A MUSEUM OF CONTEMPORARY ART FOR BOSTON
MASSACHUSETTS

A THESIS REPORT

SUBMITTED

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FOR THE DEGREE OF

BACHELOR IN ARCHITECTURE

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MAY 11, 1938 ALFRED SWEENEY, JR.

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390 Marlborough Street
Boston, Massachusetts
May 11, 1938

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Dear Sir:

In accordance with the requirements for the degree of Bachelor in Architecture, I submit herewith a Thesis entitled, "A Museum of Contemporary Art for Boston, Massachusetts."

Respectfully yours,

Alfred Sweeney, Jr.

ACKNOWLEDGEMENT

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INTRODUCTION

The term,"Contemporary Art" is a loose one; it applies to all types of creative design,"original and progressive in character, produced especially within the last three decades but including pioneers of the nineteenth century." *

Contemporary art has often had to struggle for existence in the face of adverse public opinion, especially when the art has broken abruptly with traditions and started out on its own. This was particularly true of the pioneers of the "modern art" of today. Some artists, such as the Impressionists of 1870-1880: Monet, Renoir, Degas, and Rodin,drifted gradually but steadily away from traditional expression; their work is generally accepted today. Others, such as the Post-Impressionists of 1880-1890: Cézanne,Gaugin and van Gogh; the Fauvists: Matisse, Rouault and Derain; the Cubists: Picasso and Braque; and the Surrealists: Chirico, Klee, have all had a much harder road to travel. Their work is still too original and unorthodox to be appreciated and understood by the general public.

The attitude of the public towards modern art has undergone considerable change during the last thirty

*Note: The New York Museum of Modern Art: Special publication.

years. Works of modern artists are appearing in greater numbers in the galleries of the historical museums, and further, the majority of the historical museums of large size, both in this country and in Europe, have sections devoted to this art. Abroad, London, Paris, Berlin, Munich, Amsterdam, Dresden, Venice, the Hague, Dublin, Rotterdam, Brussels, Vienna, Copenhagen, Moscow, Rome, Prague, and Madrid have both historical museums and museums of contemporary art, separately housed and in all but two instances, under separate direction. In the United States, the museum of contemporary art is in its infancy, but rapid strides are being made. In New York, the center for contemporary art in America, a new building housing the New York Museum of Modern Art will be completed next fall.

The advantages of a separate building for a museum of contemporary art and the administration of such a museum by a staff not under the control of a historical museum are many. Modern art is a difficult problem for a historical museum to handle. Says the special publication of the New York Museum of Modern Art, "...The historical art museum developed in the nineteenth century as a repository of relics of past periods; Greco-Roman antiquity was favored at first, then the Italian Renaissance, and later, the Middle Ages. But whatever the

field of interest, the attention of the museums, trustees, and staffs is focused on the past. Curators and directors of historical museums are authorities on Renaissance sculpture, Egyptian archeology or other such fields. They are scholars of historical art and devote themselves to the study, aquisition and perservation of historical objects, and are not interested in modern art. No museum can handle contemporary art as a side issue; it is as complex a subject as modern science, and fluctuates almost as rapidly."

The advantages of a separate museum are listed as follows:

1. A museum of contemporary art relieves the historical museum of having to exhibit modern art.

2. The exhibit of contemporary art is placed in the hands of an institution especially equipped for that problem, for the museum of contemporary art should function at a rate of speed very different from that of the more sedate historical museum.

3. A contemporary art museum can have more frequent loan exhibits, which serve as continual evidence of developments in modern art or as evidence of what has been neglected.

4. If the contemporary art museum ever has a permanent art collection, deletions, additions and replacements must be made more frequently.

5. Historical museums cannot afford to take chances;

they can aquire and exhibit only certainly and permanently valuable things. The museum of contemporary art can and must take chances, to properly fulfill its function.

The Boston Museum of Modern art is in need of a new building; it will widen the museum's scope and aid materially in its growth. The present situation of the museum is hardly ideal. Although in a good location, the quarters are decidedly cramped: the staff is crowded into one small office and they have but one large, high-ceilinged gallery, hopelessly out of date and most difficult to work with. Much more ample quarters are needed to house interesting exhibits and to better and more efficiently serve the public. As it is, the museum carries on as best it can. Its money is raised almost wholly through membership subscriptions and social functions. A new building will not only greatly increase the membership, but will also encourage private endowments and make for a more vigerous expansion. It is assumed that the museum has raised enough money through subscriptions and gifts to finance the new building.

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There is surprisingly little material on museum planning and installation that is not obsolete; the science of museology is yet in its infancy, in spite of the fact that museums have existed for hundreds of years. Museums from their beginnings up to the present time

have been handicapped and held down by tradition, and it has only been in the last twenty years that museologists have awakened to the complex problems that beset the museum planner and officer. Many museum articles written such a short time ago as five or ten years are now quite out of date, as are many museums designed within the same period.

Although various advanced theories were put forth in articles on museum planning, few of them have been borne out in actual buildings. It remained for the student to consult museologists and designers of museums, digest the available material, and draw his own conclusions.

DISCUSSION OF THE TRADITIONAL MUSEUM.

The majority of museums today are archaic, obsolete, and sadly out of touch with the civilization they presumably serve; they have acquired huge collections, once of great utility and value, but now of very little worth and use, save to a limited few. These are museums that are retrogressive, not progressive; stale and dry rather than inspiring and exciting; tomb-like,rather than sunny and cheerful.

Tradition has been an important factor in retarding the progress of museology. Some of the earliest museums were the great palaces of the Renaissance. The rich and powerful nobles were often patrons of the fine arts, and their impressive, monumental residences were built to be filled with costly art treasures. Many of these palaces were converted into museums, and later museums copied the over-elaborate rococco style of the Renaissance palace, with little thought as to the best means of displaying objects of art, and without realizing that these palaces had been designed not primarily as art galleries, but as places to live in. Thus a European tradition of the impressive classic museum was formed, and naturally the European idea was copied in the American museums.

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Location

The search for a proper location and setting for their temples of art led the museum builders into a serious error:

a Greek or Renaissance building housing the fine arts needed a beautiful sylvan setting to show to best advantage its architectural wonders. True to tradition, the museum has been placed in a park all too often remote from the center of population of the city, where a visit to the museum takes on the character of an excursion, something to be planned for and requiring an effort to make. While an appropriate setting for a building of this type is to be desired, its accessibility is a far more important factor; a museum should be placed as near as possible to the center of the population of the city and near to transportation facilities such as busses and subways. An art museum should not be something exalted, remote - it should play an important part in the life, growth and cultural advancement of the community. It cannot play this part unless it is inviting, interesting and easily accessible.

Plan

Tradition again is blandly accepted in the plan of a museum: the Renaissance palace prototype has survived, untouched, to the present day. This plan consists of an imposing column-studded entrance hall, an impressive and costly flight of marble stairs, and a rigidly symmetrical chain of galleries running around a court which, we are assured, gives light to the galleries and rest from museum fatigue. The shape of the room is rarely varied to add

interest; each gallery is like the next. There is no controlled circulation; one wanders through a maze of galleries, becomes lost and confused. There is usually a directory of galleries in the entrance lobby, but try and locate an exhibit from the chart in a strange museum! Because of no clearly defined circulation, related exhibits are often approached from the wrong end; one sometimes goes through a related exhibit in a series of rooms and then wonders if he has not missed a room.

An inside court is an interesting and pleasant feature of a museum located in a warm and sunny climate, but it is at a decided disadvantage in a region undergoing long, cold winters. Boston is in such a region, and the Museum of Fine Arts is an example. For six months of the year, the court is uninhabitable, bare, and dismal, and it is during those months that the museum is used most. An inside court requires much upkeep, too, and is a perfect place for the accumulation of dirt and rubbish. A glassed-in court fares as badly in this climate; there is the problem of making agreeable a large empty shaft. To make trees and plants grow in a closed court requires much patience and money, and the results are often quite disappointing, in spite of architects' drawings to the contrary. A

closed court seldom gives good light to the galleries around it: the size and cost of a glass covered court necessary to give adequate illuminating is prohibitive. In this climate, therefore, the inside court is costly and a waste of space.

The storage racks of a museum are usually located in the basement where there is very little or no natural light and where special precautions have to be taken to damp-proof the space. It is difficult to use a study collection under these conditions, and still more difficult when one has to expend so much effort and go through so much red tape to get to the collection at all. The study collections should be well lighted by natural light if possible, should be in direct relation to the public galleries, and should be quickly and easily accessible to the public.

The most important fundamental in museum planning is that the display space have the utmost flexibility. As exhibits change, the size and shape of the exhibit spaces necessarily have to change too, in order to make the displays as effective as possible: heavy pieces of sculpture require a different size and shape of gallery than does an exhibition of prints. There, again, the

older museums fall into error - their plans are inflexible, rigid, formal, and it is difficult to plan an attractive exhibit in a set gallery of fixed dimensions.

