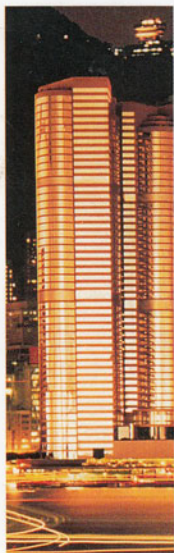


 **THORN LIGHTING**

COMPREHENSIVE CATALOGUE



1989/90

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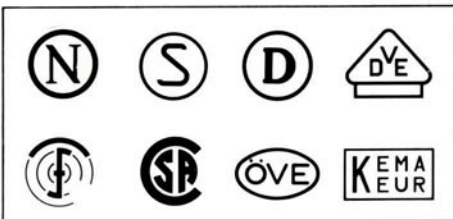
Safety and Quality with Thorn Lighting Test House Approvals

British Standards Institution

Thorn Lighting holds many BSI Safety Mark  and Kitemark  licences for its factories manufacturing lamps, starters, ballasts, lampholders and luminaires.

In addition to indicating compliance with the relevant BSI product standard, these licences give an assurance of ongoing quality of the product by requiring factory quality systems to conform with BS 5750.

Many of our products carry other European test house approvals such as those shown. This enables our products to be sold in Europe.



Quality Assurance (BS 5750)

To comply with BS 5750 we are required to meet stringent safety and performance standards, from design through to methods and systems of manufacture. Wherever possible our factories are licensed as this example certificate shows. A British Standard Institute product certification, Safety Mark or Kitemark, license gives independent assurance that the product complies and that the quality system in the



factory meets BS 5750. Where licences do not exist we are assessed to BS 5750 Quality Systems.

Consumer Protection Act 1987

In May 1987, this Act became Law. Simply it makes provision with respect to the liability of persons for damage caused by defective products. Under this legislation it is unlawful to make, or to hold in stock, or to offer for sale any electrical appliance which is unsafe. This applies at all points of sale. Thorn Lighting, by their co-operation fully in the BSI Safety Mark scheme, give the best possible guarantees of safety and quality to all our customers and will comply fully with the requirements of the Consumer Protection Act.

Health and Safety at Work

Essential guidance to safe installations, maintenance, and disposal of all Thorn Lighting products is contained in a booklet entitled "Thorn Lighting Safety Guide" and is free upon request from any of our regional offices.



This symbol on a Thorn High Pressure Sodium lamp indicates its suitability for use on control gear with an external ignitor.



In the absence of a British Standard for emergency lighting fittings I.C.E.L. (Industry Committee for Emergency Lighting) have formulated certain recommendations for their design and manufacture. All fittings with this symbol therefore can be regarded as fit for the purpose.



This mark indicates the suitability of the product for direct mounting on to a mineral fibre ceiling or a flammable surface.

Class 2. Double and/or reinforced insulation throughout and no provision for earthing.

The International Protection (IP) Code

This code is now widely used and classifies luminaires under two headings; (1) Protection against Electric Shock and protection against the ingress of solid foreign bodies, including fingers or tools at one end of the spectrum and fine dust at the other; (2) protection against the ingress of liquids.

The system is referred to in BS 4533 Part 1, section 2.3, and is fully explained in BS 775, Appendix B, Part 1.

An IP number consists of two numerals, the first referring to the left-hand column and the second to the right-hand column of the accompanying table.

For example, a dust-proof luminaire which can be hosed down would carry the number 55 and the symbols

A rain-proof fitting with protection from finger contact within the enclosure would bear the number 23 and the symbol in column 2 only.

Safety and Quality with Thorn Lighting

The higher the numerals of the first and second characteristic, the greater the degree of protection the enclosure offers; for example Jet-proof IP55 meets all the less onerous degrees such as IP22, IP23, IP34 and IP54.

The term 'Weatherproof' is frequently used of luminaires and is defined in BS 2817, as follows:

Table taken from BS 775 defining IP numbers for luminaires

Protection of persons against contact with live or moving parts inside the enclosure and protection of equipment against ingress of solid foreign bodies. Protection against contact with moving parts inside the enclosure is limited to contact with moving parts inside the enclosure that might cause danger to persons.

First characteristic numeral Degree of protection

0 No protection of persons against contact with live or moving parts inside the enclosure.
No protection of equipment against ingress of solid foreign bodies.

