U. S. DEPARTMENT OF COMMERCE
JESSE H. JONES, Secretary
NATIONAL BUREAU OF STANDARDS
LYMAN J. BRIGGS, Director

DIESEL AND FUEL-OIL ENGINES

(Export Classifications)

COMMERCIAL STANDARD CS102E–42

Effective Date for New Production from October 30, 1942

A RECORDED VOLUNTARY STANDARD
OF THE TRADE

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PROMULGATION

of

COMMERCIAL STANDARD CS102E–42

for

DIESEL AND FUEL-OIL ENGINES

(Export Classifications)

On January 30, 1942, at the instance of the Diesel Engine Manufacturers' Association, a conference of representative manufacturers adopted a recommended commercial standard for Diesel and fuel-oil engines (export classifications). Those concerned have since accepted and approved the standard as shown herein for promulgation by the U. S. Department of Commerce, through the National Bureau of Standards.

The standard is effective for new production from October 30, 1942.

Promulgation recommended.

I. J. Fairchild,
Chief, Division of Trade Standards.

Promulgated.

Lyman J. Briggs,
Director, National Bureau of Standards.

Promulgation approved.

Jesse H. Jones,
Secretary of Commerce.

DIESEL AND FUEL-OIL ENGINES

(Export Classifications)

COMMERCIAL STANDARD CS102E–42

PARTS

PURPOSE

1. The purpose of this standard is to set up definitions and requirements for fair competition and a better understanding between buyers and sellers of stationary, marine, and portable Diesel and fuel-oil engines in export from the United States of America, and to provide a uniform basis for compliance through the use of labels or certificates.

STANDARD DESIGNS

2. The detailed design of an engine is something on which the manufacturer stakes his reputation and business future. It is based upon valuable experience and continued study of new material and construction. The manufacturer can produce most efficiently only when allowed to follow his own design and construction. Rigid purchase specifications which dictate the inclusion of details which are not standard and not essential for the service in question should be avoided, as they usually increase the cost to the buyer with no improvement in quality or performance, and frequently introduce disadvantageous procurement and replacement conditions. Therefore, it is to the mutual benefit of user and builder to accept manufacturers' standard designs as far as possible.

1. NOMENCLATURE AND DEFINITIONS

3. *Diesel Engine.*—A Diesel engine is an internal-combustion engine in which the fuel oil, injected after compression is practically completed, is ignited solely by the heat resulting from the compression of the air supplied for combustion.

4. *Fuel-oil Engines.*

4a. *Spark-Ignition Oil Engine.*—A spark-ignition oil engine is an internal-combustion engine in which the fuel oil, which is injected during the compression stroke, is ignited by a spark plug.

4b. *Surface-Ignition Engine.*—A surface-ignition engine is an internal-combustion engine in which the ignition of the fuel is not accomplished solely by the heat resulting from the compression of the air supplied for combustion but partly (or entirely) by another heat-supplying agency or agencies, such as an uncooled tube, bulb or plate, or an electric-resistance coil. Other names by which this type engine has been called are hot bulb, hot head, semi-Diesel.

5. *Four-Cycle Engine.*—A four-cycle engine is one in which the ignition of fuel takes place in each combustion space once in four consecutive strokes, or two revolutions. Four-cycle engines may be single-acting, in which case the pressure of combustion acts upon one end only of the piston, or of each piston, making one power impulse per cylinder per two revolutions; or may be double-acting, in which case the pressure of combustion acts alternately upon either end of the piston, or of each piston, making an average of one power impulse per cylinder per revolution. In the case of single-acting engines, the pressure of combustion is usually applied to the end of the piston remote from the crankshaft.

6. *Two-Cycle Engine.*—A two-cycle engine is one in which the ignition of fuel takes place in each combustion space once in two consecutive strokes, or one revolution. Two-cycle engines may be single-acting, with one power impulse per cylinder per revolution, or may be double-acting, with one power impulse per cylinder per stroke, or two power impulses per cylinder per revolution.

7. *Opposed-Piston Engine.*—An opposed-piston engine may be either four- or two-cycle and is characterized by the use of two pistons per cylinder in such a way that the pressure of combustion acts simultaneously on each piston, causing them to move in opposite directions. The number of power impulses per cylinder for a given number of revolutions is equal to the number of impulses for a single-acting engine operating on the same cycle.

8. *Trunk-Piston Engine.*—A trunk-piston engine is an engine in which the connecting rod is connected directly to the wristpin in the piston. In this type of engine, the side thrust caused by the angularity of the connecting rod is taken by the piston bearing against the cylinder wall.

9. *Crosshead Engine.*—A crosshead engine is an engine in which the connecting rod is connected to a cross head traveling in guides, which crosshead in turn is connected to the corresponding piston. The side thrust caused by the angularity of the connecting rod is taken by the crosshead and guides.

10. *Air Injection.*—The term *air injection* refers to a method of introducing the fuel charge into the power cylinder of an engine. By this method a quantity of high-pressure air forces its way through a mechanically operated valve into the power cylinder by virtue of its margin of pressure over the pressure in the power cylinder, and carries the fuel charge with it.

11. *Mechanical Injection.*

11a. The term *mechanical injection* refers to a method of introducing the fuel charge into the power cylinder of an engine. In this method, the injection system is completely filled with liquid fuel, and the fuel charge is injected into the power cylinder by liquid pressure built up by a fuel pump. Mechanical-injection systems may be subdivided into the following:

1. Pump-timed-injection system, in which the fuel is injected into the engine cylinder directly by the action of the fuel-injection-pump plunger. The action of the pump both meters and times the injection of the fuel.
2. Common-rail system, in which a fuel pump supplies fuel to a header, called the common-rail, at a pressure above the cylinder pressure of the engine, the fuel being passed from this common-rail to each cylinder in turn at the proper time through mechanically operated valves.
3. Controlled pressure-injection system, in which a fuel pump supplies fuel to a header or distributor at varying pressures, the fuel being metered to each power cylinder through injectors by mechanically operated valves which reduce the pressure to atmospheric after each injection.
4. Distributor injection system, in which a single pump plunger by means of a distributor delivers the fuel to multiple injectors, the timing and injection being accomplished by the action of the injector proper, and the pump and distributor serving only as a metering device at relatively low pressure.

12. *Scavenging Air.*

12a. The term *scavenging air* refers to air at low pressure that is used for forcing the burnt gases out of the power cylinder of an engine during the exhaust period and, by this displacement, for furnishing a supply of fresh air for the cycle following. Scavenging air is not usually employed for four-cycle engines but always for two-cycle engines. This air may be compressed by any of the following methods:

1. Separate scavenging, by which the air is compressed in a scavenging compressor or blower driven by an independent source of power.
2. Integral scavenging, by which the air is compressed in a scavenging compressor or blower direct-connected, geared, or belted to the engine scavenged.
3. Power-piston scavenging, by which the air is compressed in a chamber which is separated from the crankcase of the engine but which communicates with the end of the power piston remote from the combustion space. The upstrokes of the power piston draw air into this chamber from the atmosphere and the downstrokes compress the air so drawn in, with suitable air valving provided.
4. Crankcase scavenging, by which the air is drawn from the atmosphere into the engine crankcase by the upstrokes of the power piston and compressed in the crankcase by the downstrokes of the piston, with suitable air valving provided.

12b. Scavenging air may be introduced into the power cylinder by any of the following methods:

1. Port scavenging, by which the scavenging air enters the cylinder of a two-cycle engine through a series of ports in the cylinder wall and forces the burnt gases through another series of ports into the exhaust line.

