



**FOOT CANDLE  
RECOMMENDATIONS**



**LED  
SOLUTIONS**

# WHY ARE FOOT CANDLES IMPORTANT?

FOOT CANDLES PLAY A CRUCIAL ROLE IN THE DESIGN OF A PROFICIENT LIGHTING ARRANGEMENT, SERVING AS THE SOLE METRIC TO ASSESS IF AN AREA IS ACHIEVING THE DESIRED LEVELS OF ILLUMINATION.

OSHA HAS ESTABLISHED SPECIFIC FOOT CANDLE REQUIREMENTS FOR CERTAIN SPACES AND INDUSTRIES. THIS REGULATORY FRAMEWORK UNDERSCORES THE CRITICALITY OF MAINTAINING ADEQUATE LIGHTING CONDITIONS TO UPHOLD SAFETY STANDARDS AND OPERATIONAL EFFICIENCY.

## RECOMMENDED LIGHT LEVELS

DIFFERENT LOCATIONS REQUIRE TAILORED LIGHTING SYSTEMS. LIGHTING NEEDS VARY BY FACILITY TYPE AND ACTIVITIES CONDUCTED. SQUARE FOOTAGE ALONE DOESN'T DICTATE LIGHTING REQUIREMENTS. CUSTOM FIXTURES ALIGN WITH SPECIFIC WORK DEMANDS. AVOIDING A GENERIC APPROACH IS CRUCIAL. OSHA MANDATES FOOT CANDLES FOR WORKPLACE LIGHTING. THIS ARTICLE PROVIDES FOOT CANDLE RECOMMENDATIONS FOR DIVERSE ENVIRONMENTS.

## FOOT CANDLES VERSUS LUX – WHAT'S THE DIFFERENCE?

FOOT CANDLES AND LUX ARE UNITS OF MEASUREMENT FOR LIGHT. WHILE THEY REPRESENT THE SAME CONCEPT, THEY ARE MEASURED ON DIFFERENT SCALES. IN ESSENCE, 1 FOOT CANDLE IS EQUIVALENT TO 10.77 LUX, AND 1 LUX IS EQUIVALENT TO 0.0929 FOOT CANDLES.



# 1. UNDERSTANDING LUMENS

A LUMEN IS A UNIT OF MEASUREMENT FOR THE AMOUNT OF LIGHT PRODUCED BY A SINGLE BULB, LAMP, OR FIXTURE. IT INDICATES THE BRIGHTNESS OR INTENSITY OF THE LIGHT EMITTED. LUMENS PROVIDE A MORE PRECISE MEASUREMENT OF A LIGHT SOURCE'S CAPACITY THAN WATTS.

THE TAKEAWAY: LIGHTS PRODUCE LUMENS.

# 2. CONVERTING LUMENS TO FC – OR – FOOT CANDLES TO LUMENS

A FOOT CANDLE, REPRESENTED AS FC, FT-C, OR LM/FT<sup>2</sup>, IS A UNIT OF MEASUREMENT FOR LIGHT INTENSITY. IT IS EQUIVALENT TO 10.76 LUMENS. TO CONVERT FOOT CANDLES TO LUMENS, YOU CAN MULTIPLY THE FOOT CANDLE VALUE BY 10.76.

FOR INDUSTRIAL LIGHTING, FOOT CANDLES CAN BE CALCULATED BY MULTIPLYING THE TOTAL NUMBER OF LUMENS BY 0.001496. FOR EXAMPLE, 538 LUMENS X 0.001496 = 0.805 WATTS PER SQUARE METER, WHICH WOULD CORRESPOND TO 50 FOOT CANDLES.

IN A ROOM, FOOT CANDLE MEASUREMENTS CAN VARY DEPENDING ON THE LOCATION. PLACING A SINGLE LIGHT ABOVE THE FLOOR AND USING A LIGHT METER, YOU WILL OBSERVE BRIGHTER LIGHT DIRECTLY UNDER THE FIXTURE COMPARED TO THE CORNERS.