1 Protection against accidental or inadvertent contact with live or moving parts inside the enclosure by a large surface of the human body, e.g. a hand, but not protection against deliberate access to such parts. Protection against ingress of large solid foreign bodies.

2 Protection against contact with live or moving parts inside the enclosure by fingers. Protection against ingress of medium size solid foreign bodies.

3 Protection against contact with live or moving parts inside enclosure by tools, wires or such objects of thickness greater than 2.5mm. Protection against ingress of small solid foreign bodies.

4 Protection against contact with live or moving parts inside the enclosure by tools, wires or such objects of thickness greater than 1mm. Protection against ingress of small solid foreign bodies.

5 Complete protection against contact with live or moving parts inside the enclosure. Protection against harmful deposits of dust. The ingress of dust is not totally prevented, but dust cannot enter in an amount sufficient to interfere with satisfactory operation of the equipment enclosed.

6 Complete protection against contact with live or moving parts inside the enclosure. Protection against ingress of dust.

'A term applied to apparatus so constructed that it is suitable for operation under specified weather conditions without further protection.

NOTE the use of the term splash-proof with this meaning is deprecated.'

This classification is not included in the IP system; it can, however, be equated approximately with IP23.

IP symbols are shown against the numbers to which they apply.

Protection of equipment against ingress of liquid

Second characteristic numeral Degree of protection

0 No protection

1 Protection against drops of condensed water. Drops of condensed water falling on the enclosure shall have no harmful effect.

2 Protection against drops of liquid. Drops of falling liquid shall have no harmful effect when the enclosure is tilted at any angle up to 15° from the vertical.

3 Protection against rain. Water falling in rain at an angle equal to or smaller than 60° with respect to the vertical shall have no harmful effect.

4 Protection against splashing. Liquid splashed from any direction shall have no harmful effect.

5 Protection against water jets. Water projected by a nozzle from any direction under stated conditions shall have no harmful effect.

6 Protection against conditions on ships decks (deck watertight equipment). Water from heavy seas shall not enter the enclosures under prescribed conditions.

7 Protection against immersion in water. It shall not be possible for water to enter the enclosure under stated conditions of pressure and time.

8 Protection against indefinite immersion in water under specified pressure. It shall not be possible for water to enter the enclosure.

Safety and Quality with Thorn Lighting

Luminaires in Hazardous Areas

In order that luminaires may be selected for use in a particular hazardous atmosphere, the following information is necessary:

- The classification of the hazardous area (i.e. Zone).
- The ignition temperature of the gas or vapour involved (to decide the surface temperature rating).

1. Hazardous Area Classification

Hazardous areas are classified in three zones:

Zone 0. An area where an explosive gas/air mixture is continuously present or present for long periods.

Zone 1. An area in which an explosive atmosphere, (gas/air mixture) is likely to occur in normal operation.

Zone 2. An area in which an explosive gas/air mixture is not likely to occur, or, if it occurs, will only exist for a short time.

2. Ignition Temperatures and Temperature Classification

The ignition temperature is defined as the lowest temperature determined by a standardised method, at which the most explosive mixture of the given substance and air will just ignite at a heated surface. Values vary considerably, e.g. town gas/air is over 600°C, petrol/air about 250°C, whilst carbon disulphide is about 102°C. Classification of temperature grades has been established internationally and BS 4683 Part 1 specifies these as follows:

Class	Maximum Surface Temperature °C
T1	450
T2	300
T3	200
T4	135
T5	100
T6	85

The ambient temperature is 40°C unless otherwise stated and marked.

In future all luminaires intended for use in hazardous areas will be marked with their temperature class and it will be necessary to choose luminaires of the temperature class below the ignition temperature of the gas or vapour concerned. The Code of Practice BS 5345 includes a full list of gases and explosives and data on temperature etc, to aid the user in choosing the correct luminaire for the duty envisaged.

Earlier designs of luminaires may be marked differently; e.g. BS 889, originally restricted flameproof luminaires to a maximum external surface temperature rise of 50°C then later was amended to three categories of temperature rise

'X' = 125°C, 'Y' = 75°C, 'Z' = 50°C. The ambient temperature was also specified as 35°C peak. BS 5345 Part 1 shows the relationship between the temperature grades and the temperature classes T1-T6.