2. Valve scavenging, by which the scavenging air enters the engine cylinder through a mechanically operated valve or valves, usually located in the cylinder head, and forces the burnt gases into the exhaust line, usually through a series of ports in the cylinder wall.
3. Port and valve scavenging in which the scavenging air enters the engine cylinder through a series of ports in the cylinder wall and forces the burnt gases through mechanically operated valve or valves in the cylinder head.

13. *Supercharging.*—The term *supercharging,* sometimes called pressure charging, refers to the practice of supplying the intake of an engine with air at a density greater than the density of the surrounding atmosphere, this increased density being retained in the cylinders at the start of the compression stroke. It should be noted that, although scavenging air is supplied to two-cycle engines at a density greater than atmospheric, this practice does not supercharge an engine unless arrangements are made to retain a substantial measure of the increased density in the power cylinders at the closing of the exhaust ports.

14. *Force-Feed Lubrication.*—Force-feed lubrication is that system of lubrication in which the lubricating oil is delivered under pressure produced directly by a metering pump, usually called a force-feed lubricator.

15. *Gravity-Feed Lubrication.*—Gravity-feed lubrication is that system of lubrication in which the lubricating oil is delivered under pressure of gravity from an elevated supply.

16. *Pressure Lubrication.*—Pressure lubrication is that system of lubrication in which lubricating oil is delivered under controlled pressure produced by a nonmetering pump.

17. *Drop-Feed Lubrication.*—Drop-feed lubrication is that system of lubrication in which the lubricating-oil delivery is metered by regulating the number of drops per minute usually observed through a sight feed.

18. *Clutch-Reversing Engine.*—A clutch-reversing engine is an engine designed to be operated normally in one direction of rotation only, and which is coupled to a clutch and a reversing mechanism to enable the operator to reverse at will the rotation of the power-drive shaft. This arrangement is usually found in small marine installations and in some industrial applications.

19. *Direct-Reversible Engine.*—A direct-reversible engine is an engine designed to operate in either direction of rotation, equipped with controls to enable the operator to reverse the direction of rotation at will.

20. *Port and Starboard Engines (Marine).*—An engine is defined as port or starboard according to the side of the ship on which it would be located in a two-engine installation usually with the controls facing inboard.

21. *Rotation of Engines.*

21a. *Marine.*—The rotation of an engine is termed as clockwise or counterclockwise according to the direction of rotation when the engine is viewed from the after end looking forward. A clockwise engine turns a right-hand propeller; a counterclockwise engine turns a left-hand propeller. An engine may be designed to rotate in either

direction when the ship is going ahead, regardless of whether it is a port or starboard engine. (See fig. 1.)

21b. *Other than marine.*—The rotation of other than marine engines shall be clearly specified and agreed upon.

22. *Starting Systems.*

22a. *Compressed Air To Power Cylinders.*—In this system compressed air is supplied to one or more power cylinders from a suitable source of supply. This source is maintained by means of either a built-in or separately driven compressor or both. This air is stored in receivers sometimes called starting air-tanks or starting-air bottles.

22b. *Compressed-Air Motor.*—In this system an air motor is used to crank the engine. The source of the air supply is the same as described above.

22c. *Gasoline starting* is any method employing gasoline, either in an auxiliary engine or auxiliary built-in combustion system, to provide energy for starting.

22d. *Electric.*—Electric starting is that system employing a storage battery or other suitable source of electric energy and an electric cranking motor to start the engine.

23. *Starting-Air Compressor.*—A starting-air compressor is a compressor used to supply air at a pressure sufficient to start the engine for which it is an auxiliary.

24. *Injection-Air Compressor.*—An injection-air compressor is a

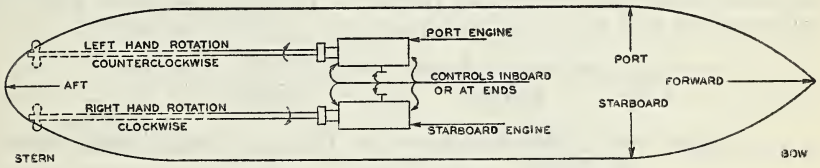

FIGURE 1.—*Port and starboard engines.*

compressor operated to furnish air at a pressure sufficient to inject fuel into the engine for which it is an auxiliary. Because of the high air pressure required, injection-air compressors are almost invariably of the multistage type, with intercoolers between stages and an aftercooler following the high-pressure stage.

25. *Displacement.*

25a. *Displacement, Engine—Per Minute.*—The displacement per minute of an engine is the volume in cubic feet or cubic inches (cubic meters, cubic centimeters, or liters) per minute which is swept by the piston (or all of the pistons, if more than one) during the power strokes, and is equal to: Number of cylinders times the area of each piston head in square feet or square inches (square meters or square centimeters) times the stroke in feet or inches (meters or centimeters) times the number of power strokes per minute.

25b. *Displacement, Engine Piston.*—Engine piston displacement is the cylinder volume in cubic inches (cubic centimeters or liters) swept by the pistons and is equal to: Number of cylinders times the area of each piston head in square inches (square centimeters) times the stroke in inches (centimeters).

25c. *Displacement and Capacity, Compressor.*

1. The displacement of a compressor is the volume displaced by the net area of the compressor piston multiplied by the length of stroke and by the number of strokes per minute. For compound and multistage machines, only the low-pressure cylinder is considered. Compressor displacement in cubic feet (cubic meters or liters) per minute is equal to: Net area of low-pressure piston in square feet (square meters) times the stroke in feet (meters) times the number of discharge strokes per minute.
2. The capacity (actual delivery) of an air compressor is the actual quantity of air compressed and delivered, expressed in cubic feet (cubic meters or liters) per minute at conditions of temperature and pressure prevailing at the compressor intake.
3. The volumetric efficiency of an air compressor is the ratio in percent of the capacity to the displacement.

26. *Horsepower.*—One horsepower (hp) is a rate of doing work equal to 33,000 ft-lb/min (4562.4 kg-m/min) or 550 ft-lb/sec (76.04 kg-m/sec).

27. *Indicated Horsepower.*—The indicated horsepower (ihp) of an engine cylinder is the horsepower developed in the cylinder. It can be determined from the mean indicated pressure (see item 28), the engine speed and the cylinder dimensions. The formula is:

$$ihp=\frac{mip\times L\times A\times N}{33{,}000}=\frac{(mip)'\times L'\times A'\times N,}{4562.4}$$

mip=mean indicated pressure, lb/sq in. $(mip)'$ same except in kg/cm.^{2}
L=stroke of piston, ft. L' same except in m.
A=the net piston area, sq in. A' same except in cm^2.
N=number of power strokes per minute.

28. *Mean Indicated Pressure.*—The mean indicated pressure (mip) of an engine cylinder is the average net pressure in pounds per square inch (mip)′ (kilograms per square centimeter) acting on the piston throughout one cycle, considered as acting during the power stroke only.

29. *Brake Horsepower.*—The brake horsepower (bhp) of an engine is the horsepower delivered by the shaft at the output end. The name is derived from the fact that it is determined by a brake. When determined by brake the formula is:

$$bhp=\frac{2\times\pi\times R\times rpm\times W}{33{,}000}=\frac{2\times\pi\times R'\times rpm\times W'}{4562.4},$$

where

R=distance between the shaft center and the point of application of the weight to the brake arm, ft. R' same except in m.
rpm=revolutions per minute of the brake shaft.
W=effective weight on the brake arm, lb. W'' same except in kg.
π=3.1416.

30. *Shaft Horsepower.*—Shaft horsepower (shp) is the horsepower delivered to the drive shaft. In the case of direct drive, this is substantially the same as the engine bhp; or in the case of any indirect drive, the shp is less than the engine bhp by the sum of mechanical, electrical and hydraulic losses between engine and propeller shaft.

