lamps, Horizontal or Angular, operating at higher current densities. Available in all markets.

POSITIVE No. 24

Shell : Hard fine-grained pure carbon.
Core : Soft round pure carbon centrally placed ensuring regular presentation of crater to mirror.

NEGATIVE No. 25

Fine-grained pure carbon shell with inlaid copper coated core.

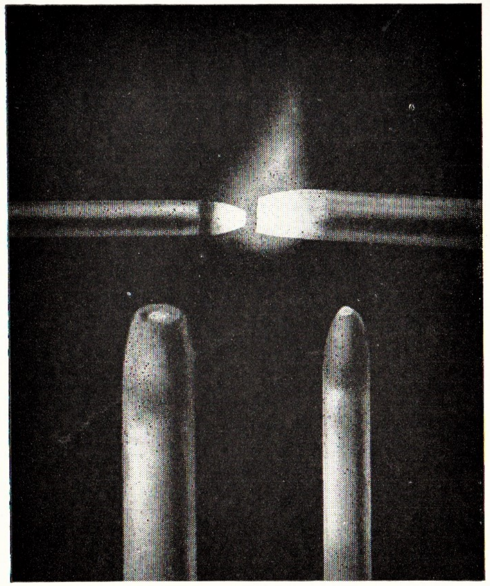
NEGATIVE No. 28

Solid clean burning fine-grained carbon copper plated to fine limits ensuring minimum obscuration of positive crater.

BURNING RATES AND TRIMS

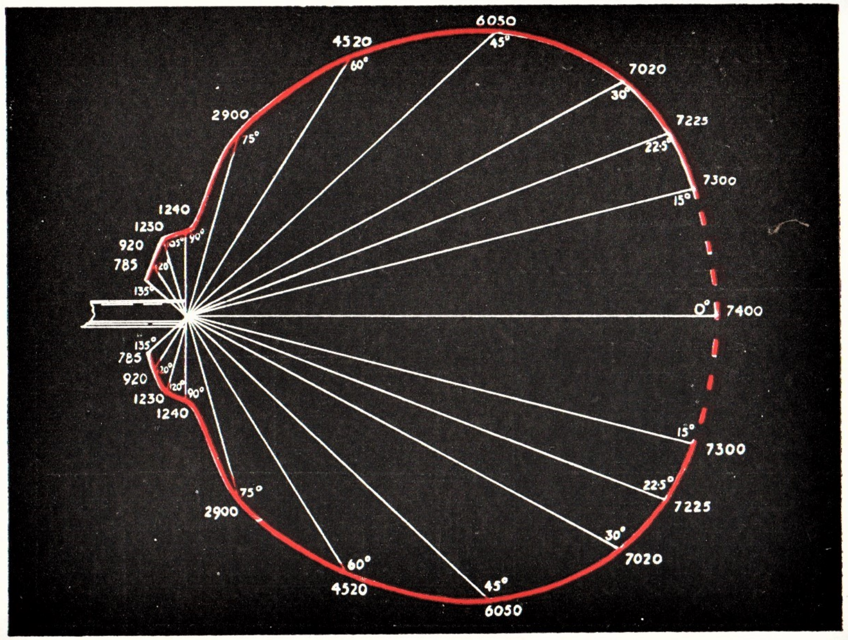
Type of Carbon	Rated Current Carrying Capacity (Amperes)	Diam. Positive mm.	Diam. Negative mm.	Average Burning Rate in Inches Per Hour: At Normal Current of Amps.	Positive	Negative	Arc Volts
Luxo Special Mirror Carbons, Nos. 24 and 25 D.C.	15–20	10	7	15	1·63	1·65	45–50
	20–25	11	8	20	2·3	2·0	48–52
	25–30	12	9	25	2·3	2·0	48–52
	30–35	13	9	30	2·2	2·2	48–52
	35–40	14	10	35	2·1	1·85	50–55

LUXO HORIZONTAL ARC, 24-25-28



The appearance of Positive and Negative ends, Luxo 24 and Luxo 25 when correctly burned in a horizontal lamp. Note clear-cut, well-defined crater and well formed Negative point.

The horizontal distribution of candlepower about the axis of a Luxo 24 Positive Carbon. In practice the negative carbon and its holder will obscure some of the light as indicated by the dotted line on the curve.



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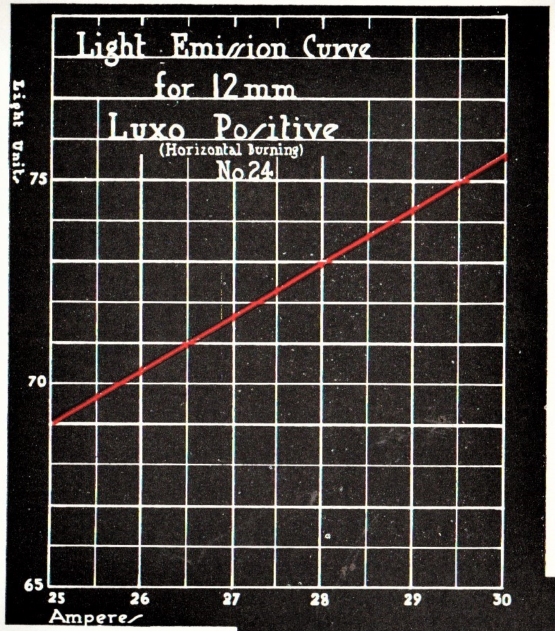
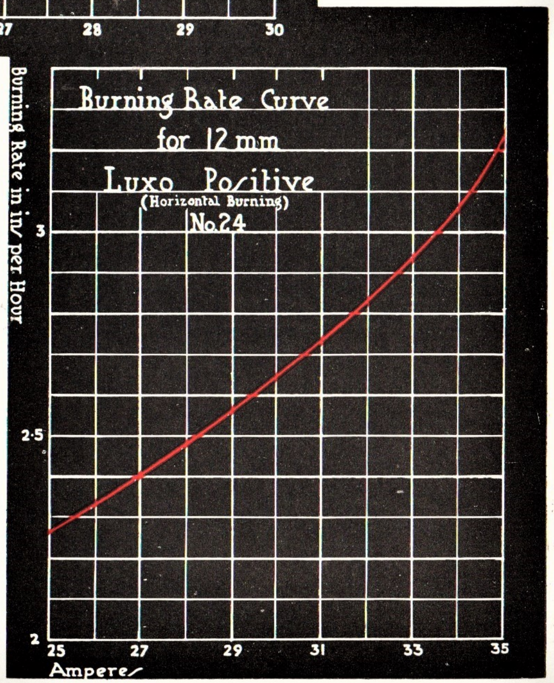
CARBONS