BY EVENLY INSTALLING FOUR FIXTURES THROUGHOUT THE ROOM, THE FOOT CANDLE MEASUREMENTS WILL INCREASE UNIFORMLY. AS YOU MOVE AROUND THE ROOM, THE LIGHT METER WILL INDICATE HIGHER FOOT CANDLE READINGS THROUGHOUT THE SPACE, INCLUDING THE CORNERS.

IN ESSENCE, LIGHTS GENERATE LUMENS, AND ADDING MORE LIGHTS WILL RESULT IN INCREASED FOOT CANDLE MEASUREMENTS THROUGHOUT THE AREA, CREATING A BRIGHTER ENVIRONMENT.

THE TAKEAWAY: THE MORE LIGHTS YOU ADD, THE HIGHER THE FOOT CANDLE READINGS WILL BE.

### 3. UNDERSTANDING LUMENS

WHAT ARE LUMENS PER SQUARE FOOT? BY DEFINITION, ONE LUMEN PER SQUARE FOOT IS ONE FOOT CANDLE. THIS MEANS THAT:

20 LUMENS PER SQUARE FOOT = 20 FOOT CANDLES  
40 LUMENS PER SQUARE FOOT = 40 FOOT CANDLES  
80 LUMENS PER SQUARE FOOT = 80 FOOT CANDLES

LIKE THE PREVIOUS DISCUSSION OF LUX, LUMENS PER SQUARE FOOT IS AN ADDITIONAL DESCRIPTION OF WHAT A FOOT CANDLE IS.

SO WHY DO WE THINK OF LIGHTING IN TERMS OF FOOT CANDLES AND NOT LUMENS PER SQUARE FOOT? MOSTLY BECAUSE THE TOOLS WE USE TO CREATE LIGHTING PLANS PROVIDE US WITH RESULTS IN FOOT CANDLES. HOWEVER, IT'S EASY TO CONVERT THE FOOT CANDLE MEASUREMENTS WE PROVIDE TO LUMENS PER SQUARE FOOT MEASUREMENTS.

### 4. LIGHTING PLAN SOFTWARE – HOW IT WORKS

LIGHTING PLAN SOFTWARE IS A COMPUTER-GENERATED LIGHTING MODEL THAT UNDERSTANDS THE PHYSICAL CHARACTERISTICS OF HOW MANY LUMENS A LIGHT PRODUCES AND HOW IT DISTRIBUTES ITS LIGHT. THE SOFTWARE ALLOWS YOU TO INSTALL LIGHTS IN A SOFTWARE “SPACE” AND RUN CALCULATIONS BY SIMULATING FOOT CANDLE READINGS ON THE GROUND. THE SOFTWARE PROVIDES HIGH LEVELS OF ACCURACY AND GENERATES A DETAILED REPORT THAT INCLUDES INFORMATION ABOUT LIGHT LEVELS AND THE OVERALL BALANCE OF LIGHTING WITHIN THE SIMULATED SPACE.

THE TAKEAWAY: WE PROVIDE FREE LIGHTING PLANS FOR OUR COMMERCIAL AND INDUSTRIAL CUSTOMERS, ELECTRICIANS, AND ELECTRICAL CONTRACTORS. SCROLL TO THE BOTTOM OF THIS PAGE TO ASK FOR YOURS.

## 5. UNDERSTANDING LIGHT EFFICIENCY – THIS IS WHAT SAVES YOU MONEY

EVEN AMONGST LEDS, NOT ALL BULBS ARE CREATED EQUAL. THOUGH THEY ARE ALL MORE EFFICIENT THAN OPTIONS LIKE FLUORESCENTS AND METAL HALIDES, NOT EVERY LED IS EQUALLY EFFICIENT.

THIS IS ANOTHER REASON WHY IT'S IMPORTANT TO PAY ATTENTION TO THE LUMENS OF AN LED LIGHT INSTEAD OF THE WATTS. IN MANY CASES, A HIGHER QUALITY LED WITH LOWER WATTAGE CAN PRODUCE A BRIGHTER LIGHT THAN ONE THAT HAS A HIGHER WATTAGE.