31. *Brake Mean Effective Pressure.*—Brake mean effective pressure (bmep) is:

$$(bmep)=\frac{bhp\times 33{,}000}{L\times A\times N},\ (bmep)'=\frac{bhp\times 4562.4}{L'\times A'\times N},$$

where

bhp=brake horsepower of one cylinder, and L (L'), A (A') and N are as in paragraph 27.

32. *Piston Speed.*—The piston speed of an engine is taken to be the total feet (meters) of travel made by one piston in one minute. The formula is

Piston speed (English units)=stroke in ft×rpm×2.
Piston speed (Metric units)=stroke in m×rpm×2.

33. *Indicated Thermal Efficiency.*—The indicated thermal efficiency of an engine is equal to the ratio of the heat equivalent of 1 horsepower-hour (2,545 Btu) 641.3 kg-cal to the number of heat units actually supplied per indicated horsepower-hour, calculated from the high heat value of the fuel.

34. *Brake Thermal Efficiency.*—The brake thermal efficiency of an engine is equal to the ratio of the heat equivalent of 1 horsepower-hour to the number of heat units actually supplied per brake horsepower-hour, calculated from the high heat value of the fuel.

35. *Mechanical Efficiency.*—Mechanical efficiency is the ratio of brake horsepower to indicated horsepower.

36. *Horsepower Ratings.*—All horsepower ratings herein indicate *usable* horsepower for the intended service.

WARRANTY

37. The standard warranty of each individual company shall be submitted with the tender.

2. SLOW- AND MEDIUM-SPEED STATIONARY DIESEL ENGINES

SCOPE

38. This standard provides requirements for larger-bore, slow- and medium-speed stationary Diesel engines. It covers engines running at 750 or less revolutions per minute. It also covers a uniform method of certifying compliance with the standard.

STANDARD RATINGS AND REQUIREMENTS

39. *Standard Sea-Level Rating.*

39a. Standard sea-level rating is the net brake horsepower the Diesel engine will deliver *continuously* to the crankshaft coupling,

when in good condition and located at an altitude of not over 1,500 feet above sea level with atmospheric temperature not over 90° F. and a barometric pressure not less than 28.25 inches of mercury.

39b. If such essential auxiliaries, as injection air compressor for an air-injection engine, scavenging air pump or blower for two-cycle engines, blower for supercharged engines, or pumps for circulating lubricating oil or piston-cooling oil are separately driven, the horsepower required to drive them shall be deducted from the horsepower delivered to the crankshaft coupling in arriving at the net brake

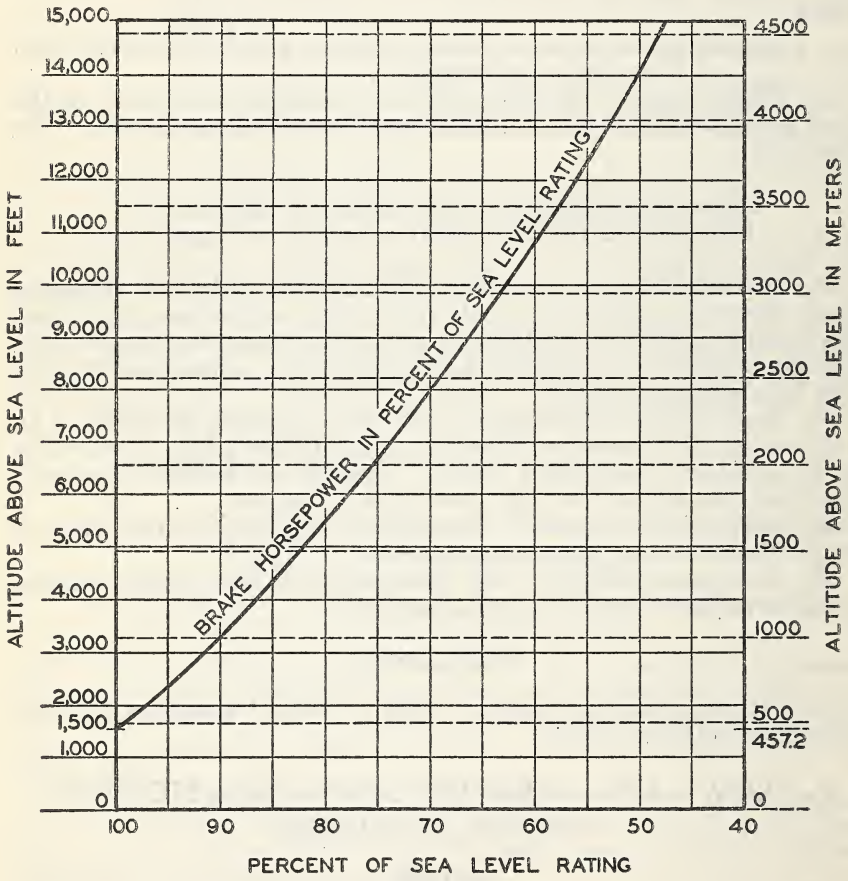

FIGURE 2.—*Altitude ratings of slow- and medium-speed Diesel engines expressed in percentage of sea-level horsepower ratings.*

horsepower. No deductions should be made for the power to drive such auxiliaries if they are mechanically driven by the engine. No deductions are made for auxiliaries intermittently operated or governed in size or operation by special conditions of plant apart from the engine, such as oil-transfer pumps, circulating water pumps, raw-water pumps, centrifuges, and compressors for starting air.

40. *Overload Rating.*—The engine shall be capable of delivering 10 percent in excess of standard rating (sea level or altitude) for 2 out of any 24 hours, with safe operating temperatures.

41. *Altitude Rating.*—At altitudes in excess of 1,500 feet above sea level, the standard sea-level rating of the Diesel engine shall—unless special provision is made to make up the weight of air lost as a result of the altitude—be derated in accordance with figure 2.

42. *Fuel Guarantees.*

42a. Fuel guarantees shall be made in pounds per net brake horsepower-hour at half, three-quarter, and full-rated load (sea-level rating or altitude rating). These guarantees shall be based on a fuel oil having a high heat value of 19,350 Btu per pound and shall be subject to the following conditions:

1. Intake-air temperature between 40° and 90° F, inclusive:
2. Barometric pressure of intake air between 28.25 and 30 inches of mercury, inclusive.
3. Fuel to conform to engine builder's specifications as set forth in his bid or tender.

42b. These variables are independent of one another and, in any specific case, may operate adversely in a cumulative way; therefore, fuel guarantees will be subject to a tolerance of plus or minus 5 percent and a correction for any deficiency in the thermal value of the fuel.

42c. On account of the difficulty of making accurate tests in the field, these fuel guarantees shall be based upon tests conducted in the engine builder's shops. Certified copies of such tests shall be furnished if requested by the buyer. If stipulated at the time the contract is awarded, the buyer may have a representative witness the fuel tests.

43. *Lubricating Oil Consumption*—Because of the many conditions beyond the builder's control, which affect the lubricating oil consumption of a Diesel engine, lubricating oil consumption estimates only will be supplied if requested.