LUXO HORIZONTAL ARC 24-25-28

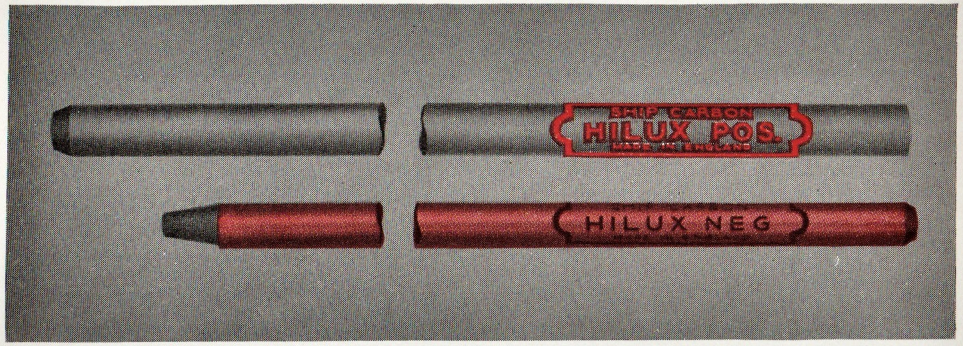


The Light Emission in arbitrary units plotted against current density for the 12 mm. Luxo 24 Positive Carbon.

The average Burning Rate in inches per hour for currents within the range of the 12 mm. Luxo 24 Carbon. Observe tendency of burning rate to "peak" at currents in excess of recommended rating.



HIGH INTENSITY CARBONS



SPECIFICATION

Ship Hilux High Intensity Carbons are designed in a range of diameters for currents between 60 and 170 amperes when used in rotating-positive lamps. The Positives are dead straight, of uniform diameter throughout each length, and of a smooth texture which enables them to be fed through the rotating jaws without binding or pitting.

POSITIVES

Shell : Clean hard smooth shell of high conductivity carbon.
Core : Alternatively available with " round inlaid " or " star squirted " cores impregnated with rare earths giving a brilliant white light of perfect colour balance (see spectrogram on opposite page).

NEGATIVES

High-conductivity carbon, cored and copper coated to carry the high current densities associated with this type of carbon, whilst at the same time ensuring the critical end formation required.

BURNING RATES AND TRIMS

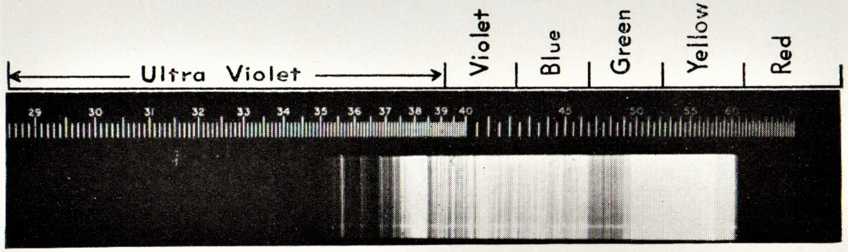
Type of Carbon	Rated Current Carrying Capacity (Amperes)	Diam. Positive mm.	Diam. Negative mm.	Average Burning Rate in Inches Per Hour: At Normal Current of Amps.	Positive	Negative	Arc Volts
HILUX	65–75	9	7·5	70	13·2	3·2	50–55
	80–95	11	9	90	14·6	2·8	54–62
	120–140	13·6	11	135	15·8	2·6	64–70
	150–170	16	12	160	13·0	3·0	70–75

GENERAL DATA ON HILUX CARBONS

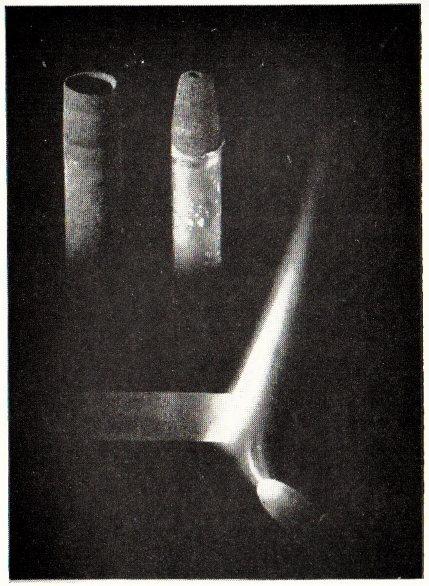
Carbons for use in rotating-positive type lamps, whether the jaws holding the positive carbon be water cooled or not, call for sound theory and sound manufacturing processes. The light emission depends largely upon securing a high density of current flux per square millimetre of crater area. The jaws must grip the carbon with sufficient pressure to feed the high current values associated with these carbons without, on the other hand, gripping them so tightly as to prevent rotation.

Since the rotary motion is frequently imparted at the carbon end and the jaws are placed as close to the crater as possible, it will be appreciated that these Positive Carbons must possess considerable torsional strength.

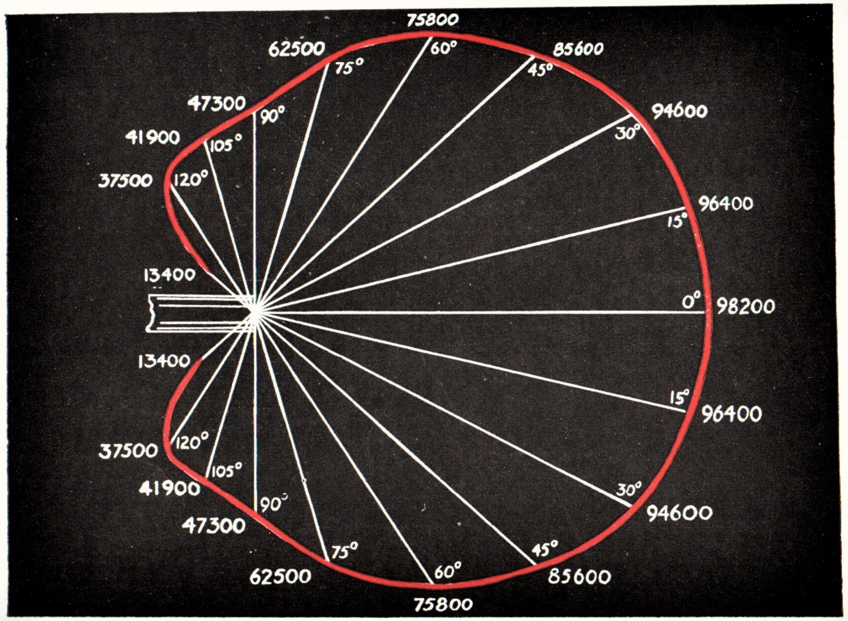
The quality of the light emitted by these carbons is similar to brilliant sunlight, both as regards intensity and colour quality. (See spectrogram.)