LET'S EXPLAIN THIS BY SHOWING TWO DIFFERENT LED LIGHTS.

THE FIRST FIXTURE PRODUCES LIGHT AT 130 LUMENS PER WATT. THE SECOND PRODUCES LIGHT AT 180 LUMENS PER WATT.

TO PRODUCE 20,000 LUMENS, THE FIRST LIGHT USES 153.84 WATTS OF ELECTRICITY. THE SECOND LIGHT ONLY NEEDS 111.11 WATTS.

THAT'S A DIFFERENCE OF 42.73 WATTS. THIS IS WHAT SAVES YOU MONEY ON YOUR LIGHTING BILL.

**BOTH LIGHTING PRODUCTS ABOVE CREATE THE SAME AMOUNT OF LIGHT, OR LUMENS.**

EFFICACY, OR LIGHT EFFICIENCY, IS ANOTHER IMPORTANT THING TO FACTOR INTO A LIGHT PURCHASE. A MORE EFFICIENT LIGHT MAY COST MORE AT THE TIME OF PURCHASE, BUT OVER THE LIFE OF THE PRODUCT, YOUR UTILITY BILL WILL BE LOWER.

# HOW TO CHOOSE THE RIGHT FIXTURE TO MEET THE FOOT CANDLE REQUIREMENTS

NOW THAT YOU UNDERSTAND OF WHAT THE FOOT CANDLE LEVELS MIGHT BE FOR YOUR PROJECT, HOW DOES THAT TRANSLATE INTO BUYING THE RIGHT FIXTURE, OR THE RIGHT TYPE OF FIXTURE? THAT'S WHERE WE CAN HELP. LED SOLUTIONS PROVIDES FOUR DISTINCT SERVICES:

1. WE PROVIDE FREE LIGHTING AUDITS.
2. WE SUPPLY THE LIGHTS FOR YOUR PROJECT.
3. WE INSTALL THE LIGHTS FOR YOUR PROJECT
4. WE FINANCE YOUR PROJECT IN-HOUSE

DETERMINING THE RIGHT LIGHT TO PRODUCE THE RIGHT AMOUNT OF FOOT CANDLES IS NOT A GUESS. WE UTILIZE ADVANCED LIGHTING PLAN SOFTWARE TO CALCULATE PRECISE LIGHT LEVELS FOR INDOOR AND OUTDOOR SPACES BASED ON SPECIFIC CUSTOMER REQUIREMENTS. SELECTING THE RIGHT FIXTURES, THEIR QUANTITY, AND ACHIEVING EVEN, SHADOW-FREE LIGHTING TO MEET DESIRED FOOT CANDLE LEVELS IS OUR EXPERTISE. OUR LIGHTING PLANS CATER TO INDUSTRIAL AND COMMERCIAL END USERS, CONTRACTORS, AND ELECTRICIANS.

# FOOT CANDLE RECOMMENDATIONS: COMERCIAL + INDUSTRIAL

CAR MANUFACTURING	
FINAL ASSEMBLY, FINISHING, INSPECTION	200 FC
BODY AND CHASSIS ASSEMBLY	100 FC
BODY PARTS MANUFACTURING	100 FC
FRAME ASSEMBLY	50 FC
SHOWROOM	25-100 FC
SERVICE AREA	25-100 FC
SALES LOT (EXTERIOR) - LIGHTING ZONE 3 (URBAN)	10-40 FC
SALES LOT (EXTERIOR) - LIGHTING ZONE 2 (SUBURBAN)	10-30 FC

WORK SHOPS	
GENERAL WORK / STORAGE	30 FC
PRODUCTION WORK WITH SOME DETAILED TASKS	50 FC
PRODUCTION WORK WITH FINE DETAILED TASKS	70-90 FC

