

78-6 CRANE CLASSIFICATIONS

6.1

GENERAL

Service classes have been established so that the most economical crane for the installation may be specified in accordance with CMAA Specifications #70 and #74.

The crane service classification is based on the load spectrum reflecting the actual service conditions as closely as possible.

Load spectrum is a mean effective load, which is uniformly distributed over a probability scale and applied to the equipment at a specified frequency. The selection of the properly sized crane component to perform a given function is determined by the varying load magnitudes and given load cycles which can be expressed in terms of the mean effective load factor.

$$k = \sqrt[3]{(W_1)^3 P_1 + (W_2)^3 P_2 + (W_3)^3 P_3 + \dots (W_n)^3 P_n}$$

Where W = Load magnitude; expressed as a ratio of each lifted load to the rated capacity. Operation with no lifted load and the weight of any attachment must be included.

P = Load probability; expressed as a ratio of cycles under each load magnitude condition to the total cycles. The sum total of the load probabilities P must equal 1.0.

k = Mean effective load factor. (Used to establish crane service class only)

All classes of cranes are affected by the operating conditions, therefore for the purpose of the classifications, it is assumed that the crane will be operating in normal ambient temperature 0° to 104° F (-17.8° to 40°C) and normal atmospheric conditions (free from excessive dust, moisture and corrosive fumes).

The cranes can be classified into loading groups according to the service conditions of the most severely loaded part of the crane. The individual parts which are clearly separate from the rest, or forming a self contained structural unit, can be classified into different loading groups if the service conditions are fully known.

6.2

CLASS A (STANDBY OR INFREQUENT SERVICE)

This service class covers cranes which may be used in installations such as power houses, public utilities, turbine rooms, motor rooms and transformer stations where precise handling of equipment at slow speeds with long, idle periods between lifts are required. Capacity loads may be handled for initial installation of equipment and for infrequent maintenance.

6.3

CLASS B (LIGHT SERVICE)

This service covers cranes which may be used in repair shops, light assembly operations, service buildings, light warehousing, etc. where service requirements are light and the speed is slow. Loads may vary from no load to occasional full rated loads with two to five lifts per hour, averaging ten feet per lift.

6.4 CLASS C (MODERATE SERVICE)

This service covers cranes that may be used in machine shops or paper mill machine rooms, etc., where service requirements are moderate. In this type of service the crane will handle loads which average 50 percent of the rated capacity with 5 to 10 lifts per hour, averaging 15 feet, not over 50 percent of the lift at rated capacity.

6.5 CLASS D (HEAVY SERVICE)

This service covers cranes which may be used in heavy machine shops, foundries, fabricating plants, steel warehouses, container yards, lumber mills, etc., and standard duty bucket and magnet operations where heavy duty production is required. In this type of service, loads approaching 50 percent of the rated capacity will be handled constantly during the working period. High speeds are desirable for this type of service with 10 to 20 lifts per hour averaging 15 feet, not over 65 percent of the lifts at rated capacity.

6.6 CLASS E (SEVERE SERVICE)

This type of service requires a crane capable of handling loads approaching a rated capacity throughout its life. Applications may include magnet, bucket, magnet/bucket combination cranes for scrap yards, cement mills, lumber mills, fertilizer plants, container handling, etc., with twenty or more lifts per hour at or near the rated capacity.

6.7 CLASS F (CONTINUOUS SEVERE SERVICE)

This type of service requires a crane capable of handling loads approaching rated capacity continuously under severe service conditions throughout its life. Applications may include custom designed specialty cranes essential to performing the critical work tasks affecting the total production facility. These cranes must provide the highest reliability with special attention to ease of maintenance features.

6.8

CRANE SERVICE CLASS IN TERMS OF LOAD CLASS AND LOAD CYCLES

The definition of CMAA crane service class in terms of load class and load cycles is shown in Table 6.8-1.

**TABLE 6.8-1
DEFINITION OF CMAA CRANE SERVICE CLASS
IN TERMS OF LOAD CLASS AND LOAD CYCLES**

LOAD CLASS	LOAD CYCLES				-k = MEAN EFFECTIVE LOAD FACTOR
	N ₁	N ₂	N ₃	N ₄	
L ₁	A	B	C	D	0.35 - 0.53
L ₂	B	C	D	E	0.531 - 0.67
L ₃	C	D	E	F	0.671 - 0.85
L ₄	D	E	F	F	0.851 - 1.00
	Irregular occasional use followed by long idle periods	Regular use in intermittent operation	Regular use in continuous operation.	Regular use in severe continuous operation	

LOAD CLASSES:

L1 = Cranes which hoist the rated load exceptionally and, normally, very light loads.

L2 = Cranes which rarely hoist the rated load, and normal loads of about 1/3 of the rated load.

L3 = Cranes which hoist the rated load fairly frequently and normally, loads between 1/3 and 2/3 of the rated load.

L4 = Cranes which are regularly loaded close to the rated load.

LOAD CYCLES/LIFE OF CRANE

N₁ = 20,000 to 100,000 cycles
 N₂ = 100,000 to 500,000 cycles
 N₃ = 500,000 to 2,000,000 cycles
 N₄ = Over 2,000,000 cycles