HILUX



This plate clearly shows the high luminosity of the rotating positive type of High Intensity Arc.
Note the critical presentation of the negative to the positive causing the negative arc stream to sweep accurately across the positive crater, resulting in the end formations and arc flame (with upswept tail) shown in these views.
The horizontal candle power distribution of the 13.6 mm. Hilux Positive is shown below.
Owing to the lamp design and presentation of negative to positive, minimum obscuration of the positive crater enables a high percentage of the emitted lumens to be collected by the optical system.



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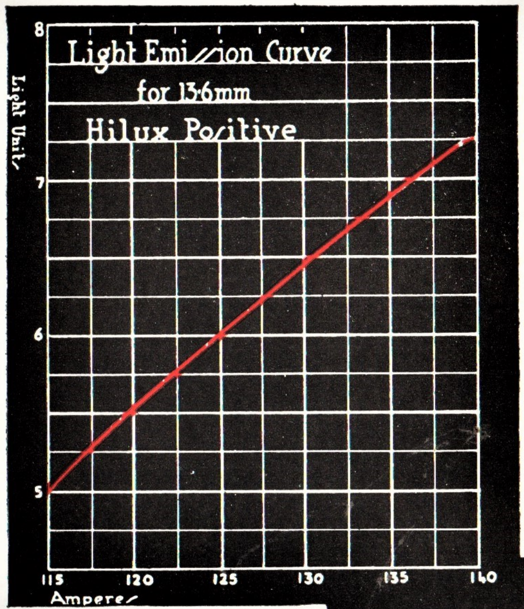
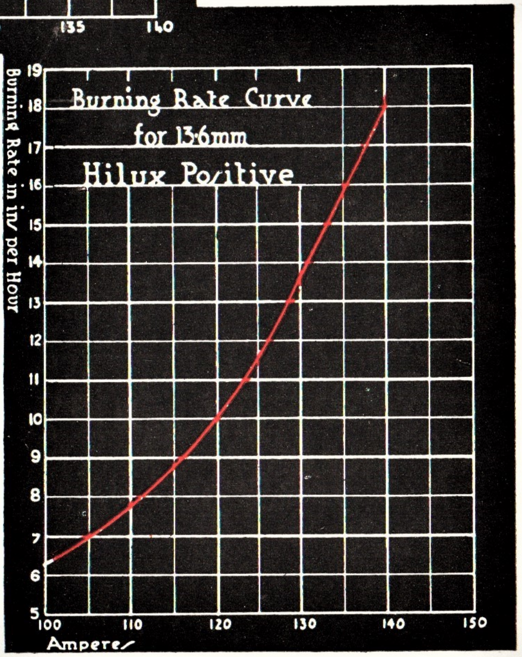
HILUX



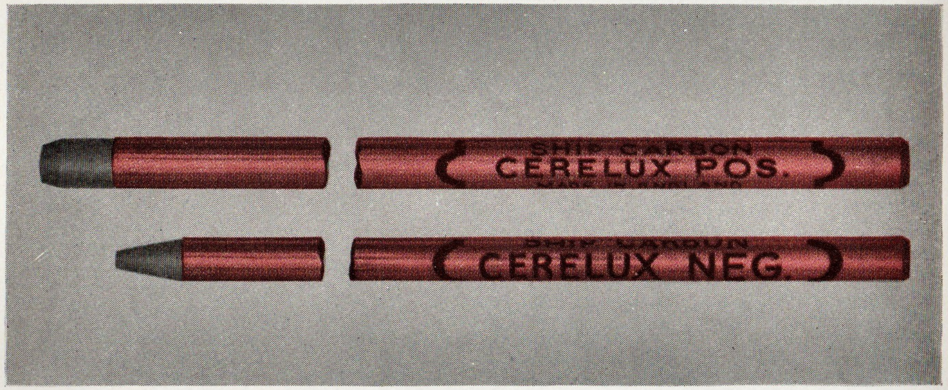
This shows the light response for Ship Hilux Carbons plotted in arbitrary units against current; owing to the extremely high intrinsic brilliance of the Hilux Crater and to the great luminous energy liberated, it is necessary in taking readings to interpose filters and scale down the values of light emission relatively to L.I. Carbons.

Compare the maximum candlepower of 98,200 for Hilux given on the previous page with that of 7,400 for the Luxo Carbon on page 8.

The burning rate goes up somewhat steeply as normal loading is approached, but an adequate factor of safety is provided.



CERELUX (known in Gt. Britain as SUPREX)



Note

On this and the following eight pages we give details of the Ship Cerelux and Cereluxa High Intensity Carbons for Reflector type lamps. Each brand possesses marked characteristics which should be studied with care, in order to secure the best results for any particular set of burning conditions.

The essential difference between the two brands is that while the Cerelux Carbon gives a higher light output per watt, its burning rate is somewhat faster than for the equivalent Cereluxa carbon.

SPECIFICATION

POSITIVES

Shell : Carbon shell of high purity, copper coated by special process.

Core : Star shaped hard squirted core impregnated with rare earths.

NEGATIVES

Cored and copper coated of high current carrying capacity.

USUAL TRIMS AND BURNING RATES

Type of Carbon	Rated Current Carrying Capacity (Amperes)	Diam. Positive mm.	Diam. Negative mm.	Average Burning Rate in Inches Per Hour			Arc Volts
				At Normal Current of Amps.	Positive	Negative	
CERELUX	30–40	6	5	35	9·0	4·5	32–38
	40–50	7	6	45	8·7	3·5	33–41
	50–60	8	7	55	11·0	3·1	37–43

GENERAL DATA ON CERELUX CARBONS

It will be appreciated that a High Intensity Carbon of this type can be designed to suit many varieties of operating conditions.

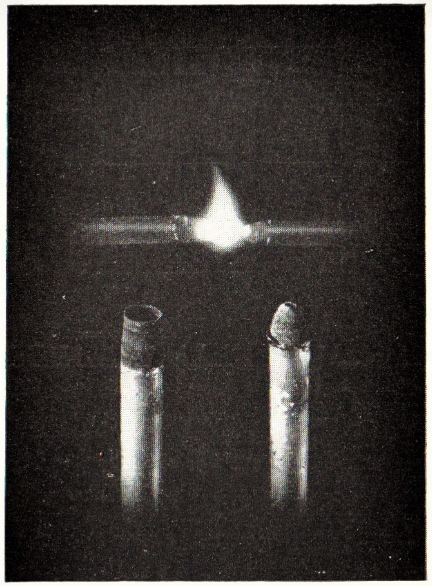
For a stated consumption of electrical energy in the arc we can either design a carbon pair to give maximum light output, or one to give maximum economy in burning rate. Or we can design a pair that compromises between these two requirements. However, apart from questions of burning rate and light emission, we must also take account of factors such as the burning ratio between the Positive and the Negative at currents throughout the rated range and this burning ratio must be considered in conjunction with the feed capacity of the lamp.* Again there is the matter of the length of stub end to be borne in mind.

