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LIGHTING FOR SWIMMING POOLS

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FOREWORD

The following members of Committee TC-4.4 took part in the preparation of the technical report:

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SUMMARY

The report covers the problems and the approach to solutions for daylighting and electric lighting of indoor and outdoor swimming pools. The main emphasis is placed on rectangular pools designed for recreational swimming as well as training and competition pools. It does not specifically cover private pools for specialist use, or private or public leisure pools. Nevertheless, many of the general principles and recommendations are applicable, and will aid the designer in his work for these areas.

The report also includes information on the special problems posed by the needs of colour television coverage of outdoor and indoor pools.

The wide variety of lighting techniques used is dictated by the structure of the buildings, the balance of daylight and electric lighting, as well as economic and practical considerations such as installation and maintenance. The lighting designer, ideally in close collaboration with the architect, must therefore devise a unique solution to meet the performance requirements proposed in this report for each and every project.

RÉSUMÉ

L'ECLAIRAGE DES PISCINES

Ce rapport évoque l'ensemble des problèmes et aborde les solutions de l'éclairage naturel et électrique des piscines à l'intérieur et à l'extérieur des bâtiments. Les bassins rectangulaires destinés à la natation récréative, comme à l'entraînement et à la compétition, ont été principalement étudiés. Les piscines privées, d'utilisation spécifique, ou les bassins de loisirs, publics ou privés, n'ont pas reçu un développement particulier. Néanmoins, beaucoup de règles et de principes généraux y sont applicables et ils aideront les concepteurs pour l'aménagement de ces bassins.

Ce rapport fournit aussi quelques informations sur les problèmes spécifiques de retransmission par la télévision en couleurs à l'intérieur et à l'extérieur.

La grande diversité des solutions techniques utilisées est imposée par la structure des constructions, l'équilibre de l'éclairage diurne et de l'éclairage électrique, aussi bien que par des considérations économiques et pratiques, liées à l'installation et à l'exploitation. Le concepteur, en collaboration étroite avec l'architecte, doit donc imaginer sa solution pour satisfaire les exigences de ce rapport dans chacune des études.

ZUSAMMENFASSUNG

BELEUCHTUNG VON SCHWIMMBÄDERN

Dieser Bericht behandelt Probleme und Lösungsmöglichkeiten für die Beleuchtung von Schwimmbädern - innen und außen - sowohl mit künstlichem Licht als auch mit Tageslicht. Im wesentlichen wird über die Beleuchtung von konventionellen Rechteckbecken für Freizeitsport, Training und Wettkampf berichtet. Privatschwimmbäder und öffentliche Freizeitbäder werden nicht speziell erfaßt. Die gegebenen Empfehlungen sind jedoch anwendbar, wenn sie vom Planer entsprechend interpretiert werden.

Der Bericht enthält ebenfalls Informationen über die Anforderungen an die Beleuchtung bei Farbfernseh - und Farbfilmaufnahmen.

Die Ausführung der Beleuchtungsanlage ist abhängig von der Art des Gebäudes, dem Zusammenwirken von künstlicher Beleuchtung und Tageslicht sowie von den wirtschaftlichen und praktischen Voraussetzungen für die Installation und Wartung. Eine enge Zusammenarbeit des Planers mit dem Architekten ist erforderlich, damit die Beleuchtungsanlage alle Güteanforderungen, die in diesem Bericht behandelt werden, erfüllt.

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1. INTRODUCTION

This report concentrates on the natural and electric lighting of conventional rectangular pools which are used by the general public for instruction, training, competition and recreation. In this context lighting has an important contribution to make in meeting the requirements of swimmers, divers, pool attendants, instructors and spectators. In the larger competition pools it may also be necessary to consider the colour television coverage of events.

Electric lighting and daylighting must be designed as complementary elements. This calls for close cooperation between the architect and lighting engineer from the earliest stages of the project design. Only in this way is it possible to ensure that the visual requirements of all pool users are satisfied and also that the lighting equipment will operate successfully by providing high quality lighting, with ease of maintenance and economic cost in use.

2. BASIC PRINCIPLES OF LIGHTING

By far the most difficult problem associated with the lighting of swimming pools is the control of veiling reflections at the water surface. When in the water, swimmers are not bothered by reflected glare, but it is a nuisance to divers, and even more so to the spectators, therefore the installation should allow the scene to be viewed under the best conditions possible without this visual interference. Excellent visibility is also of prime importance to pool staff, who must be able to see a swimmer in difficulty at the earliest possible moment.

Reflections from daylight or electric light on the surface of the water will have a luminance which is much higher than the luminance of the pool basin. In the worst conditions it is impossible to see into the water. For the spectators this is inconvenient, but more seriously, pool attendants are prevented from ensuring the safety of users.