44. *Standard Engine Equipment*—Unless otherwise expressly stipulated in builder's tender, the following standard engine equipment will be furnished: (In the following list, the expression "if required" refers to the engine manufacturer's recommendations):

(a) Engine flywheel (except in the case of a flywheel-type generator).
(b) Extension shaft and outboard bearing where engine-type generator is being driven; or in case of flat or V-belt drive or direct connection to driven machine, where the weight of engine flywheel is such that undue deflection of crankshaft would result from absence of an additional bearing.
(c) Engine piping on engine to inlet and outlet connections.
(d) Exhaust manifold or its equivalent.
(e) Air-inlet manifold or its equivalent.
(f) Blower and its driving equipment for engines which are supercharged.
(g) Strainer-type fuel-oil filter.
(h) Strainer-type lubricating-oil filter.
(i) Lubricating-oil sump tank if required.
(j) Forced-feed lubricator if required.
(k) Lubricating-oil pumps and coolers if required.
(l) Piston-cooling oil pump and cooler if required.
(m) Pump for circulating lubricating oil before starting and after stopping oil-cooled-piston engine if required.

(n) Lubricating-oil pressure gages for pressure system.
(o) Thermometers for engine-cooling water supply and discharge.
(p) Thermometers for lubricating oil and piston-cooling oil if required.
(q) Compression release valves.
(r) Synchronizing device, hand or electrically operated (for generator units) where necessary.
(s) Flywheel barring device, hand or power operated.
(t) A set of special tools for each installation (not duplicated for more than one engine per engine room).
(u) Platform and steps or stairs if required.
(v) Drilled and tapped or reamed holes for exhaust temperature measuring devices, but not including such devices themselves.
(w) Foundation bolts, nuts, and anchor plates, but not including sleeves, for engine only.
(x) Instruction book for operator.
(y) Foundation blue prints for good soil.
(z) Profile prints showing size and location of piping on engines, to which buyer connects.
(aa) Diagrammatic prints showing recommended arrangement of *typical* station piping.
(bb) Engine part lists.
(cc) Packing for ocean shipment if required. Cubic contents and gross weight of largest piece when so packed shall be specified in seller's tender.
(dd) Spare parts as regularly furnished by the manufacturer.

45. *Engine Spares.*—All like parts for each engine or for engines of the same model, size and production series shall be interchangeable.

46. *Speed Regulation.*—Unless otherwise specified, engines shall be equipped with governors which will control the engine speed change to within 6 percent of the rated speed during gradual load changes from no load to full load or vice versa, or to 3 percent where engine is required for parallel electrical operation.

47. *Parallel Operation.*

47a. Engine generator units shall be capable of running successfully in parallel with other generators, provided:

1. That such other generating units are capable of operating in parallel with each other;
2. That such other units are equipped with proper damper windings;
3. That voltage regulators are provided with adequate cross-current compensation;
4. That general characteristics and method of regulation of generators are stated so that a type of generator can be furnished which can be run in parallel with them.

48. *Engine and Accessory Data.*

48a. The following data shall be furnished for Diesel engine and generator if latter is supplied:

1. Engine rating, net brake horsepower.
2. Number of cylinders.
3. Bore of working cylinder.

4. Stroke of engine.
5. Rated speed, revolutions per minute.
6. Fuel consumption in pounds per net brake horsepower-hour at full, three-fourths, and one-half rated load at the stated governed speed.
7. Gross weight of largest piece packed for ocean shipment.
8. Cubical contents of largest piece packed for ocean shipment.
9. Total gross weight.
10. Total cubical contents.
11. Over-all length, width, height of installed unit and height to hook for pulling pistons.
12. Foundation in cubic yards required for normal ground conditions.
13. Size of pipe connections at engine for exhaust, air intake, water, starting air, fuel oil, and lubricating oil.
14. Weight of heaviest piece to be handled during routine servicing.
15. Capacity, horsepower, and method of driving separately driven blower for engines which are supercharged.
16. Recommended starting-air pressure and starting-air tank capacity.
17. Gallons per minute of circulating water recommended, maximum temperature, and temperature rise.
18. Gallons per minute of water and maximum temperature; and temperature rise of water for the oil cooler.

48b. If alternating-current generator is furnished:

1. Kilovolt amperes.
2. Kilowatts at stated power factor.
3. Phase and cycles per second.
4. Voltage.
5. Temperature rise.
6. Whether exciter belted or direct connected.
7. Whether damper winding provided.
8. Whether generator and exciter field rheostats, stator shift, and sole plates provided.
9. Number and arrangement of generator leads.
10. Set efficiency at full, three-fourths and one-half rating at the switchboard at 80–percent power factor.
11. Gross weight and cubical contents.

48c. If direct current generator is furnished:

1. Kilowatts.
2. Voltage.
3. Temperature rise.
4. Type of winding.
5. Number and arrangement of generator loads.
6. Whether generator field rheostat and other accessories provided.
7. Efficiency at full, three-fourths, and one-half rating.
8. Gross weight and cubical contents.

49. *Standard Finish.*—Engines shall be given one coat of primer or filler, and finished with one coat of paint of the manufacturer's stand-

ard color. Special colors and finishes will be furnished upon request at extra cost.

50. *Nameplate.*—The engine shall carry in a conspicuous location, a metal nameplate which shall give at least the following information:

(a) Name of manufacturer.
(b) Bore, stroke, and rated speed, rpm.
(c) Power rating at stated speed at sea level or altitude for which sold.
(d) Engine serial number.

51. *Boxing and Craing.*—Boxing and crating shall be sufficiently rugged to be acceptable to common carriers for export shipment.

CERTIFICATION

52. In order to assure the purchaser that he is receiving a Diesel engine which complies with the requirements of this standard, it is recommended that a plate or label on the engine or a certificate to the purchaser bearing the following wording shall be furnished with each engine:

> The manufacturer certifies that this Diesel engine complies with all the requirements of the applicable parts of Commercial Standard CS 102E–42 as issued by the National Bureau of Standards, United States Department of Commerce.
>
> ----------
> (Name of manufacturer)

MANUFACTURERS' RECOMMENDATIONS

OTHER NECESSARY OR DESIRABLE EQUIPMENT

53. The limitations surrounding the selection of a list of minimum equipment result in the omission of much that may be essential for engine operation or considered desirable by many operators. In order that such items will not be overlooked, a checking list is appended. The main list applies to all types of engines; the additions are for the various types and installations as applicable.

(a) Exhaust muffler.
(b) Exhaust-heat-recovery apparatus.
(c) Inlet-air filter.
(d) Inlet-air muffler.
(e) Fuel-oil centrifuge.
(f) Fuel-oil transfer pump.
(g) Fuel-oil settling and service tanks.
(h) Lubricating-oil purifier or centrifuge.
(i) Separate lubricating-oil sump tank, if required by engine design.
(j) Jacket water cooling equipment.
(k) Engine-jacket-water pump.
(l) Expansion tank for engine-jacket water.
(m) Raw-water pump.
(n) Inlet and outlet thermometers for raw water.
(o) Receiver for starting air.
(p) Starting-air compressor sets.
(q) Set of indicator cocks.
(r) Exhaust pyrometer complete.
(s) Safety alarm equipment.

3. SLOW- AND MEDIUM-SPEED MARINE DIESEL ENGINES

SCOPE

54. This standard provides requirements for larger-bore, slow- and medium-speed Diesel engines. It covers engines running at 750 or less revolutions per minute. It also covers a uniform method of certifying compliance with the standard.

STANDARD RATINGS AND REQUIREMENTS

55. *Standard Ratings.*—The standard rating of a marine Diesel engine is the net brake horsepower that the engine will deliver continuously with atmospheric temperature not over 90° F. and barometric pressure not less than 29 inches of mercury. Also, this standard rating must be such that the engine will operate on the test stand with an over-load of 10 percent for 2 hours, consecutively. Because of many variables in Diesel-engine construction, such as the basic differences between two- and four-cycle principles of design, optional fuel-injection and combustion systems and the diversity of intake-air pressures above atmospheric that can be utilized, it is impossible to fix rigid limits for brake-mean-effective pressures that would be sufficiently general to serve as a standard for all marine applications.