Lighting

The flexibility of a museum is put to its greatest test when it comes to lighting and it is this that explains for the most part the inflexibility of the present museum gallery. The lighting in museums is primitive, rudimentary, haphazard. For galleries using top lighting, the size and shape of the skylight is fixed and it limits permanently the size and shape of the room. The space under a skylight cannot be easily broken up into smaller exhibition areas, because illumination from a skylight is comparatively inflexible: it would be impossible to illuminate correctly a number of small galleries from a single large skylight and still have the galleries retain some architectural character. The problem is further complicated by the fact that during the winter months artificial light often has to be used to supplement the natural light, and flexible artificial lighting is hard to install in a gallery covered with a skylight. Top lighting is inflexible in another sense: it illuminates some walls very well and others very poorly.

Clarence Stein, noted museum authority, says of top-lighting, "The skylight makes available all four wall surfaces for exhibition purposes. But skylights are objectionable for most classes of exhibits, not only because of the depressing flatness and evenness of their light, but because they are the most expensive type of natural illumination. To be effective, they require not only a tall gallery, but a good sized room space for regulating light. They necessitate additional heating in winter and increased ventilation to prevent over-heating in the summer, and it is an expensive and difficult matter to keep skylights clean enough to be effective." *

The flexibility of the museum is further destroyed in a museum where top light is predominantly used. Experiments a number of years ago showed conclusively that side light is preferable to top light for the exhibition of painting and sculpture. Oil paintings alone can be exhibited effectively in a gallery illuminated by top light. Sculpture, water colors, prints, models, hangings, furniture displays, and other like exhibits require side lighting.

*Note: "Making Museums Function" - Clarence S. Stein: The Architectural Forum, July, 1932.

It is seen, therefore, that many museums are designed almost wholly for oil painting, without any thought as to the individual requirements of each kind of art object.

Although top light has been incorrectly regarded as the best type of light, museums having more than one story had to resort to side light - but what side light! The classical architectural style of the museum has dictated a stone facade with a minimum of narrow windows; and the style has dictated where those windows shall be placed, with no regard as to the efficient lighting of the interior. While both top light and side light through a few narrow windows provide the maximum of display space, they also provide a maximum of boredom and a minimum of efficiency, economy, and flexibility.

Exterior and Interior Expression

These great museums are monuments not to art but to extravagance and stand as admission of the architects failure to realize and express the function of the structure he designed. In these buildings little attempt has been made to solve the problem of lighting or the proper display of art - all attention has been given to designing a rigid formal building with impressive, high vaulted,

elaborately decorated rooms and with such architectural embellishments as huge monumental staircases. The very air of the museum is forbidding, with its ponderous formidable stone facade, often without windows. The interiors are fully as bad - pompous and cathedral-like in character, bristling with guards. The atmosphere is unnatural; visitors tiptoe selfconsciously through an endless series of rooms, speaking in reverent whispers. The reverent attitude towards art is deplorable; it has been fostered by the stilted monumental air of the museum. Art should not be revered; it should be an everyday experience, understood and appreciated by everyone, rather than being something to be seen only in museums, and beyond the grasp of the average person. As exhibition spaces, the galleries in these monumental monstrosities are usually most inefficient and architecturally totally out of harmony with their function. There are two general types of gallery which are seen again and again in museums: a very high room with a cove ceiling and skylight, or a very high room with two or three narrow windows and, of course, the inevitable cove ceiling. As if this in itself were not enough, the galleries are crowded with elaborate decoration supplying admirable competition for the display

material. Thus, an object of art is not only competing for public attention with every other object in the room, but also with the room itself. The type of palace interior which still infests the art museum shows what a tremendous part tradition has played in museum building. Many directors have found these galleries impossible to treat ~~heat~~. In some cases they have had to fur down the ceiling to a reasonable height and subdue the ornament to obtain anything like an appropriate setting for art objects.

It is to be hoped that the day of the pretentious stone facade of the museum has passed, yet we see that the Rodin Museum in Philadelphia, Pennsylvania, designed in 1929, the Joslyn Memorial Museum in Omaha, Nebraska, designed in 1931, the Seattle Art Museum in Seattle, Washington, designed in 1933, and the new National Art Galleries in Washington, D.C. are still holding to tradition and committing the same stupid errors.

MUSEUM INSTALLATION

A museum should be more than an art storage warehouse, but most of the present museums fill that office and go no further. Museums think too much of aquiring art objects and not enough of displaying them. A vase of great beauty and rarity has no value or utility when it is securely locked up in a storeroom or exhibited in a case with twenty other vases. An object of art has value and utility only when it can be properly displayed, and appreciated and understood. Thus, when a museum aquires a great collection at tremendous cost and displays it ineffectively, the donors who gave the money for purchases have been cheated, for the art objects have become practically worthless. The Boston Museum lf Fine Arts has one of the largest and finest collections of Oriental art in the world, but it can exhibit only a small fraction of this collection and only a very much smaller fraction of the museum visitors in this country can see and appreciate it. How much better it would be if some of the tremendous surplus of this collection could be distributed throughout the country or at least sent on loan exhibitions so that everyone could enjoy it.

The dog-in-the-manger attitudes of the museums and their petty jealousies are ridiculous and absurd. Art

objects of little actual interest and beauty bring exorbitant prices far beyond their true value because of the great competition between museums. And museums with small endowments are left out in the cold.

When art museums were first started, it was felt that the public should have the opportunity of seeing everything that the museum owned; as collections grew, the museum became more and more crowded, until it became hardly more than a glorified junk shop. During the past twenty years, museologists have begun to realize that the great amount of material displayed merely overwhelmed, then bored, the museum visitor, and the thinning out process started. Museologists also discovered "museum fatigue" and sought means to prevent it.

The behavior of the museum visitor is a complex psychological problem, and installations and displays in a museum depend largely upon this behavior. Arthur W. Melton and Edward S. Robinson, Yale psychologists published in 1935 a monograph on museum installation after ten years of observation and experimentation in museum behavior. They discovered many hitherto unknown facts which revolutionize many old theories of museum installation.

It was found that:

1. Roughly eighty percent of visitors entering a gallery turn immediately to the right and that only

about twenty percent turned to the left, although the slightest change inthe makeup of the gallery, such as an exit on the left side, would upset this theory.

2. "The exit of a gallery has a strong attraction for most visitors, such that they rarely pass the objects located along the wall opposite to that which they turned on entering."

3. The exit is "an object functionally comparable to an extremely attractive painting, so that "along the right wall (of a gallery) there is a regular decrement in attraction, the greater the distance of paintings from the entrance, or the smaller the distance between the paintings and the nearest exit, the smaller the amount of interest they receive." This statement is reversed for the left wall of the gallery.

4. Paintings suffer from; (a) competition with the other paintings,(b) competition with the exits,(c)the habit of the museum visitor of turning right,and,(d)repeated exposure of the museum visitor to similar objects.

5. The greater the distance of a gallery from the entrance to the art museum, the less attention it receives.

6. There is no noticeable decrease of interest of the museum visitor when a moderately crowded gallery, with pictures, say two feet apart, is changed into an extremely crowded gallery, with pictures a few inches apart, although when more than one row of pictures is

introduced, the interest in the gallery shows a marked decrease. Degrees of isolation greater than moderate crowding, on the other hand, will doubtlessly increase the interest of the gallery visitor, and a gallery with a few well-isolated pictures will not only increase the interest, but the percentage of the total number of paintings looked at as well.

These important findings should have great influence upon gallery design and installation. They show, firstly, that in a gallery,with entrance and exit symmetrically placed at either end, one wall is practically useless for display purposes, as it is examined by only a small percentage of the visitors. This would indicate a gallery with the wall along one side left for lighting, and not for exhibition purposes at all, so as to detract as little as possible from a focus of interest upon the opposite display wall.

The fact that the exit-attraction in a gallery is great is a more difficult problem. Undoubtedly, the size of a museum and the number of galleries it contains has an influence on the degree of exit-attraction of a gallery. In a very large museum with many galleries, the exit- attraction would probably be greater because of the great number of exhibit rooms to go through. The fact does indicate clearly, though, that the best display area is on the walls immediately adjacent to the entrance of a gallery and that the best exhibits should be placed there.

The exhibit space nearest the exit is a much less favorable display area, due to the attraction of the exit.

The fact that the museum visitor rapidly loses interest when exposed to a large number of objects similar in character is significant. It shows that the exhibits should be kept alive and varied, greatly limiting the size of displays of objects similar in character. Although museum fatigue can probably never be entirely eliminated, it can be kept to a minimum through a strict limitation of the number of objects displayed and ¢ concentration on the most effective methods of exhibiting those objects.

Another discovery, that galleries further away from the entrance to a museum recieve less attention than those nearest the entrance, shows that the size of the gallery space, as well as the size of the exhibits should be definitely limited, to do away with, as far as possible, museum fatigue, and to be of greater educational value. It is small wonder that the public is tired and bored, and gains little from a trip to a museum after walking through miles of interminable galleries filled with rows of poorly-exhibited objects. The gallery space for public display should not only be kept to a minimum but should be so arranged that the visitor has to walk the least distance possible and does not have to retrace his steps through the galleries to reach the exit of the museum. A generous number of seats

which can be moved around should provided in the galleries, to help eliminate physical fatigue; and tables with magazines should be placed in the galleries, so that a visitor may rest his eyes by changing their focus and relieve his fatigue by looking at something else other than the exhibit.

