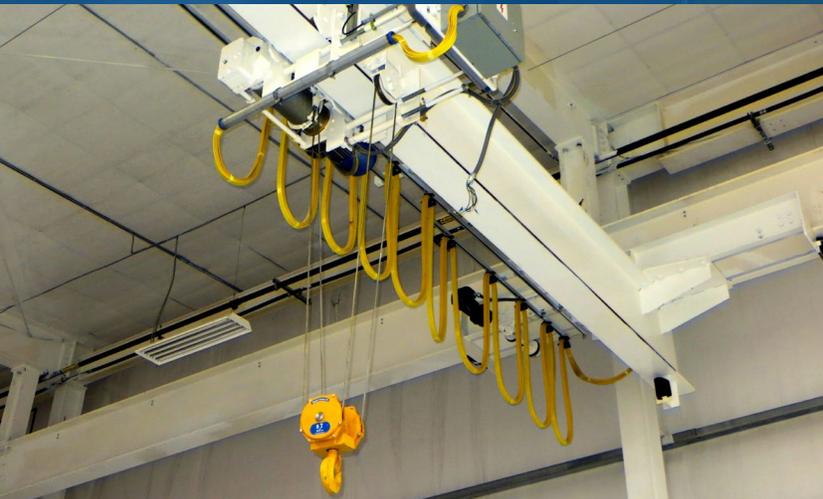

Understanding Crane and Hoist Classifications



As operations in steel, oil, aerospace and other industries continue to expand, the need for overhead lifting continues to grow and American Crane and Equipment Corporation remains at the forefront of the industry to make these operations possible. Our team specializes in providing systems that keep the world's most demanding facilities on the move.

Overhead cranes and hoists are crucial tools that can be used in almost any industry. By choosing the correct overhead lifting equipment, you can ensure a safe, productive and reliable operation. The Crane Manufacturers' Association of America (CMAA) has created a series of crane service classifications to help.

Crane Service Classifications: What Do They Mean?

Gantry cranes, jib cranes, stacker cranes, monorails, overhead bridge cranes, and below-the-hook devices are just a few of the different types of tools we use for lifting and load management in modern manufacturing and industry. CMAA Classifications help us to break down this universe of potential solutions and allow teams to narrow down the best choice of crane or hoist to suit a particular application.

CMAA Classifications are determined based upon a machine's overall performance capabilities, including:

- Load magnitude
- Number of lift cycles
- Lift height

To properly define factor, reference HMI's "Comparison of Hoist Duty Classification" for formula and more in-depth information.

By selecting an overhead crane designed for the proper service classification, a manager ensures worker safety and long life for the equipment. This strategic investment also properly prepares a team for necessary maintenance and inspection expectations, which will be made clear from the start of operations.

Building Success: Crane & Hoist Design Criteria

Cranes and hoists face a particular challenge in any industrial environment: their build must live up to heavy demands in both short and continuous long-term loading. This equipment must be crafted to accommodate complex conditions and working calendars. With the right engineering, a crane can be designed to assure a lifetime of safe, efficient, and high-functioning service.

For example:

- Full lift conditions demand maximum crane and component functionality for short-term performance.
- Structural components must be designed to manage strength and rigidity in both heavy-duty short-term lifts and repetitive long-term lifts.
- Mechanical, electrical, and structural components should be selected in accordance with the particular working load and number of load cycles for maximum machine durability.

Overhead CMAA Crane Classifications, from A to F: How Hard Does Your Crane Have to Work?

CMAA Service Classifications are dictated by the Crane Manufacturers' Association of America (CMAA). The classifications are based on speed, service, and distance needs, in addition to service conditions, load magnitude, and standard maintenance requirements. They range from Class A through Class F, or from "infrequent use" to "continuous/severe" terms of service.

All classes of cranes are affected by operating conditions. Therefore, for the purpose of the service 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.)

Subject Incorporation of Spec. 70-2.1.5 HMI Classifications: Essential Lifting Performance

Hoist Performance Classifications are the Hoist Manufacturers' Institute (HMI) specifications. When considering a hoist design, consider the following ratings. We have noted the most common hoist classification for each crane class, however depending on your application this may vary, so please use as a general guide.

CMAA vs HMI: What is the Difference?

Though typically used in conjunction whenever speaking about classifications, there is a notable difference between CMAA and HMI. CMAA classifications are used in relevance to cranes and “built-up hoists”. HMI classifications are used in relevance to “packaged” hoists, typically defined as largely self-contained units, prepared to be installed into an application, often as part of a system and powered manually, with air, hydraulics, or electricity. It is crucial to understand both classifications when choosing the right crane or hoist for your project.



CMAA Class A: Infrequent/Standby Service (Typically HMI Hoist Class H1)

Class A cranes are ideal for precise equipment handling at slower speeds and fit best in environments with infrequent or light use. Some examples of Class A applications include public utilities or powerhouses, turbine rooms, motor rooms, and transformer stations.

CMAA Class B: Light Service (Typically Hoist Class H2)

These low-speed, lightweight cranes are designed for two to five lifts per hourly load cycle, and offer an excellent solution for service buildings, repair shops, light warehousing systems, and light assembly operations.



HMI Considers the Following:

- Average operating time per day – The average hoist operating time for each day
- Load spectrum – The load magnitude as a percent of hoist rated capacity expressed over the duration of the hoist operation.
- Starts per Hour – The number of hoist motor starts per hour.
- Operating periods – The hoist operating time in minutes per hour as expressed over a work period.
- Equipment life – The projected hoist life based on a number of given factors including those previously defined.

Properly defining these factors, reference HMI's "Comparison of Hoist Duty Service Classifications" for guide formulas.