3. Dust Hazards

Many materials when suspended as dust in air in the form of a cloud, if ignited, may cause explosion and layers of dust on apparatus may raise the temperature to a degree when smouldering may begin, leading to the possibility of fire hazard. Furthermore, conducting metal dusts may cause breakdown of electrical insulation which may lead to arcing and fire.

So far there are no British Standard specifications for equipment, but international work is going on which should lead to the formulating of a suitable recommendation.

Dust proof (IP 54) may be used to prevent undue amounts of dust entering the enclosure which may interfere with the normal operation but where there are hazards complete exclusion should be the recommendation. However, the Factory Act says that dangerous situations shall not be allowed to develop and suitable enclosing in ducts and ventilation must be used to prevent a hazard from becoming possible. Thus, the position is somewhat vague but since sugar, starch, grain and other similar commodities may produce danger, the handling must be such as to prevent a dangerous mixture in air from being formed.

Where there is an explosive dust hazard such as in ammunition production, etc., stringent requirements are laid down by the Ministry of Defence and Home Office. In such plants three conditions are found:

- Where gas or vapour hazards exist when flameproof or other Zone 1 protections are used.
- Where dust-tightness and temperature limitations are the key requirements, and
- Where the danger is remote and a totally enclosed luminaire (IP 44) may be acceptable.

In due course a section of the Code of Practice CP 1003 (when revised) will deal with dust hazards.

4. Types of Protection

Luminaires installed in hazardous areas may be protected in a number of ways. The principal methods used are:

a. A Flameproof Enclosure (IEC Concept: code symbol Exd) for Zone 1

This term is applied to luminaires certified by BASEEFA (British Approvals Service for Electrical Equipment in Flammable Atmospheres) and complying with BS 4683 Part 2 or the earlier standards BS 229 (Flameproof enclosures) and BS 889 (Flameproof Lighting Fittings) at present under revision.

It is defined as 'able to withstand an explosion of the

flammable gas or vapour which may enter it without suffering damage and without communicating the internal flammation to the external flammable gas or vapour for which it is designed through any joints or structural openings in the enclosure'. It is thus necessary to control the length of path and gap width to cool the products of combustion and to prevent transmission from the inside to the outside surrounding atmosphere.



Equipment designed, tested and manufactured to BS229 (flame-proof enclosures for electrical apparatus) and BS889 (flame-proof electric lighting fittings), is submitted for approval by type test for mining use through the Safety in Mines Research Establishment of the Department of Trade and Industry, and for general use by BASEEFA (British Approvals Service for Electrical Equipment in Flammable Atmospheres). Fittings so approved are often referred to as being 'Buxton Certified'.

Briefly, the requirements are that all components capable of igniting flammable or explosive gases must be housed in an enclosure capable of withstanding the pressure of an internal explosion and preventing transmission of the explosion to gases or vapours outside the luminaires.

Flameproof luminaires are grouped according to specified maximum dimensions for gaps between joint surfaces and the surfaces of the openings in the enclosure. In practice, joints are fitted as closely as possible.

The grouping system has changed somewhat to line up with international agreement.

BS 229	Typical Gas	BS 4683 Part 2
Group II	Petroleum and Hydrocarbons	IIA
Group III	Ethylene and Town Gas	IIB
Group IV	Hydrogen	IC

It should be noted that luminaires certified for a particular group may be used where a group of larger gap dimensions would be appropriate, ie IIB would meet IIA and IIB requirements.

b. Pressurised Systems (Symbol Ex 'p')

These may be used in both zone 1 and 2. In one type air or an inert gas is maintained within the enclosure at a pressure sufficient to prevent ingress of the surrounding, possible flammable, atmosphere to the enclosure. In another, a flow of air or of an inert gas is maintained to sweep away any flammable vapour that may enter the luminaire.

Both types require a system of interconnected enclosures with provision for switching off the electrical supply automatically in the event of failure to maintain the air pressure or flow. Fittings of this type are always 'specials'.

c. Increased Safety or Type of Protection 'e'

Until recently, only flameproof or pressurised luminaires were allowed in Zone 1 areas; now Increased safety, type of protection 'e' is permitted.

This type of protection was first used in Germany and is now covered by IEC recommendations. The protection is defined in BS 4683 Part 4 as follows:

'A method of protection by which additional measures are applied to electrical equipment so as to give increased security against the possibility of excessive temperatures and of the occurrence of arcs and sparks during the service life of the apparatus. It applies to electrical equipment, no part of which produce arcs, sparks or exceed the limiting temperatures in normal service'.