56. *Net Brake Horsepower.*—The standard for net brake horsepower is defined as the horsepower measured by a dynamometer at the engine coupling, without correction for power required by auxiliaries which may or may not be driven by the engine, except that the power required for separately driven supercharging and scavenging air blowers shall be deducted for net horsepower and fuel consumption comparisons. Marine practice varies widely in regard to engine attachments. Some engines, particularly large ones, are practically bare of attached auxiliaries, although others mount and drive not only equipment needed for continuous operation, such as water and lubricating-oil circulating pumps and scavenging-air compressors, but also such auxiliaries as maneuvering compressors and bilge pumps. In many cases, independent auxiliaries are driven by separate power units and must be considered on that basis. Therefore, in comparing proposals, the buyer should evaluate carefully all horsepowers, weights and fuel consumptions when the attached (engine driven) auxiliary equipment varies, since such variation changes the auxiliary power required.

57. *Brake-Horsepower-Capacity and Fuel-Consumption Guarantees.*

57a. With few exceptions, marine installations are without facilities for the precise determination of horsepower output. Therefore, demonstrations for fulfillment of brake-horsepower-capacity and fuel-consumption guarantees must be conducted on the engine builder's test stand. Fuel-consumption guarantees are made in fractions of a pound per net brake-horsepower-hour at rated power and speed. Such guarantees are referred to a fuel oil having a high heat value of 19,350 Btu per pound. All fuel-consumption and brake-horsepower-capacity guarantees for nonsupercharged engines are contingent upon the following conditions:

1. Intake-air temperature between 40° and 90° F, inclusive,
2. Barometric pressure of intake air between 29 and 30 inches of mercury, inclusive, and
3. Fuel oil in conformity with the engine manufacturer's fuel specifications for the type of engine under test.

57b. In adopting these standard practices, the engine manufacturer absorbs the differences in performance caused by three variables. The intake-air density may vary 4.8 percent from the mean, due to atmospheric temperature; it may vary 1.7 percent from the mean, due to barometric pressure; the low heat value of the fuel may vary as much as 500 Btu per pound for the same high-heat value.

57c. These variables are independent of one another and, in any specific case, may operate adversely in a cumulative way; therefore, fuel guarantees will be subject to a tolerance of plus or minus 5 percent and a correction for any deficiency in the thermal value of the fuel.

57d. Since partial-load conditions in marine service are met at reduced speeds, which cannot be predicted accurately in advance, fuel-consumption guarantees are not made at other than rated power and speed conditions, except in the case of engines for constant speed electric drive, for which fuel-consumption guarantees will be made upon request for half, three-quarter, and full power, all at full speed.

58. *Lubricating-Oil Consumption.*—Because of the many conditions beyond the builder's control, which affect the lubricating-oil consumption of a Diesel engine, lubricating-oil consumption estimates only will be supplied if requested.

59. *Equipment for Marine Engines.*

59a. No single list of minimum equipment will apply without alteration to every marine engine. Certain modifications must be made for the following types:

1. Reverse-geared engines.
2. Direct-connected, direct-reversible engines.
3. Reduction-geared, direct-reversible engines.
4. Main engines for electric drive and auxiliary engines for electric power.

59b. The following paragraph lists minimum standard equipment on that basis. No equipment is included in the minimum if there is any possibility that such equipment may be changed for different installations. All items listed are to be of the type furnished as standard by the individual engine manufacturer, although special gages, thermometers, and other fittings can be furnished at extra cost.

60. *Minimum Standard Equipment for Marine Engines.*—The following shall be included with every marine engine, regardless of the type of drive: (In the following list, the expression "if required" refers to the engine manufacturer's recommendations):

(a) 1—Turning gear or flywheel with barring device.
(b) Engine piping on engine to inlet and outlet connections.
(c) 1—Exhaust manifold.
(d) 1—Air-inlet manifold, if required by engine design.
(e) 1—Blower and its driving equipment for engines which are supercharged.
(f) 1—Strainer-type fuel-oil filter.
(g) 1—Strainer-type lubricating-oil filter.

(h) 1—Lubricating-oil pump and cooler, if required.
(i) 1—Piston-cooling oil pump and cooler, if required.
(j) 1—Force-feed lubricator, if required.
(k) 1—Lubricating-oil pressure gage for pressure system.
(l) 1—Inlet and
(m) 1—Outlet thermometer for pressure lubricating-oil system.
(n) 1—Oil-pressure gage for cooling oil, if pistons are oil-cooled.
(o) 1—Outlet thermometer if required for piston-cooling oil, if pistons are oil-cooled.
(p) 1—Inlet and
(q) 1—Outlet jacket-water thermometer.
(r) 1—Cylinder-compression release or relief valve per cylinder.
(s) Drilled and tapped holes for indicator cocks but not including such indicator cocks.
(t) Drilled and tapped holes for exhaust-temperature measuring devices, but not including such devices.
(u) 1—Speed-regulating governor, if required.
(v) 1—Set of special tools (not duplicated for more than one engine per engine room).
(w) 1—Set of manufacturer's standard spare parts.
(x) 1—Operator's instruction book.

and, in addition, for reverse-geared engines only:

(y) 1—Main thrust bearing.
(z) 1—Driving half of shaft coupling.
(aa) 1—Overspeed control.
(bb) 1—Reverse gear and clutch.

for direct-connected, direct-reversible engine only:

(cc) 1—Main thrust bearing.
(dd) 1—Driving half of shaft coupling.
(ee) 1—Overspeed control.
(ff) 1—Reversing mechanism with control on engine.

for reduction-geared, direct-reversible engines only:

(gg) 1—Driving half of coupling between engine and slip coupling or gear.
(hh) 1—Overspeed control.
(ii) 1—Reversing mechanism with control on engine, or with central control if more than one engine is connected to one reduction gear.

for main electric-drive and auxiliary engines for electric power only:

(jj) 1—Speed-regulating governor.

61. *Engine Spares.*—The majority of ships built or repowered are classified under the American Bureau of Shipping or Lloyds, or both. Spare parts furnished with engines in such instances must meet classification society requirements. If no spares are specified, it is standard practice to furnish certain minimum spares, which are specified in each bid. *All like parts for each engine or for engines of the same model size and production series shall be interchangeable.*

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62. *Engine and Accessory Data.*

62a. The following data shall be furnished for Diesel engine and generator if latter is supplied:

1. Engine rating, net brake horsepower.
2. Number of cylinders.
3. Bore of working cylinder.
4. Stroke of engine.
5. Revolutions per minute at rated output.

6a. Fuel consumption for main propulsion engines in pounds per net brake horsepower hour at rated load and speed.

6b. Fuel consumption for main electric and auxiliary service in pounds per net brake horsepower hour at full, three-fourths and one-half rated load at the stated governed speed.

7. Gross weight of largest piece packed for ocean shipment.
8. Cubical contents of largest piece packed for ocean shipment.
9. Total gross weight.
10. Total cubical contents.
11. Over-all length, width, height of installed unit, and height to hook for pulling pistons.
12. Size of pipe connections at engine for exhaust, air intake, water, starting air, fuel oil, and lubricating oil.
13. Weight of heaviest piece to be handled during routine servicing.
14. Capacity, horsepower, and method of driving separately driven blower for engines which are supercharged.
15. Recommended starting-air pressure, and starting-air tank capacity.
16. Gallons per minute of circulating water recommended, maximum temperature and temperature rise.
17. Gallons per minute of water and maximum temperature; and temperature rise of water for the oil cooler.