The Cerelux Carbon strikes the compromise in favour of high luminous output. It has, in fact, an exceptional emission of lumens per watt.

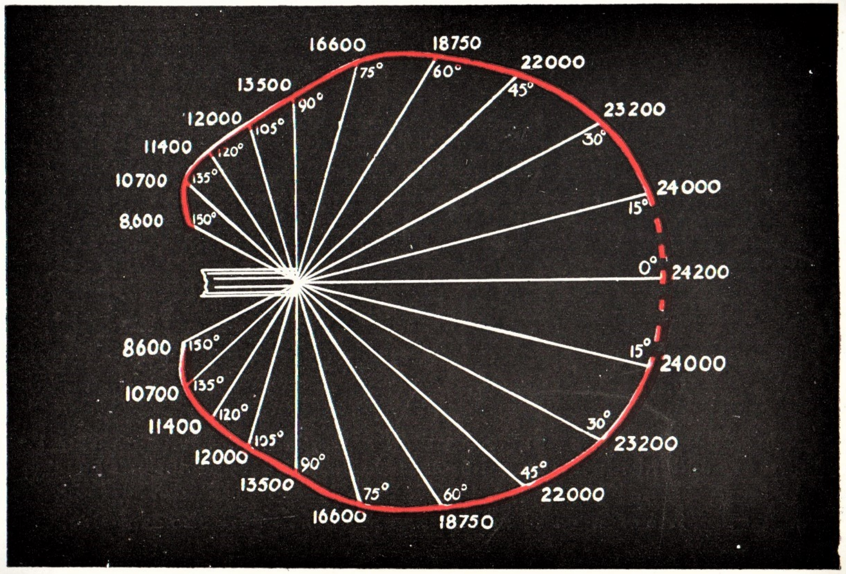
* Cerelux Negatives of 5·5 mm., 6·5 mm. and 7·5 mm. diameters can be supplied as standard when required to assist in maintaining balance in burning ratio.

Cerelux Positives of larger diameters than those shown are also available.

CERELUX (known in Gt. Britain as SUPREX)



The well-formed crater and its associated light distribution about the horizontal axis of the Cerelux Carbon are well shown by the examples given here.
Compare them with the corresponding views given on page 20, in particular noting the shape of the light distribution curve.



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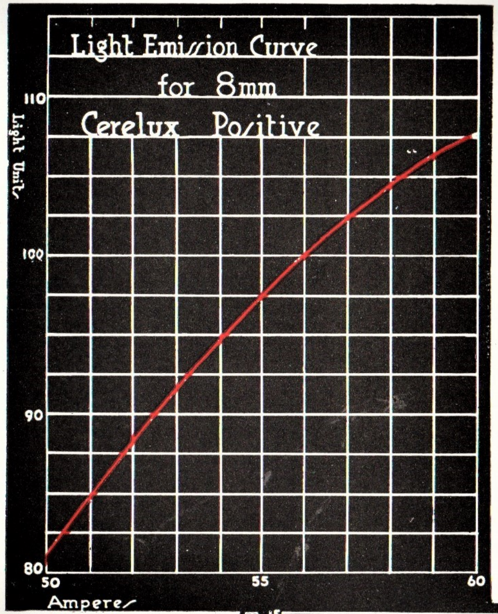
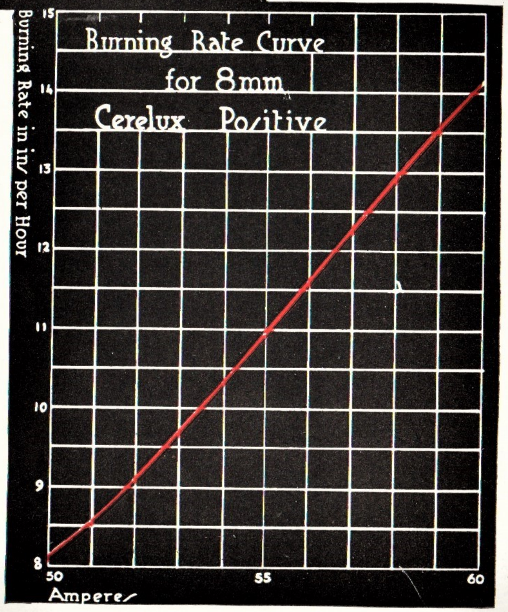
CERELUX
(known in Gt. Britain as SUPREX)

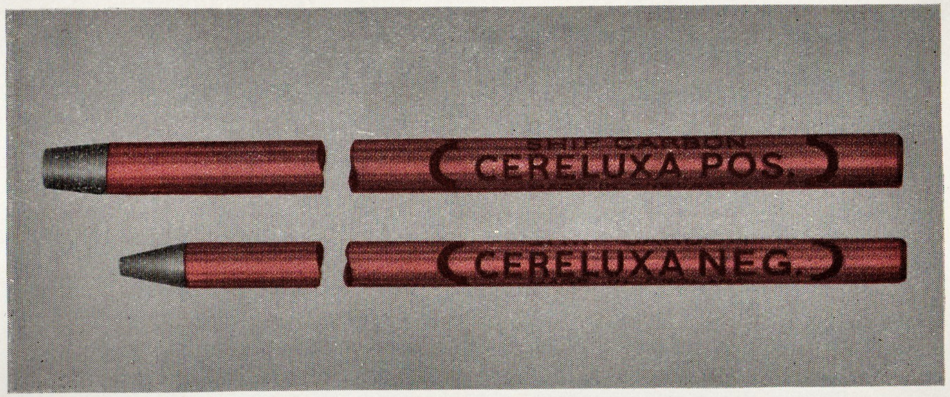


Note that the light emission curve for the Cerelux type of carbon shows a tendency to droop as soon as the rated maximum current is exceeded. Any additional overload would cause a further falling off in lumens per watt.

The burning rate curve shows a steady rise over the recommended range of the carbon, but will rise progressively sharply with each watt of overload. The Cerelux Carbon gives a brilliant light and steady burning within its rating, but overloading must be avoided.



CERELUXA (known in Gt. Britain as SUPREXA)



In the Cereluxa Carbon the Positives are provided with hard high conductivity type shells, copper coated and carrying star shape impregnated cores, resulting in a slower burning rate within their rated current and a margin of safety should the current be exceeded.

The Cereluxa carbon is a compromise between the conflicting requirements of a high light output and a low burning rate and will give excellent results, provided due regard is paid to its particular operating characteristics.