The light sources allowed are cold starting fluorescent tubular lamps with single pin caps, tungsten filament lamps for general lighting service and mixed light (i.e. tungsten/mercury) lamps. The luminaire enclosure must also meet minimum strength requirements.

Type 'e' luminaires may be used in Zone 1 and Zone 2 areas if the mechanical protection is at least equal to IP 54. The protection type 'e' is suitable for use in all gases and vapours so far as explosion risk is concerned, if the temperature class is acceptable and the materials of construction are compatible with vapours, etc., in the surrounding environment. It should be noted that installation in acetylene atmospheres requires the protection of any bare copper by coating with insulating varnish to avoid the possible formation of acetylides.

d. Non Sparking (Symbol 'N')

This class of luminaire is suitable for Zone 2 areas.

Type of protection 'N' is defined in BS 4683 Part 3 as 'a type of protection applied to electrical apparatus such that, in normal operation, it is not capable of igniting a surrounding explosive atmosphere and a fault capable of causing ignition is not likely to occur'.

This classification covers all Thorn Zone 2 luminaires in the Invincible range. It probably covers up to 80% of hazardous areas likely to be encountered.

e. Special Protection (Symbol 's')

This concept is used when the protection cannot be related to recognised techniques; it exists to allow the development of new ideas prior to the issue of standard specifications. Examples are the factory-sealed handlamp and completely encapsulated lighting fittings.

These luminaires are of their nature 'specials'. A certificate is issued describing the technique employed and the conditions of use.

Relationship Between British Standards and IEC Recommendations


Types of protection are covered in IEC (International

Safety and Quality with Thorn Lighting

Electrotechnical Commission) recommendations and BS (British Standard) specifications. Where there is no BS recommendation they must be covered by a BASEEFA certificate.

The relationship between the three systems is shown in the table below.

Zone	Class	BSS	IEC	BASEEFA
0	p	—	79-2	—
1	d	4683 Part 2	79-1	—
1	e	4683 Part 4	79-7	—
1	s	—	79-2	SFA 3009
2	N	4533 Part 3	—	—

 In order to give assurance that lighting fittings are safe, manufacturers have three options. They are:

1. To Mark with the BSI Safety Mark

This is a major guarantee endorsed by the Department of Prices and Consumer Protection and supported by an independent testing authority.

The mark guarantees that compliance with BS 4533 has been checked by an independent test house and that the producing factories are licensed by BSI and their quality control monitored by BSI inspectors.

2. To Mark the Product BS 4533

This indicates that the manufacturer or importer claims compliance with BS 4533 in all respects. The claim of safety is valid, but might not be supported by independent test or inspection.

3. Self Certification

The manufacturer claims without reference to any specification, that the fittings are safe within the meaning of the Regulations. If the claim is unsupported by independent evidence it would be more difficult to substantiate in law.

The value of such a claim is directly related to the standing of the firm making it. The policy of Thorn Lighting is to mark with the BSI Safety Mark.

The BSI Kite-mark



The Kite-mark, the official term for which is the 'BSI Certification Trade Mark', can be used only by those manufacturers granted a licence under the certification mark scheme operated by the BSI.

The presence of the Kite-mark on or in relation to a product is an assurance that the product has been produced under a system of supervision, control and testing operated during manufacture and including periodical inspection of the manufacturer's works. The certification mark scheme is designed to ensure compliance with the

British Standard in all respects and illustrates the high quality standard necessary to fulfil the exacting test requirements in order to comply fully with the standard.

The Kite-mark covers the same standards of quality control and inspection procedure as the BSI Safety mark, but may not necessarily cover Safety, unless the appropriate BS includes all the necessary requirements.



Design Council have now withdrawn their familiar symbol which was synonymous with good design and quality.

Spare Parts Service

In line with its policy of improving customer service, Thorn Lighting will operate a Spare Parts Service Centre directly from its major fittings factory at Spennymoor, County Durham from 1 January 1989.

Fast selling spare parts listed in this catalogue will continue to be available through our major Distribution Centres as at present.

In the event of requiring spare parts for fittings not listed in this catalogue, please enquire as to availability by contacting:-

THORN LIGHTING LIMITED

Spare Parts Service Centre
Spennymoor
County Durham
DL16 7UR

Telephone: 0388 420000

Telex: 58165 THORN

Fax: 0388 811467

All dimensions throughout this catalogue are shown in mm.