62b. If alternating-current generator is furnished:

1. Kilovolt-amperes.
2. Kilowatts at stated power factor.
3. Phase and cycles per second.
4. Voltage.
5. Temperature rise.
6. Whether exciter belted or direct-connected.
7. Whether damper winding provided.
8. Whether generator and exciter field rheostats, stator shift and sole plates provided.
9. Number and arrangement of generator leads.
10. Set efficiency at full, three-fourths, and one-half rating at the switchboard at 80-percent power factor.
11. Gross weight and cubical contents.

62c. If direct current generator is furnished:

1. Kilowatts.
2. Voltage.
3. Temperature rise.
4. Type of winding.
5. Number and arrangement of generator leads.

6. Whether generator field rheostat and other accessories provided.
7. Efficiency at full, three-fourths, and one-half rating.
8. Gross weight and cubical contents.

63. *Standard Finish.*—Engines shall be given one coat of primer or filler, and finished with one coat of paint of the manufacturer's standard color. Special colors and finishes will be furnished upon request at extra cost.

64. *Nameplate.*—The engine shall carry in a conspicuous location, a metal nameplate which shall give at least the following information:

(a) Name of manufacturer.
(b) Bore, stroke and rated speed, revolutions per minute.
(c) Power rating at stated speed.
(d) Engine serial number.

65. *Boxing and Crating.*—Boxing and crating shall be sufficiently rugged to be acceptable to common carriers for export shipment.

CERTIFICATION

66. In order to assure the purchaser that he is receiving a Diesel engine which complies with the requirements of this standard, it is recommended that a plate or label on the engine or a certificate to the purchaser bearing the following wording shall be furnished with each engine:

> The manufacturer certifies that this Diesel engine complies with all the requirements of the applicable parts of Commercial Standard CS 102E-42, as issued by the National Bureau of Standards, United States Department of Commerce.
>
> ---
> (Name of manufacturer)

MANUFACTURERS' RECOMMENDATIONS

OTHER NECESSARY OR DESIRABLE EQUIPMENT

67. The limitations surrounding the selection of a list of minimum equipment result in the omission of much that may be essential for engine operation or considered desirable by many operators. In order that such items will not be overlooked, a checking list is appended. The main list applies to all types of engines; the additions are for the various types and installations as applicable.

(a) Exhaust muffler.
(b) Spark arrester.
(c) Exhaust-heat recovery apparatus.
(d) Inlet-air filter.
(e) Inlet-air muffler.
(f) Fuel-oil centrifuge.
(g) Fuel-oil transfer pump.
(h) Fuel-oil settling and service tanks.
(i) Lubricating-oil purifier or centrifuge.
(j) Separate lubricating-oil sump tank, if required by engine design.

(k) Lubricating-oil engine service pump, if required by engine design.
(l) Engine-jacket-water pump.
(m) Engine-jacket-water-temperature control.
(n) Additional outlet-jacket-water thermometers to provide one per cylinder.
(o) Expansion tank for engine-jacket water.
(p) Raw or salt-water pump.
(q) Fresh-water cooler.
(r) Inlet and outlet thermometers for raw or salt water.
(s) Receiver for starting air.
(t) Starting-air-compressor sets.
(u) Maneuvering-air compressor, attached or independent.
(v) Set of indicator cocks.
(w) Exhaust pyrometer complete.
(x) Safety alarm equipment.
(y) Inspection by American Bureau of Shipping or Lloyd's.
(z) Spare parts, not included in minimum equipment (Par. 60) as required by American Bureau of Shipping or Lloyd's.
(aa) Platforms, gratings, rails, ladders, etc.
(bb) Board for wrenches and tools.
(cc) Board for gages.
(dd) Tachometer or revolution counter.
(ee) Services of guaranty engineer.

and, in addition, for reverse-geared units only:

(ff) Cast-iron or welded structural-steel subbase for engine and gear, with bolts for holding engine and gear to such base.

for direct-connected, direct-reversible engine only:

(gg) Sailing clutch (sometimes used on small vessels).

for reduction-geared, direct-reversible engine only:

(hh) Main thrust bearing.
(ii) Reduction gearing and slip couplings, accessory equipment, and spares.

for main electric-drive and auxiliary engines for electric power only:

(jj) Extension shaft for mounting generator (and exciter).
(kk) Outboard bearing for extension shaft.
(ll) Over-speed control.
(mm) Generator (and exciter).
(nn) Spare electrical parts.

GENERAL INFORMATION HELPFUL IN REQUESTING AND COMPARING BIDS

68. *Attached Pumps.*

68a. Pumps necessary to the operation of a Diesel are sometimes attached and engine-driven and sometimes not attached, in which case they must be driven independently. When comparing bids on engines, proper allowance should be made if attached and unattached pumps do not correspond; i. e., power required to drive unattached, independently driven pumps should be deducted from the total horsepower of an engine when comparing it with an engine which drives such pumps directly.

68b. Some two-cycle engines are constructed with built-in scavenging pumps or blowers; others are designed for the use of separately-driven equipment.

69. *Thrust Bearing.*—The thrust bearing may be built-in at the after end of the engine or may be entirely independent of it. When comparing engine bids, the purchaser should be careful to note whether the thrust bearing is included in engine price or must be purchased as an extra.

70. *Turning Gear.*—The turning gear should be arranged to lock the engine in position during inspection and overhaul. This eliminates the danger to personnel of unexpected movement, which might be caused by unbalance due to removal of a piston and connecting rod or impulse from the propeller.

71. *Oil Coolers.*—The capacities of lubricating-oil coolers are determined by the engine manufacturer after consideration of the operating conditions. Engines having oil-cooled pistons require larger oil coolers than those having non oil-cooled pistons. The quantities of cooling water and the connection of oil cooler in the circulating-water system must be approved by the engine manufacturer. It is not feasible for the buyer to specify the capacity or type of oil cooler to be furnished with a Diesel engine, but operating conditions must be described for the information of the engine manufacturer. Coolers for piston-cooling oil or lubricating oil may be of built-in or detached type.

72. *Starting-Air System.*—If excessive maneuvering is anticipated, an independently driven auxiliary starting-air compressor should be installed in addition to the attached engine-driven compressor usually furnished. If no attached engine-driven compressor is quoted, proper allowance should be made when comparing such a bid with one that includes such equipment.

73. *Engine Gratings.*—Differences in engine design, such as the height of the controls from the floor level, location of parts requiring attention during operation and the position of the machinery in the ship, are responsible for a variety of Diesel engine grating arrangements. In all cases, gratings should suit the individual engine design and deck arrangements. All gratings should be supported from the ship's structure or the engine, but not from both. The engine manufacturer may supply pads on the engine structure for attaching necessary grating supports.

74. *Port and Starboard Engines.*—Either port or starboard engines may be furnished for single-screw, single-engine ships, depending upon the requirements of the installation, but the standard of the individual engine manufacturer should be followed whenever possible. The same comment applies to the direction of rotation. For twin-screw installations, one port and one starboard engine are required, and usual practice is for propellers to turn outboard when going ahead.

75. Wrenches, tools, and tool boards subject to mutual agreement between buyer and seller.

4. SMALL, MEDIUM- AND HIGH-SPEED STATIONARY, MARINE, AND PORTABLE DIESEL ENGINES

SCOPE

76. This standard provides requirements for Diesel engines of the smaller bore, medium and high-speed classes operating at approximately 750 revolutions per minute and over for such applications as

trucks, tractors, locomotives, excavators, oil fields, stationary, industrial, generator sets, marine propulsion and auxiliary service, and the like. It also covers a uniform method of certifying compliance with the standard.