ELECTRICAL EQUIPMENT MANUFACTURING	
IMPREGNATING	20-50 FC
INSULATING, COIL WINDING, TESTING	50-100 FC



MEDICAL FACILITIES	
HALLWAYS	5-30 FC
PATIENT WAITING AREAS	10 FC
NURSE STATIONS	30 FC
HOSPITAL LOBBY AREAS	5 FC
MEDICAL RECORD AREAS	50 FC
STAIR AREAS	10 FC
ROOMS	10-30 FC
EMERGENCY ROOMS	50-100 FC
GENERAL NURSING STATION	30
OPERATING ROOMS	100-200

HOTELS	
BATHROOMS	20-50 FC
BEDROOMS - READING	20-50 FC
CORRIDORS, ELEVATORS, STAIRS	10-20 FC
FRONT DESK	50-100 FC
LINEN ROOM - GENERAL	10-20 FC
LINEN ROOM - SEWING	100-200 FC
LOBBY, GENERAL	10-20 FC
READING AND WORKING AREAS	20-50 FC

LAUNDRIES	
WASHING	20-50 FC
IRONING	20-100 FC

FOOD SERVICE FACILITIES	
CASHIER STAND	20-50 FC
CLEANING AREAS	10-20 FC
DINING AREAS	5-20 FC
FOOD COURTS	30 FC
FOOD DISPLAYS	30-100 FC
KITCHEN, FOOD PREP	50-100 FC

AIRPLANE HANGARS	
GENERAL WORK / STORAGE	30 FC
AIRCRAFT MAINTENANCE WITH SOME DETAILED TASKS	30-50 FC
AIRCRAFT MAINTENANCE WITH FINE DETAILED TASKS	70-100 FC
DRILLING, RIVETING, SCREW FASTENING	75 FC
FINAL ASSEMBLY	100 FC
INSPECTION	50-200 FC
WELDING	50 FC

BANKS	
ATM	10-40 FC
LOBBY	10-50 FC
WRITING AREAS	20-70 FC
TELLER STATIONS, POSTING AND KEYPUNCH	50-150 FC

LIBRARIES	
ORDINARY READING, STACKS	20-50 FC
BOOK REPAIR AND BINDING	20-50 FC
STUDY AND NOTE TAKING, CATALOGING, CARD FILES, CHECKOUT DESK	20-100 FC

FOUNDRIES	
ANNEALING FURNACES	20-50 FC
CLEANING	20-50 FC
CORE MAKING	50-200 FC
INSPECTION - FINE	100-500 FC
INSPECTION - MEDIUM	50-100 FC
MOLDING	50-200 FC
POURING, SORTING	50-100 FC

GARAGES	
HOBBY WORK	30 FC
WORK WITH LIMITED DETAILED TASKS	30-50 FC
WORK WITH FINE DETAILED TASKS	70 FC

GARAGES	
ENTRANCES	5 FC
PARKING GARAGE - BASIC	1 FC
PARKING GARAGE - RAMPS	1-2 FC
PARKING LOTS	2-5 FC
VEHICLE STORAGE	2-5 FC

IRON + STEEL MANUFACTURING	
STOCK, HOT TOP, CHECKER CELLAR, CALCINING	10-30 FC
BUILDING, SLAG PITS, STRIPPING YARD	20 FC
CONTROL PLATFORMS, REPAIRS, MIXER BUILDING	30 FC
ROLLING MILLS	30-50 FC
SHEARING	50 FC
TIN PLATE	50 FC
MOTOR ROOM, MACHINE ROOM	30 FC
INSPECTION	100 FC

PRINTING	
PHOTO ENGRAVING, ETCHING, BLOCKING	20-50 FC
COLOR INSPECTING	100-200 FC
PRESSES	50-100 FC
PROOFREADING	100-200 FC
COMPOSING ROOM	50-100 FC