The isolation of objects in a museum is an important question; the isolation of an art object greatly enhances its importance, and many objects are not important enough to be displayed in this way. It is obvious, therefore, that compromises should be made: objects of great importance may be exhibited entirely by themselves in a separate room or niche, where there will be no competition with other displays. Other objects, of less importance, may be exhibited three or four to a room, where they are comparatively well isolated; and finally, an exhibit of not too great importance may be displayed in one large gallery. Such a display arrangement calls for the utmost flexibility in the design of the public exhibit galleries, but it can be easily accomplished with control of light and with the use of temporary partitions.

PROGRAM

The following elements have been considered essential for a Museum of Modern Art for Boston:

Basement

Receiving and packing room
Work room
Inspection room
Photography room and dark room
Storage room
Lavatory and lockers
Freight and passenger elevators
Boiler room and space for air conditioning and refrigerating

Ground Floor

Entrance lobby
Admission booth
Telephone booth
Coat room
Information and catalogue desk
Auditorium, stage, with dressing room and lava- adjoining
Gallery loft.
Display window
Stairs and elevator
Storage space
Truck entrance and lift

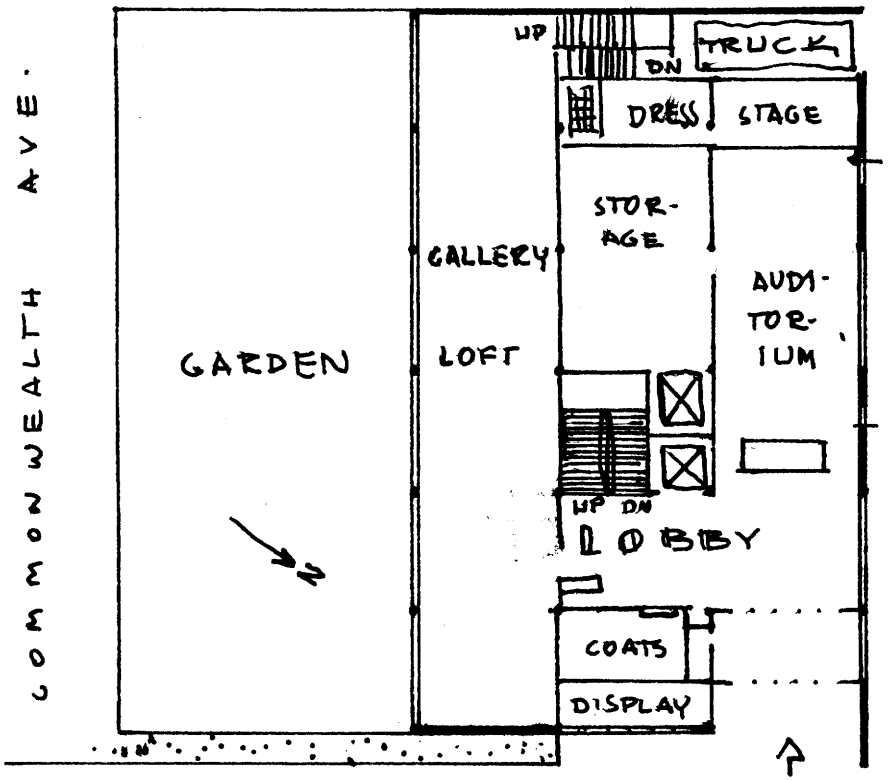
Second Floor

Lounge
Kitchen
Rest rooms for men and women
Gallery loft
Stairs and Elevators
Storage room
Room for painting storage and study

Third Floor

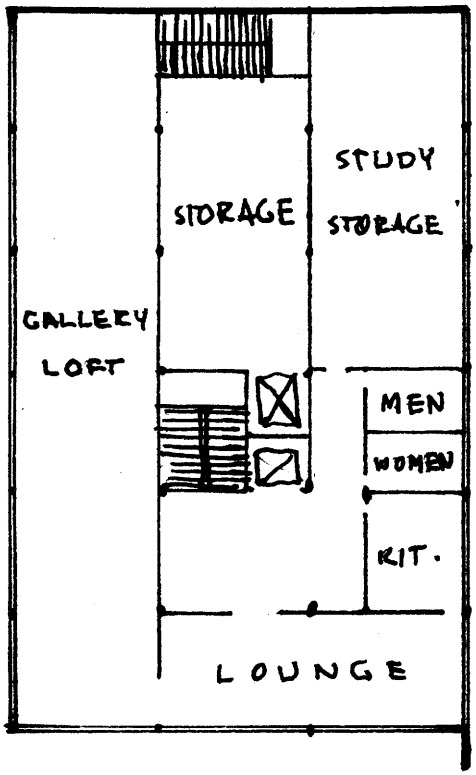
Reading room
Librarian's room
Catalogue room
Library stacks
Two classrooms
Five offices
Rest rooms for men and women
Stairs and elevators

FIRST FLOOR



ARLINGTON ST.

SECOND FLOOR



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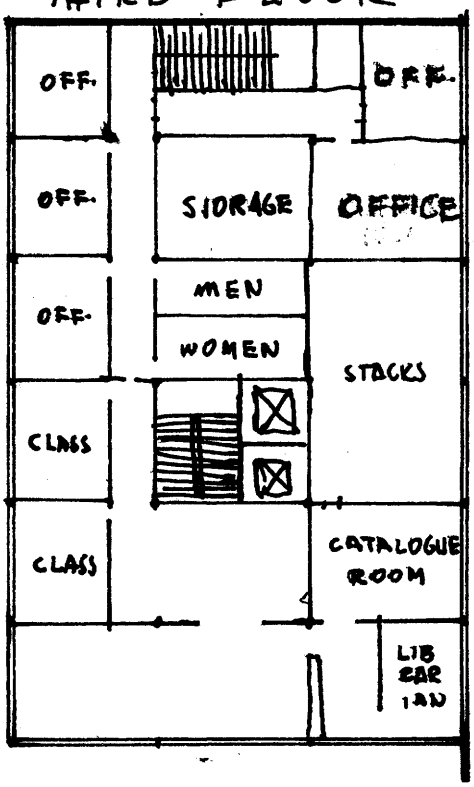

THE DESIGN FOR THE MUSEUM

Location

It was decided that the best location for the Museum of Contemporary Art for Boston was in the Back Bay area, near the center of population of the city, adjacent to the shopping district, and close to the many art schools in this area, as well as numerous art galleries. The Back Bay district is one of the cultural centers of Boston, and it is fitting that the museum should be placed in this location, easily accessible and close to subway and bus lines.

The site selected for the museum is located on the corner of Arlington street and Commonwealth Avenue, overlooking the Boston Gardens. As it is located on the north side of Commonwealth Avenue, the Commonwealth Avenue facade faces south and receives sunlight all day. The east, or Arlington Street, side of the building faces the Gardens, providing a lovely view from the lounge and receiving morning sunlight. Along the north side of the building runs an alley, and the west side backs up against the next building. The site is three blocks from Boylston Street, a principal thoroughfare and shopping street, along which run subways and busses.

Size

The site is rectangular in shape and runs east and west, along Commonwealth Avenue. The dimensions are : length(Commonwealth Avenue side) one hundred and twenty

five (125) feet; width (Arlington Street side) one hundred and fifteen (115) feet.

It was decided that the museum be definitely limited in size; A large building overwhelms the museum visitor, and there are always interior rooms in the building that recieve no natural light. A small museum, too, can be more intimate and cheerful, thus putting the visitor more at his ease. For reasons described previously, the public display area has been restricted. Accordingly, the museum has been made one hundred and twenty-two feet long by seventy-five feet wide, and is designed on the grid system: three twenty-five foot bays along the short side, and six twenty-foot bays for the long side.

Circulation

The circulation of the museum visitor is simple: he enters the museum through a vestibule, in which a ticket office is located and comes into the lobby, in which a coat room and telephone booth are located. The gallery circulation consists in going past the control and catalogue desk, through the ground floor galleries, and up the stairs at the end of the gallery to the second floor exhibition space. He passes through this gallery to the lounge overlooking the Gardens, and thence, by stairs or elevator, back to the lobby. This procedure may be reversed according to the will of the administration. The public circulation in the museum is thus direct and perfectly controlled.On the third floor, the public cir-

culation is restricted to the library and classrooms, and there is no interference with the administration of the building. The storage and study gallery is easy to reach and is well lighted by north light.

Auditorium

The auditoruim entrance is directly opposite the entrance to the museum, and can be used without interfering with the rest of the museum in any way. The auditorium is designed to seat one hundred and fifty persons, and is used for lectures and the showing of films. A dressing room and lavatory has been provided for speakers, and there are four exits: two opening into the museum lobby, and two leading to the alley.