STANDARD RATINGS AND REQUIREMENTS

77. *Specified Conditions.*

77a. All horsepower output figures shall be given for standard sea-level conditions of 29.92 inches of mercury barometric pressure and air temperature of 60° F.

77b. When requested, manufacturers shall supply horsepower corrective factors for altitude and temperature applicable to the specified horsepower output capacities.

77c. *Net Horsepower Output.*—Net horsepower rating shall be based on the performance of the engine complete with such auxiliaries as are necessary for the operation of the engine and as specified by the manufacturer for the type of application. These may include such typical items as air cleaner, fan, pumps, superchargers, scavenging equipment, exhaust silencer, and similar items introducing continuous power losses, and do not include other items not so required or specified. Specific installations may require optional equipment which may affect the published net horsepower.

77d. *Peak Horsepower.*—Peak horsepower is the maximum horsepower which the engine will develop and maintain without drop in speed for at least 1 minute, with a reasonably clean exhaust when the engine is in proper adjustment. The peak horsepower is to serve as a guide only to the surplus power available in the engine as stipulated by the manufacturer.

77e. *Intermittent Horsepower.*—This rating shall be the power which the engine will develop at the stated speed and with good operating conditions. The engine shall be capable of carrying this load for periods not exceeding 30 minutes if immediately followed by loads not exceeding the continuous horsepower rating, and the latter decreased load shall exist for at least two times the period of the intermittent load.

77f. *Continuous Horsepower* shall be the horsepower which the engine is capable of carrying at the corresponding stated speed for continuous full-load operation of more than 24 hours.

78. *Fuel Consumption at Stated Speed,* in pounds per brake horsepower hour at full, three-quarters, and one-half load shall be given when required, with conditions as listed under 77f. Such fuel consumption shall be given on the basis of a high heat value of 19,350 Btu per pound and with certain stated permissible range of fuel characteristics. For marine propulsion service, fuel consumption is stated only for full rated load and stated speed.

79. *Fuel Consumption Guarantees,* when given, shall state that they are subject to a tolerance of plus or minus 5 percent, a correction for any deficiency in the thermal value of the fuel and are based on a certain stated permissible range of fuel characteristics. If required to be verified by test, such test is to be conducted only at the manufacturer's factory. Field tests, because of the many different conditions which may be encountered, are subject to considerable variation in results.

80. *Lubricating Oil-Consumption.*—Because of the many conditions beyond the builder's control, which affect the lubricating-oil consumption of a Diesel engine, lubricating-oil consumption estimates only will be supplied if requested.

81. *Engine Spares.*—All like parts for each engine or for engines of the same model, size, and production series shall be interchangeable without hand-fitting.

82. *Standard Finish.*—Engines shall be finished with one coat of paint of the manufacturer's standard color. Special colors and finishes will be furnished upon request at extra cost.

83. *Name plate.*—The engine shall carry in a conspicuous location, a metal name plate which shall give at least the following information:

(a) Name of manufacturer.
(b) Model number.
(c) Engine serial number.

84. *Boxing and Crating.*—Boxing and crating shall be sufficiently rugged to be acceptable to common carriers for export shipment.

CERTIFICATION

85. In order to assure the purchaser that he is receiving a Diesel engine which complies with the requirements of this standard, it is recommended that a plate or label on the machine or a certificate to the purchaser bearing the following wording shall be furnished with each engine:

> The manufacturer certifies that this engine complies with all requirements of the applicable parts of Commercial Standard CS102E–42, as issued by the National Bureau of Standards of the United States Department of Commerce.
>
> ----------
> (Name of manufacturer)

5. SMALL, MEDIUM- AND HIGH-SPEED STATIONARY, MARINE, AND PORTABLE, SPARK-IGNITION OR SURFACE-IGNITION FUEL-OIL ENGINES

GENERAL

86. All of the requirements and stipulations of part 4 are equally applicable to part 5 except that the types of engines covered are those defined in part 1, paragraphs 4a and 4b.

CERTIFICATION

87. In order to assure the purchaser that he is receiving a fuel-oil engine which complies with the requirements of this standard, it is recommended that a plate or label on the machine or a certificate to the purchaser bearing the following wording shall be furnished with each engine:

> The manufacturer certifies that this engine complies with all requirements of the applicable parts of Commercial Standard CS102E–42, as issued by the National Bureau of Standards of the United States Department of Commerce.
>
> ----------
> (Name of manufacturer)

88. Figure 3 illustrates the label adopted by the Diesel Engine Manufactures Association to certify compliance of any particular engine with the applicable parts of this standard.

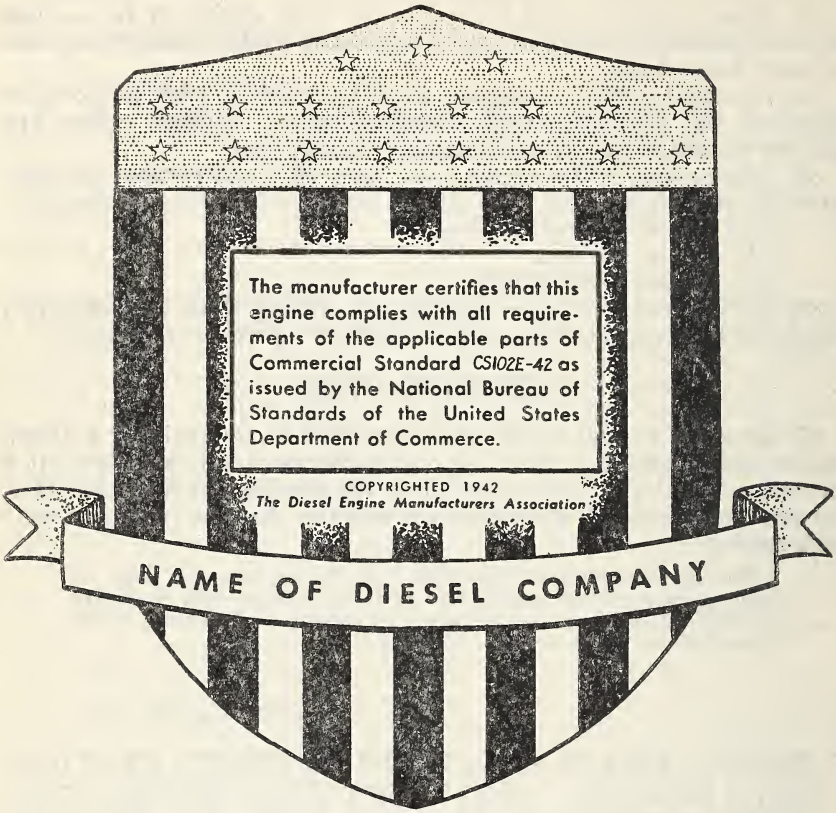

FIGURE 3.—*Label adopted by the Diesel Engine Manufacturers Association.*

EFFECTIVE DATE

The standard is effective for new production from October 30, 1942.

ADDENDUM—DIESEL ENGINES

Metric Equivalents of Measurements Used

1 in.=25.4 mm=2.54 cm=0.0254 m.
1 ft=12 in.=304.8 mm.
1 yd=3 ft=36 in.=914. 4 mm.
1 sq in.=6.4516 cm^2=645.16 mm^2.
1 sq ft=929.03 cm^2=0.092903 m^2.
1 sq yd=8361.31 cm^2=0.836131 m^2.
1 cu in.=16.387 cm^3=16387 mm^3=0.0163867 liter.
1 cu ft=28317 cm^3=0.028317 m^3=28.3162 liter.
1 cu yd=0.764559 m^3=764.538 liter.
1 lb=16 oz=453.592 g=0.453592 kg.
1 gal=4 qt=8 pt=231 cu in.=3.78533 liter.