Class C: Moderate Service (Typically Hoist Class H3)



Applications for moderately rated, or Class C, cranes, include medium-grade machine shops, paper mill machine rooms, and other mid-grade manufacturing set-ups. These tools can handle five to ten lifts an hour, with an average load weighing in around 50% of their rated capacity, averaging 15 feet, not over 50% of the lift at rated capacity.

Class D: Heavy Service (Typically Hoist Class H4)



Lumber mills, container yards, foundries, heavy machine shops, steel warehouses, and fabricating plants demand heavy-duty, or Class D, crane and lifting solutions. These cranes are crafted to constantly handle 50% of their rated capacity during a working period, and include standard duty bucket and magnet operations for heavy weight production. In this type of service, loads approaching 50% 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.

Hoist Manufacturers Institute Specifications

Those specifications define Class H3 and H4 service as:

HMI H3 Service Class

General machine shop, fabricating, assembly, storage, and warehousing. Loads and utilization randomly distributed. Total running time not over 25% of the work period.

HMI H4 Service Class

High Volume handling of heavy loads, frequently near rated load in steel warehousing, machine and fabricating shops, mills, and foundries, with a total running time not over 50% of the work period.

CMAA Class E: Severe Service (Typically HMI Hoist Class H5)

Scrap yards, cement mills, container handling, and heavy manufacturing require Class E cranes. These cranes are capable of handling near-full-capacity loads throughout operations, with twenty or more expected lifts per hour.



CMAA Class F: Continuous Severe Service (Typically a Custom Hoist)

The toughest cranes are often custom designed specialty cranes, engineered for specific critical work such as coke handling or slag management. Class F cranes are structured to be capable of continuous load handling at full capacity for the life of the crane, and provide maximum reliability with an eye to easy maintenance and custom features.

Remember, if your crane will not be working in normal atmospheric conditions or temperatures your equipment may require special environmental features depending on your application. Make sure you discuss this with your crane vendor.

What do the C/H3 and D/H4 ratings mean in practical terms?

American Crane, differentiates between Class C and Class D in the choice of wheels for top running cranes and hoists. For Class C, we use the gear rim type wheels. This is an economical design choice and has demonstrated years of satisfactory service in the Class C applications. For Class D service, we specify rotating axle type wheel and bearing systems. This system allows for longer bearing life, and precludes open gearing with its associated challenges of maintaining proper lubrication.

Changes a customer can expect to see on a crane when ordering a CMAA Class D, instead of a CMAA Class C crane includes a slight increase in girder section, as a result of fatigue configuration. As the class of service increases, the allowable stress range decreases, which may necessitate an increase in girder section size to reduce stresses. Please note this is a fatigue issue as the allowable static stress is the same for both Class C and D service.

Several mechanical items also increase in size or rating when moving to Class D. Sheaves and drums both increase in size. Class C sheaves and drums are required to be 18 times the rope diameter, whereas in Class D it is required to be 20 times rope diameter. This increase in diameter reduces rope stresses and thereby increases rope life.

Changes also occur in the gearing design to produce gears of greater durability for Class D service. The major change in the mechanical is the increase in L-10 bearing life from 5000 hours at Class C service to 10,000 hours in Class D service. In a Class D application, the electrical design also may change.

A Class D application may require increasing the contactor size for the motor controller based on its rating (horsepower) - wire size will also increase.

ACECO has found that the following applications generally require Class C service cranes.

CMAA Class C/HMI H3 Service Applications

- Job Shop
- Steel Fabrication
- Maintenance Activity
- Papermill Wet End
- Machine Shop

For Class D, the heavy service class, we have found the following applications require the Class D service.

CMAA Class D/HMI H4 Service Applications

- Steel Warehouse
- Structural Steel Fabrication
- Papermill Dry End
- Production Cranes

Performance Standard for Overhead Electric Wire Rope Hoists

Drum and sheave diameter requirements under the ASME HST standard do not increase with increasing duty cycle. In the ASME HST, the minimum drum diameter requirement is 18 times rope diameter. Note that this is a smaller diameter than Class D service. The sheave diameter in the ASME HST standard is 16 times the rope diameter, which would be equivalent to CMAA Class A and B service. Bearing life for H3 and H4 is similar to CMAA Class C and CMAA Class D, respectfully.

It should be understood that the above are general guidelines. When questions arise, please consult American Crane's Applications Engineering Department for a complete duty cycle sizing analysis to assure the hoist and crane selected performs adequately for service.

The CMAA buyer's guide is available for helping you define your application classification. [Click here to view the CMAA buyer's guide.](#)

High Performance Crane and Hoist Solutions from American Crane

For over 40 years, American Crane has manufactured equipment to meet lifting needs throughout industrial facilities, from light duty to the most hazardous conditions on the planet. Our machines lift and move heavy equipment, materials, and components with safety, reliability, and long life. We're proud of our quality and safety, all backed by our comprehensive in-house Quality Assurance program, because we believe in protecting people as well as heavy loads.

Our cranes and hoists routinely meet and exceed CMAA duty cycle requirements. Learn more from one of our experts — [reach out today!](#)



“In an increasingly complicated marketplace, it is nice to know about a company whose capabilities you can rely on. At American Crane & Equipment Corporation, we are uniquely positioned to provide our customers with a single source to satisfy material handling requirements. This integrated approach includes project managers, engineers, complete manufacturing facilities and service technicians to help you with your material handling needs. Our company has a long standing reputation as a leading supplier of quality equipment and engineering services to customers throughout the world. American Crane & Equipment Corporation is here to make your job easier.”

Oddvar Norheim, President and CEO

A handwritten signature in white ink, appearing to read "Oddvar Norheim".

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