MACHINE SHOPS	
ROUGH BENCH	20-50 FC
MEDIUM BENCH, ROUGH GRINDING, BUFFING	50-100 FC
FINE BENCH	200-500 FC

RETAIL	
CIRCULATION AREA STOCKROOM	10-30 FC
DEPARTMENT STORE	20-80 FC
DISCOUNT WAREHOUSE, DRUG/CONVENIENCE	25-100 FC
MERCHANDISING, SELF-SERVICE	200 FC
SHOPPING MALL	30 FC

WOODWORKING	
ROUGH SAWING AND BENCH WORK	20-50 FC
SIZING, PLANING, ROUGH SANDING, MEDIUM QUALITY MACHINE AND BENCH WORK, GLUING, VENEERING, COOPERAGE	20-50 FC
FINE BENCH AND MACHINE WORK, FINE SANDING AND FINISHING	50-100 FC
WORKSHOP	30-75 FC
COMPOSING ROOM	50-100 FC

PAINT SHOPS	
SPRAYING, HAND ART, STENCIL	20-50 FC
FINE HAND PAINTING AND FINISHING	50-100 FC

TEXTILE MILLS	
COTTON PICKING, CARDING, ROVING, SPINNING	50 FC
BEAMING AND SLASHING	150 FC
DRAWING	200 FC

PAPER MANUFACTURING	
BEATERS, GRINDING	20-50 FC
FINISHING, CUTTING	50-100 FC
HAND COUNTING	50-100 FC
PAPER MACHINE REEL, INSPECTION	100-200 FC
REWINDER	100-200 FC

SHEET METAL WORKS	
GENERAL	100 FC
TIN PLATE INSPECTION, GALVANIZED, SCRIBING	100-200 FC

OFFICES	
OPEN CUBICLE SPACE	30 FC
PRIVATE	50 FC
RECEPTION AREAS	10 FC
CONFERENCE ROOMS	30 FC
VIDEO CONFERENCES	50 FC

SECURITY FENCES	
HIGH SECURITY AREAS (PRISONS - FOR EXAMPLE)	5 FC
LOW SECURITY AREAS	1-2 FC

SCHOOLS	
CLASSROOMS	30-50 FC
COLLEGE LECTURE HALLS	50-100 FC
HALLWAYS	10 FC
SMALLER SCHOOL GYMNASIUMS	30-50 FC
LARGER SCHOOL GYMNASIUMS	50-100 FC

DISTILLERIES	
MALTING	20-30 FC
BARREL FILLING	20-30 FC
SORTING, WASHING, PACKING	30-40 FC
FILTERING	50 FC
BOTTLING	50 FC
INSPECTION	100 FC

CONVENTION CENTERS	
MAIN CONVENTION AREA	30-90 FC
SMALLER MEETING ROOMS	30-50 FC
STAIRWAYS	5 FC
WASHROOMS AND RESTROOMS	5 FC
VIDEO CONFERENCES	50 FC

## WAREHOUSE

COARSE MATERIAL PROCESSING	10 FC
MEDIUM MATERIAL PROCESSING	30 FC
FINE MATERIAL PROCESSING	50 FC
EXTRA FINE MATERIAL PROCESSING	50-100 FC
WRAPPING, PACKAGING AND LABELING	30 FC
PICKING STOCK	30 FC
SIMPLE ASSEMBLY	15-60 FC
MEDIUM ASSEMBLY	25-100 FC
DIFFICULT ASSEMBLY	50-200 FC
COMPLICATED ASSEMBLY	50-200 FC
EXACTING ASSEMBLY AND INSPECTION	150-600 FC
GENERAL FOOD PROCESSING	75 FC
WAREHOUSING - INACTIVE AREA	5-10 FC
WAREHOUSING - ACTIVE - LARGE ITEMS	10-20 FC
WAREHOUSING - ACTIVE - SMALL ITEMS	15-60 FC
WAREHOUSING - ACTIVE - MEDIUM ITEMS	20 FC
WAREHOUSING - ACTIVE - FINE ITEMS	20-50 FC
SHIPPING AND RECEIVING AREA	30 FC
RECEIVING AND SHIPPING DOCK	5-20 FC
RECEIVING AND STAGING	15-60 FC
MAINTENANCE AND SHOP AREAS	50 FC
COLD STORAGE	10-30 FC
OPEN WAREHOUSE	10-30 FC
WAREHOUSE WITH AISLES	10-30 FC