Library

The library is located on the top floor, and overlooks the Gardens. It is essential that the library have ample stack space for clippings, magazines, books and photographs, for the library is one of the major parts of the museum's permanent collection. The stacks are well lighted by north light; the reading room is large and also well-lit, and will receive the morning sunlight.

Lounge

The lounge is an important element of the museum, and it serves many uses: as a rest space where the visitor may sit and look out over the Boston Gardens, as an exhibit space for modern furniture, as a gathering place for social functions, and as a board room for the trus-

tees. In connection with the last two uses, a kitchen has been placed at the end of the room so that teas and light meals may be served here.

A lounge fifty feet long is quite adequate for the ordinary use of the museum, but some occasions may demand a larger lounge space. Therefore, a movable partition has been designed to swing out and increase the dimensions of the room by twenty-five feet, making it large enough for any required occasion. The walls of the lounge will be covered with wood veneer, and no pictures will be exhibited on them: A complete change from the gallery exhibits is needed by the visitor.

Display

The display area of the museum has been made as simple, flexible, and unencumbered as possible. There are no columns or wall projections to break up the galleries and limit their flexibility. The two exhibit areas are on the first and second floors, and are placed one above the other. They both run the entire length of the south side of the museum building and have sunlight throughout the day: Southern exposure is the preferred exposure for galleries if the light can be properly controlled and diffused; south light gives a warm glow to the museum interior, whereas north light is cold and flat.

The exhibition areas have been designed as lofts only, as it is impossible to dictate a set arrangement of galleries; each exhibit requires a different size and

shape of gallery. The lofts will be divided into galleries by means of moveable, temporary partitions. These will probably consist of plywood covered with cloth fixed to a metal frame. They will not run to the ceiling, as that would complicate the problem of air conditioning. The display areas may be broken up into niches and the direction of the walls will be continually changed to isolate exhibits as much as possible. The partitions will not be perpendicular to the windows, but will be slanted in a little, to give better light to the exhibits.

The lofts have been designed twenty-five feet deep; twelve to fourteen feet is the average distance at which a person can stand and take in a field of vision not too great for proper observation, so the lofts are of ample width to permit a gallery and a circulation aisle next to the window.

On the ground floor, the gallery loft opens out on to a garden which may be used for planting and for exhibits of sculpture.

The walls of the galleries will be covered with rough cloth light and neutral in color. The floors will be quite dark and of resilient rubber composition, and the ceiling will be white, to reflect the light better. At the end of each gallery will be placed a description of the exhibit projecting into the passage.

There are various other exhibition spaces through-

out the museum; as one enters the museum, he faces an "Exhibit of the Week" , a special exhibit to arouse interest. The entrance to the auditorium is on either side of this exhibit; the doors will be set flush with the wall.

Lighting

The entire side walls of the side galleries, from floor to ceiling, are covered with Thermolux, a new form of translucent glass. The glass is described in the "Architects' Journal for March 14, 1935, as follows:

" Thermolux is a compound glass, with a central lamina composed of spun silk threads, arranged in a regular manner, and held between two sheets of clear glass. .... The advantages of the glass are that it provides insulation against sun heat, directional light diffusion and conservation of indoor warmth, and that it eliminates glare.....Where Thermolux is used, the multiplicity of refractory surfaces in the central glass silk lamina, re-directs light that strikes at an angle, to a horizontal plane, throwing it well into the room."

The window opening, extending from floor to ceiling, may be altered and made smaller both longitudinally and vertically, by the use of panels fitting in grooves along the columns and floor; the flexibility of this arrangement is great. Any type of natural lighting may be had, from a wall entirely of glass to clerestory lighting, and any width of opening may be obtained. If desired for special display purposes, an entire section of the wall

can be panelled up.

Natural lighting often has to be supplemented or replaced by artificial light, and it is a difficult problem to design flexible lighting by electricity. One must be able to light any part of a gallery effeciently and well with artificial light. For the Gallery lofts, it is planned to have the ceiling constructed entirely of removable units. These may be taken out and a lighting fixture set in and connected to a main supply line. The light can then be directed upon the exhibits by means of louvers.

Service

The truck bringing objects of great value into the museum should be brought directly into the building to offer the objects protection against bad weather and emergency. The truck entrance into the museum is from the alley side; once inside the building, the truck is brought by lift directly into the basement where it is loaded or unloaded. The advantage of bringing the truck into the basement is great: it gives additional valuable space to the first floor, where formerly a receiving room had to be located, and it simplifies the work, as the art material can be unloaded directly into the room where it is unpacked.

A service lift extends up through the entire building, and on the gallery floors there is ample storage space for furniture, temporary partitions and

panels, and paintings.

Exterior

The expression of the exterior will be simple and modern; it is doubtful how pilasters, columns, or heavy cornices would look on an exterior for a museum of contemporary art. A vertical fin with the lettering, "Boston Museum of Contemporary Art" upon it projects from the side of the entrance and extends to the top of the building. To the left of the entrance is another advertising motif: a display window to catch the eye of the passer-by and interest him enough to come in.

The building is of simple concrete and steel construction, and is faced with slate. A light stone, such as limestone or marble, weathers badly in Boston and soon takes on the appearance of concrete.

CONCLUSION

In the design for this problem, no provision was made for expansion, because no expansion is intended; The student believes that museums can, and have, grown too large; the visitor is overwhelmed by the welter of static, unexplained material. Museums and their builders are still standing with their feet in the past and their heads in the clouds. It is impossible to believe that traditional art, as well as modern art, cannot be displayed in an interesting way, because it has been done; but it takes time and effort and thought.

The contemporary museum can play a great part in showing the public the relation of art to everyday life, through the exhibition of objects that are familiar and commonplace. The possibilities are tremendous: poster art, illustration, every type of industrial art can be shown and explained. The museum of today deals too much in things that are remote, unreal, removed from everyday life and unintelligible to the layman. There is too great an emphasis on painting and sculpture. The museum of tomorrow will redirect this emphasis, and art will be better understood and will play a greater part in the life of the community.

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SEMON BACHE & CO.
Greenwich & Morton Streets
NEW YORK CITY

THERMOLUX GLASS

Registered

American Patent No. 2011252

PROPERTIES

Glass

A NEW form of translucent glass, known as Thermolux, originally made in Italy, is now being manufactured in this country by the Triplex Glass Company.*

Thermolux is a compound glass, with a central lamina composed of spun silk threads, arranged in a regular manner, and held between two sheets of clear glass. This central layer is porous, and in order that the air it contains may remain undisturbed, the edges are hermetically sealed.

The advantages of the glass are that it provides insulation against sun heat, directional light diffusion and conservation of indoor warmth, and that it eliminates glare.

The glass is claimed to transmit sunlight, without sun heat, permitting an undistorted transmission of the visible wavelengths of the spectrum, and so giving all indoor colours their true values.

The diffusion of light is as nearly as possible complete, so that there is no effect of blinding illumination contrast—such as may occur where there are patches of sunlight on a floor.

In a room glazed normally, light is not always economically distributed. There may be very bright patches of concentrated light near the window, falling upon a non-reflecting surface, with relative darkness at the far end of a deep room.

Where Thermolux is used, the multiplicity of refractory surfaces in the central glass silk lamina, re-directs light that strikes at an angle, to a horizontal plane, throwing it well into the room.

It seems the glass may be particularly useful in such places as factories, where the extension of the period of usefulness of daylight is an important factor, effecting considerable saving in the cost of artificial illumination. I am told it has been found that in a factory having an area of 120,000 superficial feet the lighting bill may be reduced by as much as £100 per annum. This figure is based on east and west glazing, which is ideal.

I understand the insulation against radiant heat is due:

1) To a certain degree of reflection of heat, partly by the brilliant surface of the glass, and partly by the central spun glass lamina.

(2) The heat absorbed by the outer sheet of clear glass cannot pass into the air playing upon the inner surface of the inner sheet without overcoming the resistance of three surfaces, besides that of the central lamina itself.

(3) The heat rays from the sun are diffused in much the same way that light rays are diffused. Therefore, the rays that do come through the glass, do not all proceed straight to the floor to heat it, and cause hot air to rise round the occupants of the room, but they are, to some extent, deflected upwards above the heads of the occupants, heating the air in the upper part of the room, so that it appears they are more likely to improve ventilation than to produce discomfort.

Apart from its capacity to insulate against radiant heat, the glass is said to reduce heat losses from the interior. In this respect it is claimed to be about 50 per cent. more efficient than ordinary clear or figured glass.

Unlike prismatic glass, Thermolux is smooth on both faces. At night, when it is dark outside, the glass does not appear black from the interior, but reflects artificial light, and appears as a finely fluted mirror.

The glass is supplied in three thicknesses, according to the amount of glass silk in the interlayer, which itself depends upon the degree of obscurity desired. The interlayers may be 1/26 inch, 1/16 inch or ⅛ inch thick.

Reprint from "Architects' Journal"—March 14, 1935

Purpose

"THERMOLUX" glass is a glazing material for roofs and windows. It diffuses light and insulates against heat and cold.