SPECIFICATION

POSITIVES

Shell : Of high conductivity carbon, copper coated by special process.

Core : Star shaped hard squirted core impregnated with rare earths.

NEGATIVES

Cored and copper coated of high current carrying capacity.

USUAL TRIMS AND BURNING RATES

Type of Carbon	Rated Current Carrying Capacity (Amperes)	Diam. Positive mm.	Diam. Negative mm.	Average Burning Rate in Inches Per Hour: At Normal Current of Amps.	Positive	Negative	Arc Volts
CERELUXA*	35–45	6	5	40	10·4	4·8	32–38
	45–55	7	6	50	10·0	4·1	34–41
	56–65	8	7	60	9·6	3·2	38–42

* Cereluxa Negatives of 5·5 mm., 6·5 mm. and 7·5 mm. diameters can be supplied as standard when required to assist in maintaining balance in burning ratio.
Cereluxa Positives of larger diameters than those shown are also available.

GENERAL DATA ON CERELUXA CARBONS

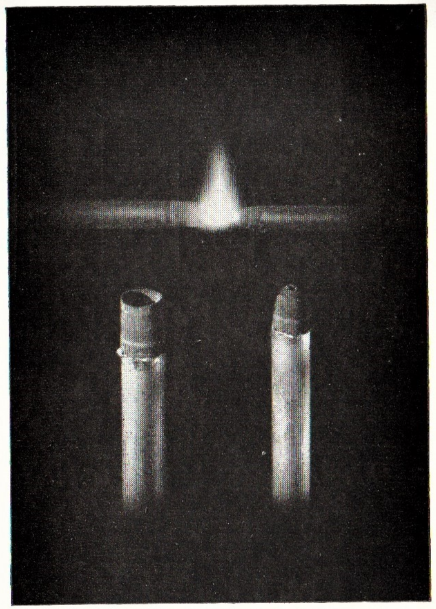
The burning rate and light emission charts for Cerelux and Cereluxa Carbons given on pages 17 and 21 have been plotted so as to facilitate comparison.

The 8 mm. Cerelux Positive when burned at its normal current of 55 amperes has an emission of 97½ light units (arbitrary) and a burning rate of 11 inches per hour. The arc wattage in this case is to the order of 2,200 watts.

The 8 mm. Cereluxa Positive when burned at its normal current of 60 amperes has an emission of 86 light units and a burning rate of 9·6 inches per hour. The arc wattage in this case is about 2,400 watts.

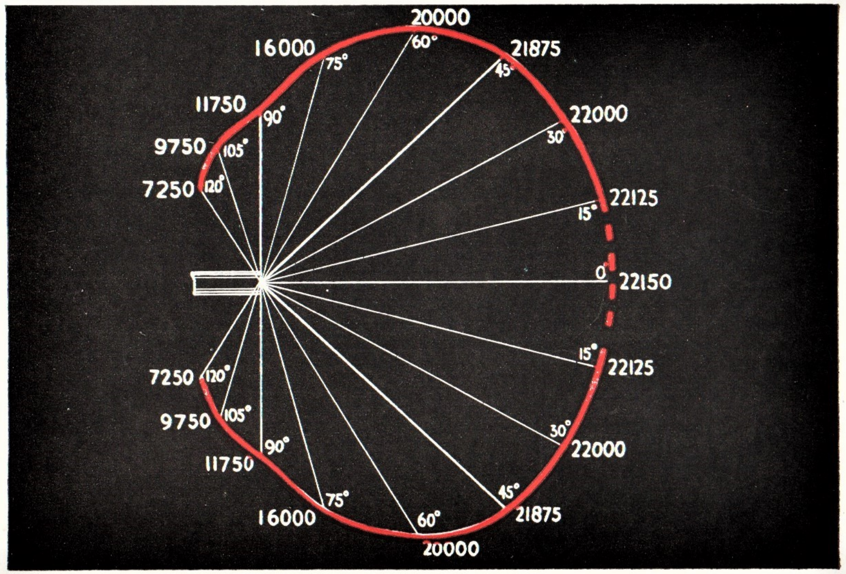
In general it will be observed that the normal current rating of Cereluxa is 5 amperes higher throughout the range than for Cerelux, but whereas the burning rate for Cerelux goes up steeply, that for Cereluxa does not exhibit this tendency.

CERELUXA (known in Gt. Britain as SUPREXA)

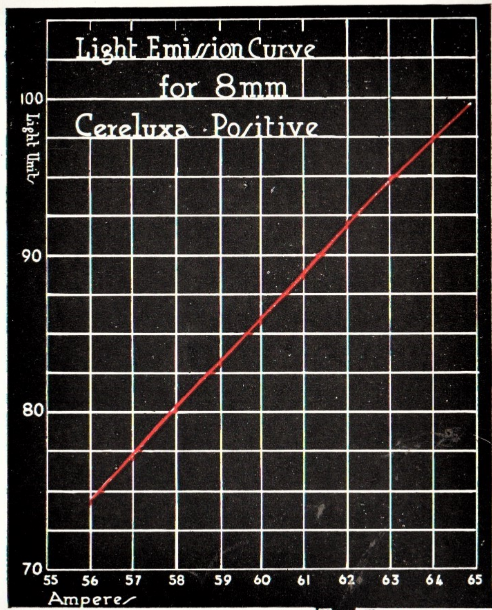


View of Cereluxa trim showing correct arc flame and end formation when burned at normal current.

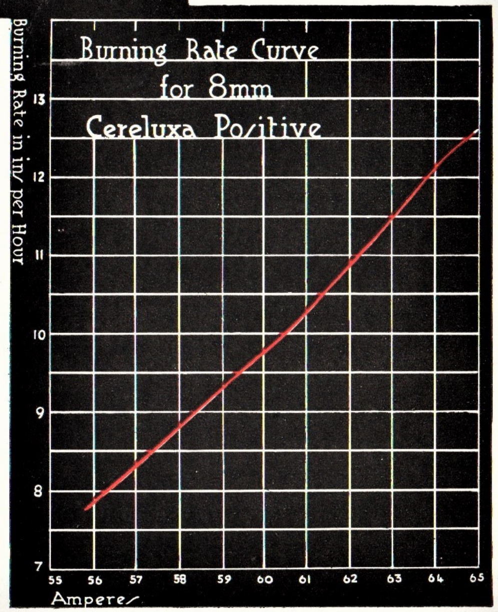
Note that the maximum candlepower observed on the horizontal axis is 22,150 as against 24,200 for Cerelux.