# FOOT CANDLE RECOMMENDATIONS: SPORT

BASEBALL + SOFTBALL		
	INFIELD	OUTFIELD
COLLEGIATE (TELEVISED)	100 FC	70 FC
COLLEGIATE	70 FC	50 FC
HIGH SCHOOL	50 FC	30 FC
LITTLE LEAGUE	50 FC	30 FC
RECREATIONAL	30 FC	20 FC

FOOTBALL	
COLLEGE TELEVISED	80-150 FC
COLLEGE	70-100 FC
LARGE HIGH SCHOOL	50-70 FC
SMALLER HIGH SCHOOL	30-50 FC
POP WARNER	30-50 FC
RECREATIONAL	20-40 FC

BASKETBALL	
COMMUNITY CENTER COURTS	30 FC
BACKYARD COURTS	10-20 FC

BATTING CAGES	
PROFESSIONAL LEVEL	65-100 FC
TRAINING	40-50 FC
RECREATION LEVEL	20-30 FC

POLO	
POLO FIELD (RECREATIONAL)	20-35 FC
POLO FIELD (COMPETITIVE)	35-50 FC

TENNIS COURTS	
COLLEGE TELEVISED	90-120 FC
COMPETITION LEVEL	50-80 FC
CLUB LEVEL	30-60 FC
RECREATION LEVEL	20-35 FC

INDOOR HOCKY	
PROFESSIONAL LEAGUES	100-150 FC
JUNIOR LEAGUE TELEVISED	70-10 FC
JUNIOR LEAGUE UN-TELEVISED	50-70 FC
RECREATIONAL AND LOCAL TOURNAMENTS	20-40 FC

PICKLEBALL COURTS	
COMPETITION LEVEL	50-80 FC
CLUB LEVEL	30-60 FC
RECREATION LEVEL	20-30 FC

GYMNASIUMS	
ASSEMBLIES	10 FC
GENERAL EXERCISE AND RECREATION	30 FC
LOCKER ROOMS	10-30 FC
EXHIBITIONS, MATCHES	50 FC
SCHOOL GYMS	30-50 FC
PUBLIC GYMS	30-70 FC

SOCCER FIELDS	
RECREATIONAL	5-20 FC
MIDDLE SCHOOL	20-30 FC
SMALL HIGH SCHOOL	20-40 FC
LARGER HIGH SCHOOL	40-50 FC
COLLEGE	60-120 FC

HORSE RIDING ARENAS	
OUTDOOR RECREATIONAL ARENA (RECREATIONAL)	5-10 FC
OUTDOOR RECREATIONAL ARENA (MID-LEVEL)	10-20 FC
OUTDOOR RECREATIONAL ARENA (PROFESSIONAL LEVEL)	20-50 FC
INDOOR RECREATIONAL ARENA (RECREATION)	10-20 FC
INDOOR RECREATIONAL ARENA (PROFESSIONAL)	20-40 FC

# FOOT CANDLE RECOMMENDATIONS: OSHA

OSHA REQUIRMENTS	
OSHA WAREHOUSE LIGHTING REQUIREMENTS	5 FC
OSHA EMERGENCY LIGHTING REQUIREMENTS	5 FC
OSHA TEMPORARY LIGHTING REQUIREMENTS FOR CONSTRUCTION	5 FC
OSHA LIGHTING REQUIREMENTS FOR MANUFACTURING	10 FC
OSHA INDUSTRIAL LIGHTING REQUIREMENTS	10 FC
OSHA OUTDOOR LIGHTING REQUIREMENTS	3 FC
OSHA PARKING LOT LIGHTING REQUIREMENTS	3 FC