Description

"THERMOLUX" glass is a compound glass with smooth, brilliant surfaces. It consists of a sandwich of spun glass between two sheets of clear glass. The spun glass is in the form of a felt consisting of glass threads so arranged that when in position they shall be horizontal. The edges are hermetically sealed with a material chosen for the permanence of its adhesive properties and for its powers of resistance to exposure and damp.

Colours

"THERMOLUX" glass is at present supplied in white, pale and dark amber, pale and dark blue, pink and green, and marbled effects can be obtained whenever required.

Maximum Sizes

For Windows: about 9 ft. long and 6 ft. wide; for Roofs and Lay (Ceiling) Lights: about 10 ft. long and 2½ ft. wide. (N.B.—In laylights the safe maximum length is dependent upon the rigidity of the supporting frame.)

Interlayers

These are variable according to requirements. The standard interlayers for glazing are:—
1/25 in. (1 mm.) for all upright glazing, except where privacy is important.
1/16 in. (1.5 mm.) for all roof glazing exposed to the sun; for upright glazing (1) where the sun is often hot or the light intense, and (2) where privacy is essential.
1/16 in. full (2 mm.) for windows in hot climates.
1/10 in. (2.5 mm.) for roofs in hot climates.
⅛ in. (3 mm.) for particularly heavy insulation against radiant heat.

Scientific Facts

Directional Light Diffusion:—In a black-walled model room, having opposite the window a vertical obstruction of 45° extending parallel to the window, at distances of 4 ft. and 6 ft. respectively from the centre of the bottom edge of that window the N.P.L. established the following daylight factors:—

"THERMOLUX"	0.52 per cent.	0.18 per cent.
Clear glass	0.07 "	0.02 "

Thermal Conductivity:—

"THERMOLUX" about 1.4 } B. Th. U.'s per sq. ft. per hour for 1 in. thickness and 1° F.
Clear glass " 7.4 } difference in temperature between faces.

Coefficients of Heat Transmission:—

"THERMOLUX" ¼ in. overall thickness: 0.7 } B.Th.U.'s per sq. ft. per hour for 1° F. differ-
Clear glass approx. ¼ in. overall thickness: 1.1 } ence in air temperature.

Insulating Properties against Radiant Heat:—At working level under, for example, a normal factory roof glazed on the south slope, solar radiant heat is practically eliminated. For details see Building Research Station Report No. 236. (Copy on request.)

Transmission of Light:—65-70 per cent. This figure applies to the 1/25 in. interlayer.

Sound Reduction:—The test material was ¼ in. "THERMOLUX" glass weighing 2¼ lbs. per sq. ft.

For a frequency of 200 cycles per second	23 decibels.
" " 300 " "	21 "
" " 500 " "	16 "
" " 700 " "	26 "
" " 1000 " "	41 "
" " 1600 " "	42 "
" " 2000 " "	39 "

All figures quoted are actual findings of the National Physical Laboratory at Teddington and the Building Research Station at Garston, Watford.

Directional Light Diffusion

In transmission the light rays of the sun are diffused, but this diffusion is given direction. Instead of proceeding straight to the floor, the light is thrown into the body of the room.

Heat Losses from Within

The coefficient of heat transmission is only about 0.7 British Thermal Units per sq. ft. per hour per 1° F. difference in temperature against 0.52 for average brick walls—as assumed by a leading authority for purposes of calculation. The transmission through ordinary glass is about 1 to 1.1. In practice this means that the heat conserved by "THERMOLUX" which would normally be lost through ordinary glass, would cost about $20.00 per annum per 1,000 sq. ft. of window area to replace (full allowance has been made in this calculation for ventilation, &c.).

Reprinted from THE ARCHITECTS' JOURNAL

THE ARCHITECTS' JOURNAL
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INFORMATION SHEET

• 372 •

THERMOLUX DIFFUSING GLASS

General :

On the face of this Sheet are set out diagrams showing the comparative distribution of light within top-lighted buildings of different orientations, glazed with clear glass or Thermolux Diffusing Glass. The diagrams shown are based upon the results of the Building Research Station Department of Scientific and Industrial Research, Report No. 208-36/1498/2 of July, 1935.

Light Intensity :

The following table sets out the monthly variation in illumination of a horizontal surface, expressed in foot candles, derived from the whole sky. The tests were made over a period of ten years at the National Physical Laboratory, Teddington. The figures below have been taken from Illumination Research Technical Paper No. 17. Under direct sunlight the intensities given may be approximately doubled.

Average for Ten years

Month	9 a.m.	12 Noon	3 p.m.
January	405	850	390
February	770	1,375	805
March	1,305	1,920	1,270
April	1,845	2,540	1,975
May	2,625	3,500	2,885
June	3,120	3,780	2,880
July	2,825	3,790	2,620
August	2,415	3,315	2,270
September	2,000	2,785	1,770
October	1,305	1,750	920
November	730	1,050	405
December	390	760	295

The North Octant :

When comparing north lighting with east and west glazed roofs, it should be noted that the north octant actually gives an average illumination of considerably less than one quarter of the total light available from the whole sky. In the diagrams shown, however, due to the fact that a 60 deg. pitch draws upon 30 deg. more sky than the true octant, the comparison has been based upon the assumption that the north light roof receives exactly one quarter total light available from the whole sky.

Thermolux Glass :

"Thermolux" is a compound glass with smooth, brilliant surfaces for glazing roofs and windows to diffuse light and insulate against heat and cold.

It consists of a sandwich of spun glass between two sheets of clear glass. The spun glass is in the form of a felt consisting of glass threads so arranged that when in position they shall be horizontal. The edges are hermetically sealed with a material chosen for the permanence of its adhesive properties and for its powers of resistance to exposure and damp.

Maximum Sizes :

For windows : about 9 ft. long and 6 ft. wide ; for roofs and lay (ceiling) lights : about 10 ft. long and 2½ ft. wide. (N.B.—In lay lights the safe maximum length is dependent upon the rigidity of the supporting frame.)

Interlayers :

These are variable according to requirements. The standard interlayers for glazing are :—$\frac{1}{25}$ in. (1 mm.) for all upright glazing, except where privacy is important. $\frac{1}{16}$ in. (1.5 mm.) for all roof glazing exposed to the sun ; for upright glazing (1) where the sun is often hot or the light intense, and (2) where privacy is essential. $\frac{1}{16}$ in. full (2 mm.) for windows in hot climates. $\frac{1}{10}$ in. (2.5 mm.) for roofs in hot climates. $\frac{1}{8}$ in. (3 mm.) for particularly heavy insulation against radiant heat.

Schedule of Thicknesses :

Applicable to glasses with interlayer $\frac{1}{25}$ in. or $\frac{1}{16}$ in. thick.

Size : (United Inches = Length plus breadth)	Use : Upright glazing			Use : Inclined or horizontal glazing		
	Description	Approx. overall thickness in inches	Average net weight in oz. per sq. ft.	Description	Approx. overall thickness in inches	Average net weight in oz. per sq. ft.
Up to 30 ins. united	Type 45	$\frac{7}{32}$ in.	38	Type 45	$\frac{7}{32}$ in.	38
,, 60 ins. ,, and 24 ins. wide	,, 45	$\frac{7}{32}$ in.	38	,, 6	$\frac{5}{16}$ in.	50
,, 70 ins. ,, ,, 30 ins. ,,	,, 45	$\frac{7}{32}$ in.	38	,, 8	$\frac{3}{8}$ in.	67
,, 100 ins. ,, ,, 30 ins. ,,	,, 6	$\frac{5}{16}$ in.	50	,, 8	$\frac{3}{8}$ in.	67
Over 100 ins. ,, ...	,, 8	$\frac{3}{8}$ in.	67	,, 8	$\frac{3}{8}$ in.	67

Prices :

White "Thermolux" glass in cut sizes.

Up to 5 ft. super	...	2/6 per sq. ft.
,, 10 ft. ,,	...	2/9 ,,
,, 15 ft. ,,	...	3/- ,,
,, 20 ft. ,,	...	3/3d. ,,
,, 25 ft. ,,	...	3/6d. ,,
,, 35 ft. ,,	...	3/9d. ,,
,, 45 ft. ,,	...	4/- ,,
,, 50 ft. ,,	...	4/3d. ,,

These prices are for interlayers of $\frac{1}{25}$ in. (1 mm.) to $\frac{1}{16}$ in. full (2 mm.) thickness ; for interlayers of $\frac{1}{10}$ in. (2.5 mm.) and $\frac{1}{8}$ in. (3 mm.) thickness, add 3d. per sq. ft.