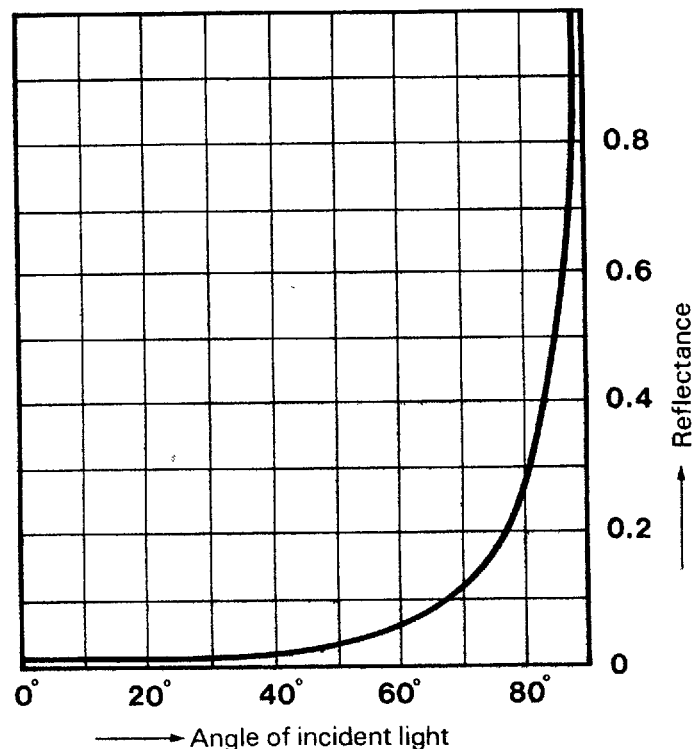


Figure 1. Reflectance of water as a function of the angle of the incident light.

It is therefore necessary to control reflections from daylight or electric light on the water surface and to ensure a good penetration of light into the water. The proportion of light reflected and transmitted at the surface of the pool is dependent upon the angle of incidence of the light as shown in Fig.1.

2.1. LIGHT REFLECTED FROM THE WATER SURFACE

Fig.2 shows where reflections of a luminaire, and points on the ceiling and wall would occur on the surface of (a) still water and (b) turbulent water. The reflected luminance of each point will increase, as shown in Fig.1, at larger angles of incidence relative to the observers position. Hence the luminance of the image of the nearest point on the ceiling at 20° will be 2% of the surface luminance at this point, the luminance of the luminaire at 50° will be 4% and the lowest point shown on the wall at 70° will be 10%.

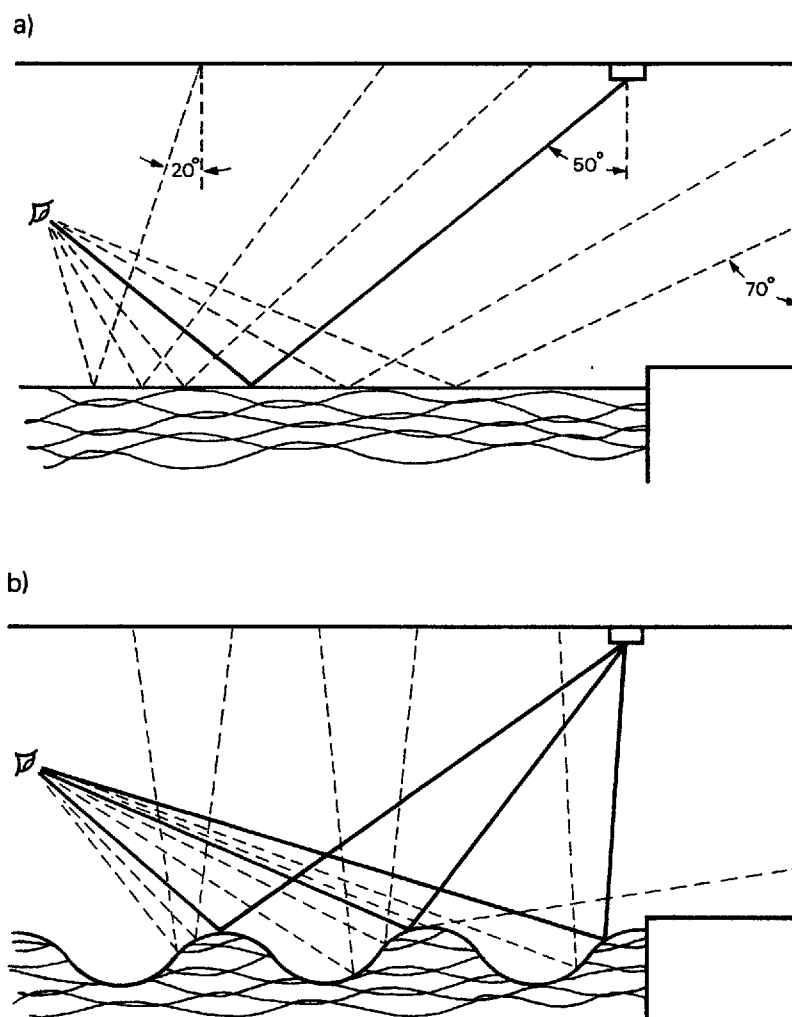


Figure 2. Reflections of a luminaire and of the walls and ceiling at the water surface. (a) - calm water
(b) - turbulent water