CERELUXA
(known in Gt. Britain as SUPREXA)

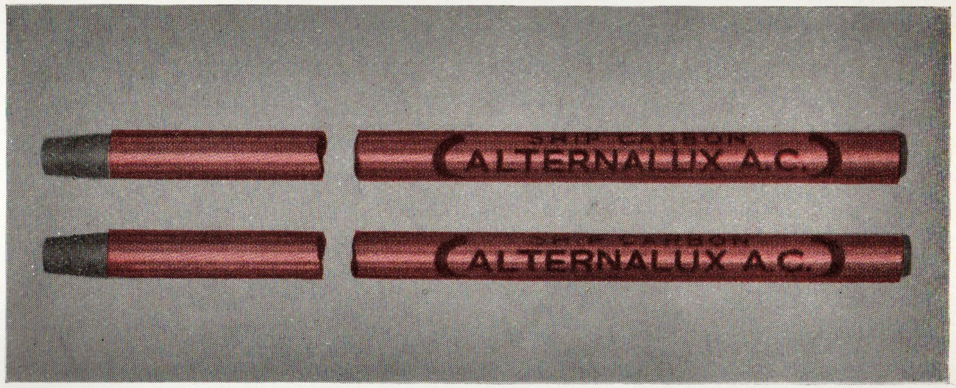


Note that the light emission for the Cereluxa carbon is a straight line curve, increasing in direct proportion to the current. If loading is carried beyond the rating of the carbon, the light emission curve would continue to rise steadily for some time.



Note that the burning rate for Cereluxa Carbons rises steadily within its rating and will continue to rise at about the same rate under reasonable overloads.

ALTERNALUX



Alternalux Carbons, as their name denotes, are designed for use in Alternating Current Arcs.

Since each carbon is alternately the " Positive," diameters in any pair are the same—the two carbons are, in fact, identical and interchangeable in any given trim.

Considerable research and pioneer work into the behaviour and characteristics of the Alternating Current Arc as applied to High Intensity Carbons was carried out by the Ship Laboratories prior to the 1939–45 war and the present carbons are developments of the prototypes of those days.

SPECIFICATION

Shell : Pure carbon copper coated by a very specially developed process.

Core : Star shape hard cores impregnated with rare earths.

BURNING RATES AND TRIMS

Type of Carbon	Rated Current Carrying Capacity (Amperes)	Diam. Positive mm.	Diam. Negative mm.	Average Burning Rate in Inches Per Hour			Arc Volts
				At Normal Current of Amps.	Positive	Positive	
ALTERNALUX*	65–75	7	7	70	5·1	5·1	25–26
	80–90	8	8	85	4·8	4·8	25–26
	95–105	9	9	100	4·6	4·6	26–28

* Larger diameters available if required.

GENERAL OPERATING DATA FOR ALTERNALUX CARBONS

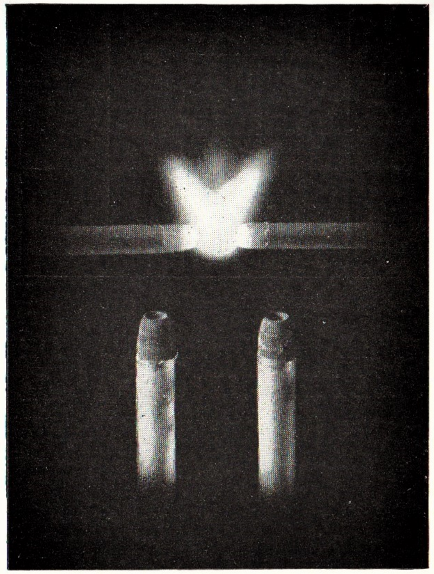
Earlier attempts at operating projection arcs from " raw " AC were unsuccessful, because the periodicity in the arc light set up a beat effect with the shutter frequency and so produced an unsteady light on the screen.

As the result of Ship Carbon research this disability was overcome by employing the relatively small diameter high intensity type of carbon and feeding it with current at a density which reduced the falling off in crater temperature between one cycle and the next.

A glance at the light emission curve on page 25 will show that the Alternalux trim must be run well up to its rated current value (in this case 85 amperes) before anything approaching maximum light emission is obtained.

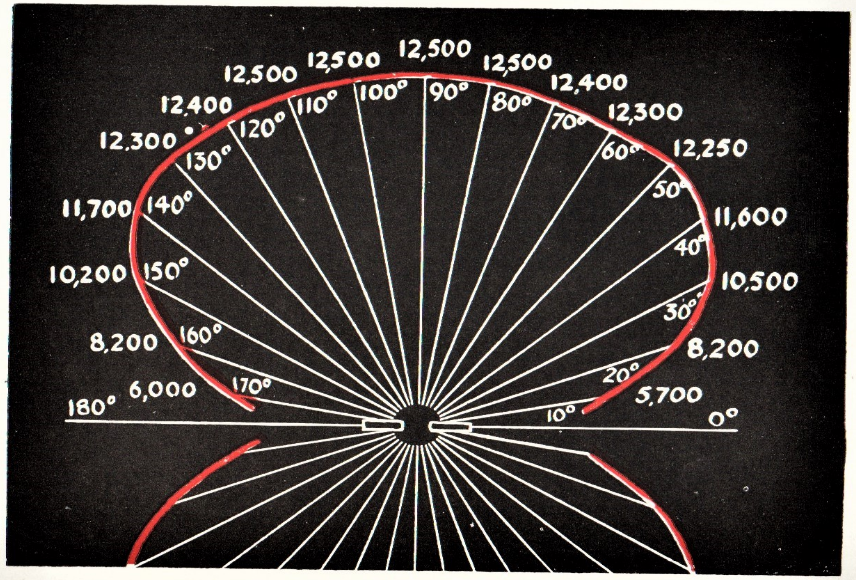
The trim tends, however, to become critical in operation, because not only does light emission and steadiness depend upon adequate current, but burning rate between the two carbons (to correspond with the 1 to 1 feed ratio of the lamp) is liable to be upset if normal current rating is greatly exceeded. Provided, however, that these carbons are run in suitable lamps and at arc characteristics reasonably in accord with those shown in the table above, a steady light of high intensity brilliance will be secured.

ALTERNALUX

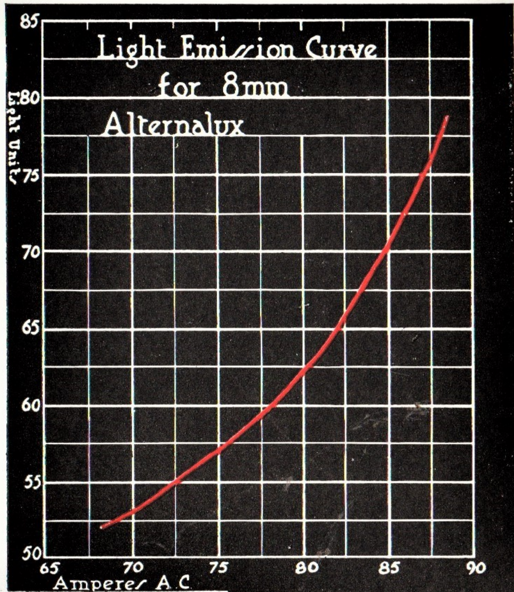


The twin flames of the alternating current arc are shown clearly by this exposure. Crater formation on each carbon is identical and if similar formation is not obtained, faulty setting or load factor is indicated.