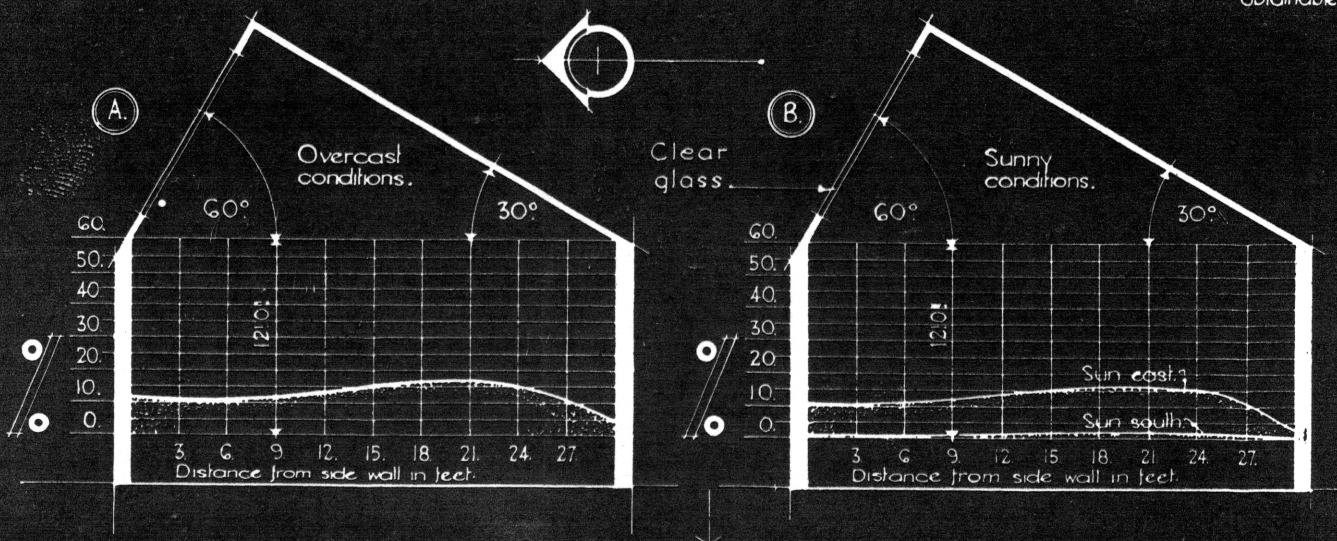
Information from : The Thermolux Glass Company, Ltd.
Address : 1 Albemarle Street, Piccadilly, London, W.1
Telephone : Regent 1321-2

350. THE ARCHITECTS' JOURNAL LIBRARY OF PLANNED INFORMATION

PHYSICAL PROPERTIES OF THERMOLUX LAMINATED DIFFUSING GLASS:

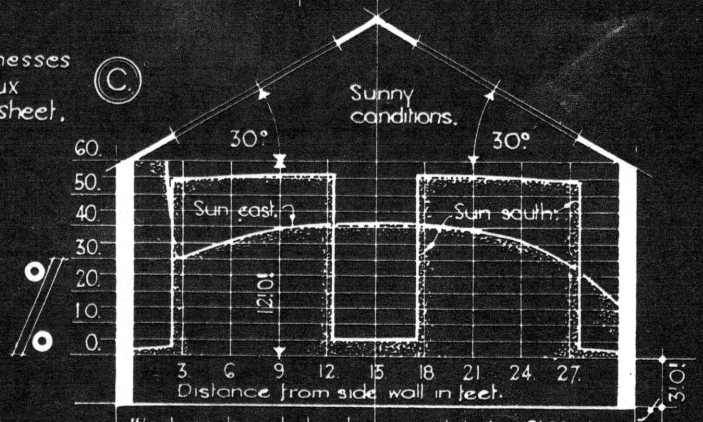
DESCRIPTION: Thermolux is a compound glass of three laminations with both external surfaces perfectly smooth, & consists of a variable sandwich of spun glass between two clear sheets. All edges are hermetically sealed with a damp-resisting adhesive material.

COLOURS: The standard colour of Thermolux is pure white, but pale & dark amber or blue, pink & green, & marble effects are also obtainable.



For standard thicknesses and types of Thermolux glass see back of this sheet.

NOTE:
In all diagrams the floor width is 30 feet & each run of roof glazing 11'6" wide, by any length.



Working bench level assumed to be 3'0" above main floor level for all diagrams.

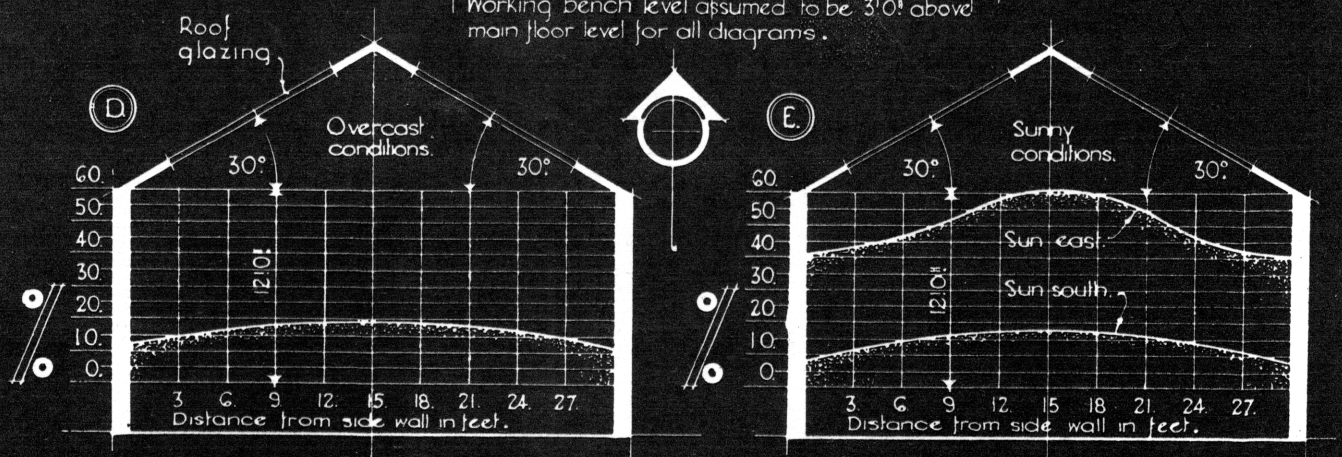
(A) CLEAR GLASS FACING NORTH:

(B) CLEAR GLASS FACING NORTH:

(C) CLEAR GLASS FACING EAST & WEST:

(D) THERMOLUX GLASS FACING EAST & WEST:

(E) THERMOLUX GLASS FACING EAST & WEST:



3/32" SCALE DIAGRAMS SHOWING RELATIVE LIGHT INTENSITIES OBTAINED AT WORKING BENCH LEVEL:

NOTE: The diagrams above show the percentage of available light from the whole sky transmitted to the working plane. For average total light available in the latitude of London, see table on the reverse side of this Information Sheet. With Thermolux, solar radiant heat is reduced to about 1/3 at working level. (See B.R.S. Report of Investigation No. 236 - 36/1498/2.)

The data regarding the distribution of light shown above is extracted from B.R.S. Report of Investigation No. 208 - 36/1498/2.

Information from The Thermolux Glass Co. Ltd.

For the relationship between Illumination & Industrial efficiency, see Information Sheet No. 2. of this series.

INFORMATION SHEET: SMOOTH-SURFACED LAMINATED DIFFUSING GLASS No. 1.

SIR JOHN BURNET TAIT AND LORNE ARCHITECTS ONE MONTAGUE PLACE BEDFORD SQUARE LONDON WC1. Oscar P. Boyes.

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THERMOLUX LAMINATED DIFFUSING GLASS IN EAST & WEST LIGHTED FACTORY BUILDINGS :

Graphs showing the relation between illumination and industrial efficiency.

DESCRIPTION :
The graphs show the months during which daylight, adequate for various working efficiencies is obtained on horizontal indoor working planes.

CONDITIONS :
The foot-candle intensities are based on outdoor averages derived from the whole sky over a period of 10 years in the latitude of 51° 26' N. at the various Greenwich Mean Times indicated.