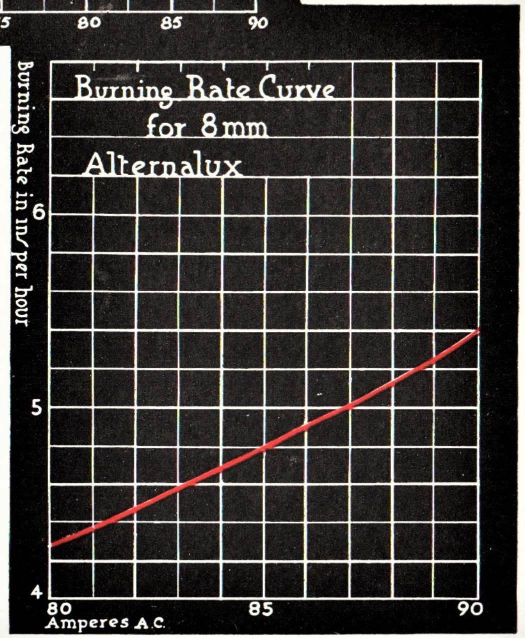
The distribution of candle-power is roughly spherical about the arc centre and is maintained substantially constant over an angle of some 50 degrees around the maximum.



ALTERNALUX



Note that the light emission is low at underloads but builds up rapidly to maximum as normal loading is approached.



Burning rate for each carbon should be equal. Note that the arc voltage for the AC arc is to the order of 26 volts and wattage is, therefore, comparable with DC H.I. arcs of similar diameter positive.

STAGE LIGHTING & SPOTS

STAGE ARC

Type of Carbon	Current Range Amperes	Diam. Positive mm.	Diam. Negative mm.	Average Burning Rate in inches Per Hour. At Normal Current of Amps.	Posi-tive	Nega-tive	Arc Volts
STAGE ARC POS. CORED and STAGE ARC NEG. COPPER CORED	10–15	10	7	15	2·7	2·4	48–52
	15–20	11	7	20	2·6	2·7	
	20–25	12	8	25	2·7	2·3	
	25–35	14	9	30	2·3	2·2	
	35–45	16	10	40	2·2	2·2	
	45–55	18	12	50	2·1	1·9	
STAGE ARC POS. CORED and STAGE ARC NEG. COPPER COVERED.	55–65	20	10	60	2·1	2·1	
	65–75	22	11	70	1·9	1·9	
	75–85	25	12	80	1·9	2·2	

Type of Carbon	Maximum Current Amperes	Diam. Positive mm.	Diam. Negative mm.	Average Burning Rate in inches Per Hour: Positive	Negative	Arc Volts
STAGE ARC POS. CORED and STAGE ARC NEG. SOLID.	20	14	10	1·5	1·9	50–55
	25	15	11	1·7	1·7	
	30	16	12	1·7	1·8	
	40	18	13	1·8	1·7	
	50	20	15	1·7	1·8	
	60	22	18	1·6	1·5	
	70	25	20	1·4	1·3	

We have endeavoured to supply tables above showing typical burning combinations and rates for Ship Stage Arc Carbons.

It is realised, however, that Theatre Electricians will prefer to choose the carbon combination and arc characteristics suitable to their particular needs and to the widely varying conditions of Stage and Spot Lighting.

The assistance of Ship Service Engineers and of the Ship Laboratory is readily available where problems of an unusual nature are encountered.

STAGE ARC

SPECIFICATION

Ship Stage Arc Cored Positive Carbons are used alternatively with Stage Arc Negatives Copper Cored, Stage Arc Negatives Copper Covered, and Stage Arc Negatives Solid, according to the type of spotlight.

These carbons are illustrated and listed in the previous pages (pp. 26 and 27).

The POSITIVE Carbons consisting of fine grain shell and pure carbon core are used with

COPPER CORED NEGATIVES (*i.e.*, Negatives having a pure carbon shell within which is inlaid a copper coated core) for all normal stage lighting and spotlight purposes.

or

COPPER COVERED NEGATIVES
in modern high power spotlights operating over long throws. (The outside copper reinforcement of the Negative enables a small diameter carbon to be employed with consequent reduction in the obscuration of the crater and a more accurate focusing of the spot.)

or

SOLID NEGATIVES
for short throws and, in particular, where the use of copper covered or cored Negatives is inadvisable owing to falling particles of molten copper.

CINEMA STUDIO CARBONS

STUDIO

Positive	Negative	Amps.	Arc-Volts	Arc-Gap (ins.)	Crater Candlepower	Crater Diameter (mm.)	Mean Intrinsic Brilliancy (Candles/mm.)	Average Burning Rates ins. per hour: Positive	Average Burning Rates ins. per hour: Negative
13·6 mm. R.A.	10 mm. R.A.	120	65	$\frac{3}{8}$–$\frac{7}{16}$	48,000	11·6	453	14·0	2·8
13·6 mm. Panchromatic	10 mm. R.A.	120	54–55	$\frac{3}{8}$–$\frac{7}{16}$	34,000	10·4	407	10·2	2·8
16 mm. R.A.	11 mm. R.A.	150	63–64	$\frac{1}{2}$–$\frac{9}{16}$	57,500	12·8	457	10·6	3·0
16 mm. Panchromatic	11 mm. R.A.	150	60–62	$\frac{1}{2}$–$\frac{9}{16}$	59,500	12·8	472	10·0	3·0
9 mm. R.A.	7 mm. R.A.	63	50–51					12·5	3·6
9 mm. Panchromatic	7 mm. R.A.	68	45					10·8	3·6
8 mm. Spectral	7 mm. Spectral	40	40					4·25	3·3
8 mm. Spectral	8 mm. Spectral	35	43					4·2	2·5
16 mm. B.P. 200	12 mm. B.P. 200	200	68		89,600	13·8	600	18·8	2·8
16 mm. B.P. 150	11 mm. B.P. 150	150	65					10·5	2·9

STUDIO

The range of carbons illustrated on page 29 and detailed in the Table on the opposite page covers all the requirements of the modern Film Studio whether for spotlighting, set lighting or rear projection.

In the case of carbons used in Spot Lights and Rear Projection the design allows for noiseless operation in the Rotating Positive type of Arc Lamp.

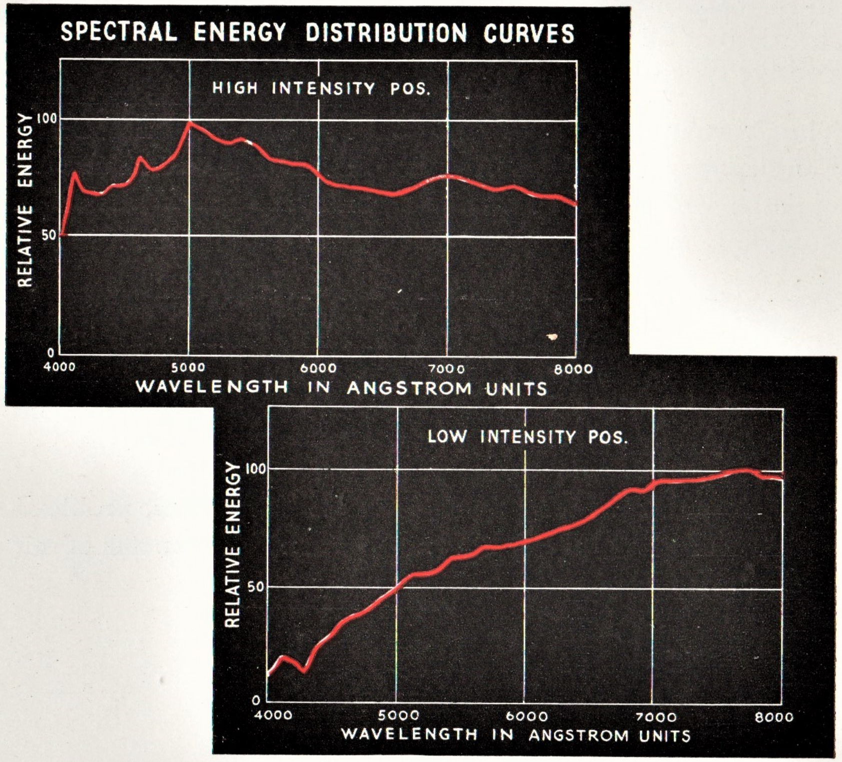
The burning characteristics and figures showing Crater Candlepower and Mean Intrinsic Brilliancy given in the table opposite will assist the Studio Technician to make a selection suitable to any set location or emulsion characteristics.

The Ship Carbon Laboratory has always specialised in anticipating the needs of Studio Illumination and in co-operating both with Studio Technicians and with Manufacturers of Photographic Stock to produce lighting conditions suitable to the latest advances in photography.

Our Engineers are at all times willing to discuss these problems with Technicians on the site and to extend the benefits of our research and experience in these matters.

LABORATORY RESEARCH

Spectral analysis of the light emitted by the various types of Ship Carbon is a routine, but very important duty of the staff of our Physical Laboratory.



These charts show a comparison between the Spectral Energy Distribution Curves of typical Ship Low Intensity and High Intensity Carbons. Note how the energy in the case of the H.I. Carbon is concentrated largely towards the Ultra Violet end of the spectrum, whilst the L.I. Carbon is richest towards the Infra Red end.

Ship Carbon Engineering Service

The applications of arc lamp carbons to Industry, Commerce and social amenities are many and varied. Carbon Arc Lamps are employed in Motion Picture Film Production, Cinemas, Theatres, Photographic Studios, Photographic Process and Plan Reproduction, Hospitals, Clinics, Therapeutic Treatment Centres and other specialised locations.

Each application presents its own particular problems and it is the function of our Engineering Service to assist you in securing the desired light characteristics from the Ship Carbons used in your lamps.

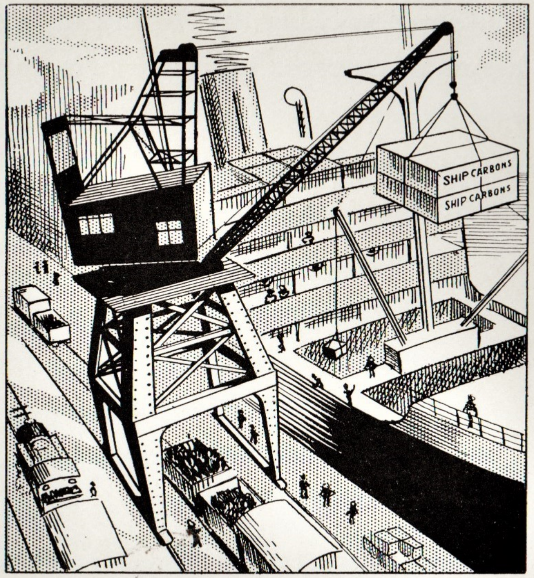
Ship Laboratory and Service Engineers are always available to give assistance and advice in these matters, either by correspondence or by personal visit.

These Engineers are trained in our Factory, where they also attend frequent refresher courses and keep themselves fully informed of all developments affecting the technique of the carbon arc.

They are equipped with a full range of sensitive and accurate measuring instruments, they carry samples of all carbon pairs in current demand and they have behind them the entire resources of our Laboratories and Sales Organisation.

It is their wish and ours that you should obtain from Ship Carbons the complete satisfaction that you have a right to expect, and that you should benefit to the full from our specialised experience in all problems relating to electric arc lamp carbons.

Ship Carbons Overseas



To the Directors and Staff of Chas. H. Champion & Co. Ltd. and its associated Company, The Ship Carbon Company of Great Britain Ltd. it is a matter for no small gratification to observe the ever-growing demand for Ship British Made Carbons in overseas markets.

The distribution of Ship Carbons can, with accuracy, be described to-day as world-wide, and the quality of our goods is identical throughout—namely, of the highest possible standard—whether intended for use at Home or Abroad. At the same time it is, on occasions, necessary to make some slight modifications in the matter of packing and brand names to suit the requirements of overseas markets. As an example, the Suprex and Suprexa carbons sold on the British market are, in certain countries abroad, designated as Cerelux and Cereluxa, although, apart from this change of name, the carbons are identical respectively with their counterparts.

In addition there may be carbons manufactured specifically to meet the requirements of special operating or electricity supply conditions which obtain in certain overseas countries only.

Our overseas Distributors—established in most of the important countries in the world—are in constant touch with our Main Offices to whom they communicate any problems of a specialised nature which may occur in their countries—and such problems, whether they be of a technical or a marketing nature, are rapidly solved.

Our wish is that wherever you may be situated, at home or abroad, you may secure completely satisfactory results from the products of Ship Carbons and our organisation is at your service to this end.

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