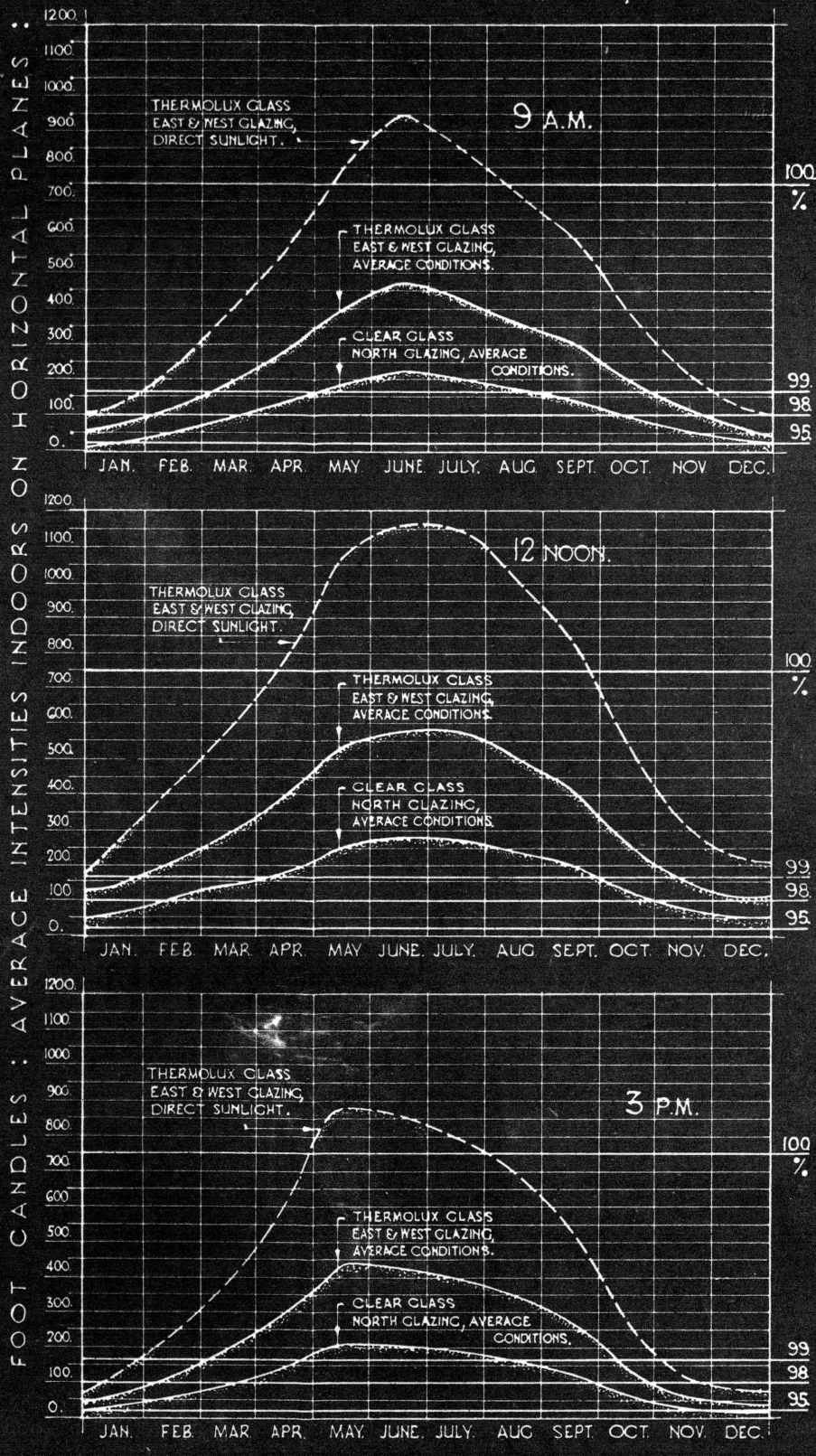
ILLUMINATION :
Under the given conditions it may be assumed that the illumination is inadequate during the months when the curve falls below the desired performance percentage line.

SUNLIGHT :
It will be noticed that for clear glass North glazing, only the average intensities are given, as increases due to direct sunlight do not, on an average, exceed 2½% with this form of glazing.

Using East and West Thermolux glazing however, these maximum intensities, due to direct sunlight, are approximately double the average figures and are shown dotted on each graph.

RELATIVE EFFICIENCY :
The percentages given represent the degree of efficiency of normal people in detecting objects which subtend an angle of two minutes at the eye e.g. 6-point type at a distance of 13".

This is 6 point type



Figures have been extracted from the Joint Report of the Industrial Health Research Board and the Illumination Research Committee entitled, "The Relation between Illumination and Industrial Efficiency. 1. The Effect of Size of Work."

Information from The Thermolux Glass Co. Ltd.

INFORMATION SHEET : SMOOTH-SURFACED LAMINATED DIFFUSING GLASS, No. 2.

SIR JOHN BURNET TAIT AND LORNE ARCHITECTS ONE MONTAGUE PLACE BEDFORD SQUARE LONDON WC1.

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INFORMATION SHEET
• 373 •
THERMOLUX DIFFUSING GLASS

General :

This is the second sheet dealing with top-lighted buildings of different orientations, and shows by means of graphs the relationship between illumination and efficiency. For the actual distribution of light within the buildings see Sheet No. 1 of this series (No. 372).

Test Conditions :

Figures used in the calculations were extracted from the joint report of the Industrial Health Research Board and the Illumination Research Committee, entitled "The Relation between Illumination and Industrial Efficiency. 1. The Effect of Size of Work." The investigation was carried out at the National Physical Laboratory, where the performance of eighteen normal male subjects was measured. The work done consisted in cancelling all the Landolt broken rings having a given gap orientation on specially prepared test sheets. The test characters were printed in black on matt paper having a reflection factor of 0·84, and the gap width was such that, at a distance of 13 in. from the eye, the angle subtended at the eye was two minutes. This angle corresponds with that of 6-point type, shown in the panel overleaf.

Times of Tests :

The tests were made at 10.30 a.m. and 2.30 p.m. over a period of days with short test periods at varying illuminations. It should be noted that a considerable increase in illumination would be required if the work were finer or if the reflection factor were less than the figure of 0·84 utilised, e.g. objects subtending an angle of less than two minutes at the eye, or objects subtending two minutes at the eye but placed on a darker coloured background. Furthermore, for spells of work comparable in duration with those of industry, the percentages of performance would be relatively lower than those shown.

Light Transmission and Diffusion :

65 per cent. to 70 per cent. of the light is transmitted through Thermolux glass of 1/25 inch interlayer, the sun's light rays being diffused and directed evenly into the whole body of the room, i.e. they are not concentrated in patches.

Heat Losses from within :

The coefficient of heat transmission is 0·6 to 0·7 B.T.U. per square foot per hour per 1 deg. F. difference in temperature : transmission through ordinary glass is 1·0 to 1·1.

Comparative Lighting and Heat Insulation Efficiency of Thermolux and Clear Glass Roofing :

Roof dimensions are as shown on Sheet No. 372, "Smooth-surfaced laminated diffusing glass No. 1." The "Comparison of Light available indoors" refers to the relative intensities of illumination available at the working plane indoors, assuming that a value of 100 represents the light transmitted by an ordinary North glazed roof of 60° pitch when the sky is evenly overcast.

The expression "Overcast" means a completely overcast grey sky.

"Heat Losses" are the percentages of the losses through an ordinary north glazed roof of 60° pitch, containing clear or cast glass.

Where glazing on both slopes is indicated, it is assumed that the total glass area is twice the area on any one slope.

Colour Values (Indoors)

The light transmitted by the glass is undistorted, and gives all indoor colours true relative values with richness of tone.

Method of Glazing

The threads of glass silk forming the interlayer must always be glazed parallel to the ground (in roofs at right angles to the slope, in canopies parallel to the wall, in ceiling lights at right angles to the best source of light). The glass must not be cut after manufacture, otherwise it can be glazed in the normal way.

Specifications :

Specifications of sizes must state distinctly which dimension is the height, or parallel to which dimension the threads are to run. As an alternative, plans should be attached. If the glass is intended for roofs or lay (ceiling) lights this must be stated, as glass for this purpose is supplied of greater thickness than for upright glazing.

Standard Thicknesses, Sizes and Prices :

See material on the reverse side of the previous Sheet of this series (No. 372).

Copies of Building Research Station Reports Nos. 190 (Heat Losses), 208 (Light Distribution) and 236 (Heat Gains) are obtainable from The Thermolux Glass Co., Ltd.

Information from : The Thermolux Glass Company, Limited
Address : 1 Albemarle Street, Piccadilly, London, W.1
Telephone : Regent 1321-2

Orientation of glazed section of roof	Pitch of roof	Weather	Comparison of light available indoors		Heat Losses	
			Thermolux	Clear	Thermolux	Clear
North	60°	Overcast.	67	100	60	100
		Fine.	67	100	60	100
South	30°	Overcast.	85	125	60	100
		Fine.	> 200	Very patchy	<60*	<100*
East and West ...	30°	Overcast.	170	250	120	200
		Fine.	> 400	Very patchy	<120*	<200*
North (Clear) ... and South (Thx)	(60°) (30°)	Overcast.	185		160	
		Fine.	> 300		<160*	

* Night losses as under overcast conditions.

Sunlight without Sun Heat

By thoroughly breaking up the heat rays of the sun "THERMOLUX" glass transmits sunlight without sun heat, preventing uncomfortably high temperatures indoors during the summer months, particularly in south and west lit buildings.

Comparison with other Glasses

Unlike prismatic glasses, "THERMOLUX" is smooth on both surfaces. Unlike ordinary glasses it does not make the illumination of the inner half of any room more or less dependent on the amount of sky visible from there. Unlike rough rolled, figured, or ground glasses it does not hold dirt. At the same time it is infinitely more diffusing than the average prismatic glass, which generally effects the re-direction of light by collecting it into a series of beams hardly describable as diffused light.

Tints.

The following surcharges apply:
To amber, 5 per cent.; to blue, green, pink, or white and one colour combined, 10 per cent.; to marbled combinations of two or more colours, 15 per cent.

Schedule of Thicknesses. *Applicable to glasses with interlayers 1/25" or 1/16" thick.*

SIZE (United Inches=Length plus Breadth)	USE: UPRIGHT GLAZING			USE: INCLINED OR HORIZONTAL GLAZING		
	Description	Approximate overall thickness in inches	Average net weight in oz. per sq. ft.	Description	Approximate overall thickness in inches	Average net weight in oz. per sq. ft.
Up to 30" united	Type 45	7/32"	38	Type 45	7/32"	38
" 60" " and 24" wide	" 45	7/32"	38	" 6	5/16"	50
" 70" " " 30" "	" 45	7/32"	38	" 8	3/8"	67
" 100" " " 36" "	" 6	5/16"	50	" 8	3/8"	67
Over 100" "	" 8	3/8"	66	" 8	3/8"	67

Method of Glazing

The threads of glass silk forming the interlayer must always be glazed parallel to the ground (in roofs at right angles to the slope, in canopies parallel to the wall, in ceiling lights at right angles to the best source of light). The glass must not be cut after manufacture. Otherwise it can be glazed in the normal way.

Specifications

Specifications of sizes must state distinctly which dimension is the height, or parallel to which dimension the threads are to run. As an alternative plans should be attached. If the glass is intended for roofs or lay (ceiling) lights this must be stated, as glass for this purpose is supplied of greater thickness than for upright glazing.

Countries of Manufacture

ITALY: Vetreria Italiana Balzaretti Modigliani, Roma.
ENGLAND: The Triplex Safety Glass Co., Ltd., London.
FRANCE: Comp. De St. Gobain, Paris.
CZECHOSLOVAKIA and CENTRAL EUROPE: Muehlig Union, Prague.
SPAIN: Soc. An. Thermolux Espanola, Madrid.

USES

"THERMOLUX" glass is useful for glazing roofs, laylights and windows in:—

(1) FACTORIES, *i. e.* Drawing Offices, Laboratories, Workshops, Inspection Departments and Stores, being the only smooth-surfaced glass which has all the properties necessary for the efficient utilisation of the light of the eastern, southern, and western sky: perfect light diffusion over the working plane, elimination of glare, provision of a colourless light, insulation against heat losses (convection currents playing on the inside surface) and heat gains (solar radiant heat, 87 per cent. of which is transmitted by ordinary window glass).

(2) WAREHOUSES, SHOWROOMS, SHOPS, and EXHIBITIONS, because it provides a great amount of light; the light it transmits is pleasant; the surface is smooth; the glass is pleasing to the eye; the light is distributed directionally, *i.e.* mainly into the body of the room; there is a reduction, during cold weather, in comparison with other window glasses in use of over one-

third of the heat losses through the area glazed; the glass silk interlayer appears like a satin curtain at night and reflects much of the artificial light which would normally pass out of the windows.

(3) HOSPITALS, SCHOOLS, HOTELS, and PLACES OF PUBLIC ENTERTAINMENT, being the only smooth-surfaced glass which makes easy the keeping of the rooms at an even temperature in summer and winter; which provides excellent light; which is easily cleaned and which ensures adequate obscuration by day and by night.

(4) ART and PHOTOGRAPHIC STUDIOS, READING ROOMS, MUSEUMS, ART GALLERIES and other PUBLIC BUILDINGS, because it is the only glass which is a completely effective sun screen and enables work or inspection to continue without eye strain, without resorting to blinds, throughout those periods when the windows or glazed roof are exposed to the sun.

In short, wherever bright but even illumination is required, concurrently with both prevention of noticeable heat losses in winter and insulation against sun heat in summer.

Avoidance of Glare and Fading

This directional light diffusion is such as, firstly, to avoid blinding illumination contrasts (*e.g.*, patches of sunlight on tables and floors), and, secondly, to reduce substantially the rate of fading of colours.

Colour Values Indoors

The light transmitted by "THERMOLUX" glass is undistorted, giving all colours indoors their true relative values and great richness of tone.

Enhancement of Site Values

The possibility of obtaining diffused, white light with other than north glazing is invaluable where factories are to be erected on sites offering poor north light facilities.

Longer and Better Daylight

One of the outstanding advantages is the extension of the period of usefulness of daylight for work in factories, increasing output, but in any case effecting a considerable saving in the cost of artificial illumination. Assuming a saving of one hour morning and evening for only fifteen weeks per annum, it has been calculated that in a factory of an area of 120,000 sq. ft. about £100 per annum can be saved on the lighting bill, the assumption being combined east and west as compared with north lighting.

A comparison between an ordinary north lit factory bay and a bay of equal floor area but having a symmetrical roof running north-south—in other words providing east and west lighting—has given the following results:—

	Clear Glass North Lighting	THERMOLUX Glass East and West Lighting
Sun east or west	13½ per cent.	52 per cent.
Sun south	1¾ "	14½ "

The percentages given are the average amounts of daylight from all natural sources available on the floors of the buildings. (Based on B.R.S. Report No. 206; copy on request.)

Vision and Illumination Areas

In dwellings, schools, hospitals, hotels, offices, and other buildings, "THERMOLUX" is a rational material to employ for glazing all areas except those which must be reserved for vision. It is possible to divide many windows in a manner so that they serve both for vision (containing ordinary window glass) and for diffused illumination (containing "THERMOLUX" glass). This treatment is an advance on recent practice which led to intense illumination immediately under the window and partial gloom along the opposite wall.

Verandas and Canopies

"THERMOLUX" solves the veranda roof and canopy glazing problem. It gives complete protection against the heat of the sun and, having perfectly flat and smooth surfaces, holds dirt no more readily than plate glass. Glazed at a slight pitch it will direct light into the interior, illuminating it brilliantly.

Ceiling Lights and Artificial Lighting

The reflecting powers of "THERMOLUX" glass can be utilised to improve artificial illumination. At night, instead of the window appearing black, it gives the impression of a finely fluted mirror.

In ceiling lights lighted either from above or below the satin sheen of the glass silk interlayer is very attractive.

For any further information apply to—

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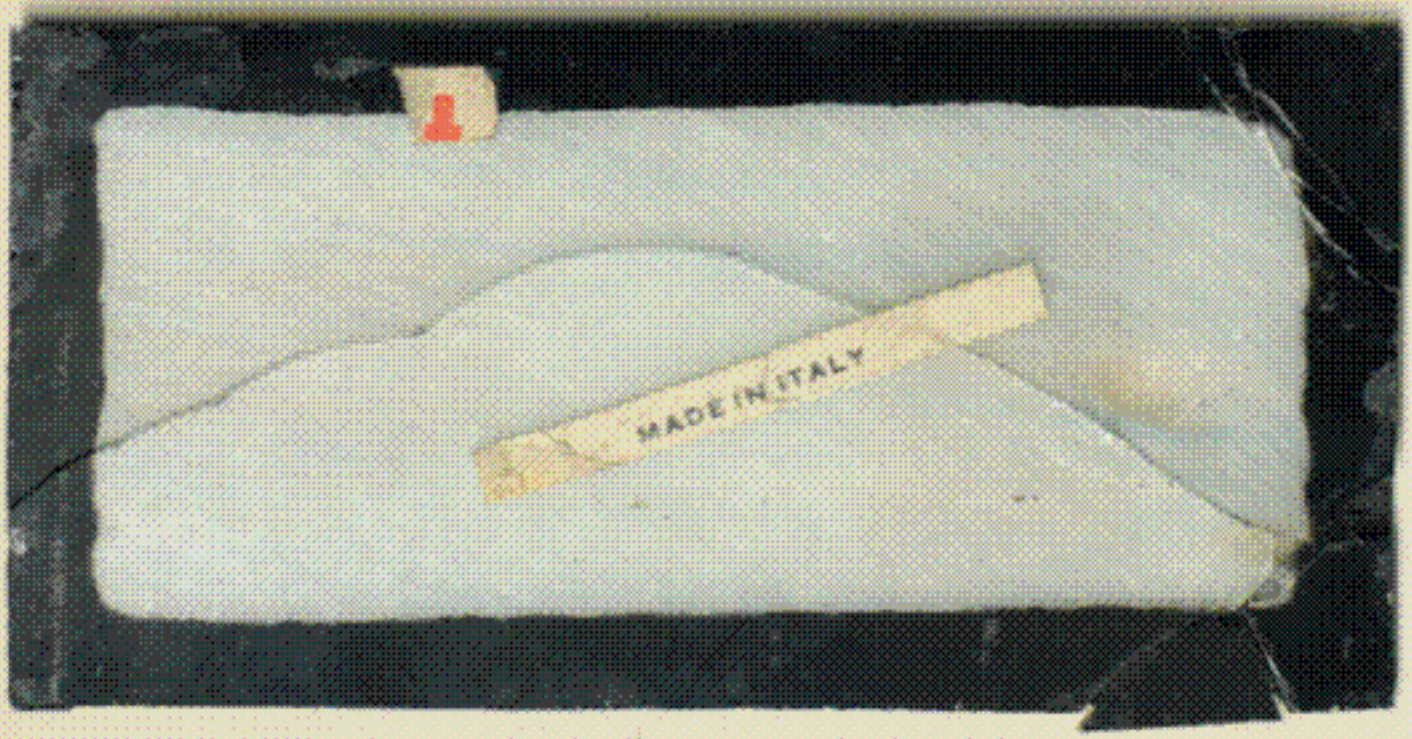
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