[NOTE.—Imperial gal, qt, pt,=1.20095 U. S. gal, qt. pt, respectively.]

1 hp = 550 ft-lb/sec = 1.01386 CV[a] = 76.04 kg-m/sec.
1 ft-lb = 0.138255 kg-m.
1 lb/sq in. = 0.070307 kg/cm^2.
1 in. Hg = 0.033421 atmosphere = 0.491293 lb/sq in. = 0.034541 kg/cm^2.
1 Btu = 0.251996 kg-cal.

$$°F = \frac{(°C \times 9)}{5} + 32.$$

$$°C = \frac{(°F - 32) \times 5}{9}$$

Abbreviations of Units of Weight and Measure Used

Abbreviation	Unit	Abbreviation	Unit	Abbreviation	Unit
Btu	British thermal unit.	gal	U. S. gallon.	m	meter.
°C	degree centigrade.	hp	horsepower.	m^2	square meter.
cm	centimeter.	in	inch.	m^3	cubic meter.
cm^3	cubic centimeter.	in. Hg	inch mercury.	mm	millimeter.
cm^2	square centimeter.	kg	kilogram.	mm^2	square millimeter.
cu ft	cubic foot.	kg-cal	kilogram-calorie.	mm^3	cubic millimeter.
cu in	cubic inch.	kg/cm^2	kilogram per square centimeter.	oz	ounce.
cu yd	cubic yard.			pt	pint.
CV	cheval-vapeur.	kg-m	kilogram meter.	qt	quart.
°F	degree Fahrenheit.	kg-m/sec	kilogram meter per second.	sec	second.
ft	foot.			sq ft	square foot.
ft-lb	foot pound.	liter	liter.	sq in	square inch.
ft-lb/sec	foot pound per second.	lb	pound.	sq yd	square yard.
		lb/sq in	pound per square inch.	yd	yard.
g	gram.				

STANDING COMMITTEE

The following individuals comprise the membership of the standing committee, which is to review, prior to circulation for acceptance, revisions proposed to keep the standard abreast of progress. Each organization nominated its own representative. Comment concerning the standard and suggestions for revision may be addressed to any member of the committee or to the Division of Trade Standards, National Bureau of Standards, which acts as secretary for the committee.

Stationary Engine Manufacturers:

Roland W. Bayerlein, (chairman) Nordberg Manufacturing Co., Chase & Oklahoma Aves., Milwaukee, Wis.
T. M. Robie, Fairbanks, Morse & Co., 600 So. Michigan Ave., Chicago, Ill.
J. G. Earle, Baldwin De La Vergne Sales Corporation, Paschall Post Office, Philadelphia, Pa.

Marine Engine Manufacturers:

J. W. Linford, Diesel Engine Division, American Locomotive Co., Auburn, N. Y.
T. F. Hudgins, Cooper-Bessemer Corporation, Mt. Vernon, Ohio.
George F. Noltein, Superior Engine Division, National Supply Co. Springfield, Ohio.

Portable Engine Manufacturers:

Daniel B. Worth, Cummins Engine Co., Columbus, Ind.
Alternate: Harry K. Smyth.
L. F. Shoemaker, The Buda Co., Harvey, Ill.
R. S. Pfeiffer, Caterpillar Tractor Co., 1937 Walker St., Peoria, Ill.

[a] CV (cheval-vapeur) is constant, whereas CF (caballo de fuerza) is variously interpreted in different localities to be either 75 or 76.04 kg-m/sec.

HISTORY OF PROJECT

On February 3, 1941, the Diesel Engine Manufacturers' Association submitted a preliminary draft of a Recommended Commercial Standard for Slow- and Medium-Speed Stationary and Marine Diesel Engines, which was circulated on February 15, 1941 to the manufactures for comment. On March 21, 1941, part 4 of the recommended commercial standard, covering small, medium- and high-speed stationary, marine, and portable Diesel engines, as prepared by Caterpillar Tractor Co., was circulated to the manufacturers for comment.

On May 15 and 16, 1941, a conference of interested manufacturers was held in Chicago, which revised and adjusted an intermediate draft which had been prepared as a result of the previous comment. The revised draft as tentatively adopted by the manufacturers was circulated on June 5, 1941 to selected Federal agencies, to all manufacturers of record, and through the Bureau of Foreign and Domestic Commerce and the Department of State to selected offices in Latin America, for comment.

With this comment in hand, a conference of interested manufacturers in Chicago on January 30, 1942 adjusted, revised, and adopted the recommended commercial standard, which was circulated on March 25, 1942 for written acceptance. Upon receipt of written acceptances representing a satisfactory majority, Commercial Standard CS102E–42, as shown herein, was promulgated in mimeographed form on June 30, 1942, to become effective in the production, labeling, and rating of Diesel and fuel-oil engines from October 30, 1942.

CS102E–42

ACCEPTANCE OF COMMERCIAL STANDARD [1]

If acceptance has not previously been filed, this sheet properly filled in, signed, and returned will provide for the recording of your organization as an acceptor of this commercial standard.

Date_____

Division of Trade Standards,
National Bureau of Standards,
Washington, D. C.

Gentlemen:

Having considered the statements on the reverse side of this sheet, we accept the Commercial Standard CS102E–42 as our standard of practice in the production, labeling, and rating of Diesel and fuel-oil engines (export classifications).

We will assist in securing its general recognition and use, and will cooperate with the standing committee to effect revisions of the standard when necessary.

(Cut on this line)

Signature of individual officer _____
(In ink)

(Kindly typewrite or print the following lines)

Name and title of above officer_____

Organization_____
(Fill in exactly as it should be listed)

Street address_____

City and State_____

[1] Please file separate acceptances for all subsidiary companies and affiliates which should be listed separately as acceptors. In the case of related interests desiring to record their general approval, the words "in principle" should be added after the signature.

TO THE ACCEPTOR.

The following statements answer the usual questions arising in connection with the acceptance and its significance:

1. *Enforcement.*—Commercial standards for exports are commodity specifications voluntarily established by mutual consent of those concerned. They present a common basis of understanding between the producer, distributor, and consumer and should not be confused with any plan of governmental regulation or control. The United States Department of Commerce has no regulatory power in the enforcement of their provisions, but their provisions through usage soon become established as trade customs, and are made effective through incorporation into sales contracts by means of labels, invoices, and the like.

2. *The acceptor's responsibility.*—The purpose of commercial standards is to establish for specific commodities, nationally recognized grades or consumer criteria and the benefits therefrom will be measurable in direct proportion to their general recognition and actual use. Instances will occur when it may be necessary to deviate from the standard and the signing of an acceptance does not preclude such departures; however, such signature indicates an intention to follow the commercial standard where practicable, in the production or exportation of the article in question.

3. *The Department's responsibility.*—The major function performed by the Department of Commerce in the voluntary establishment of commercial standards for exports on a Nation-wide basis is fourfold: first, to act as an unbiased coordinator to bring all interested parties together for the mutually satisfactory adjustment of trade standards; second, to supply such assistance and advice as past experience with similar programs may suggest; third, to canvass and record the extent of acceptance and adherence to the standard on the part of producers and exporters; and fourth, after acceptance, to publish and promulgate the standard for the information and guidance of buyers and sellers of the commodity.

4. *Announcement and promulgation.*—When the standard for exports has been endorsed by a satisfactory majority of production in the absence of active, valid opposition, the success of the project is announced. If, however, in the opinion of the standing committee or the Department of Commerce, the support of any standard is inadequate, the right is reserved to withhold promulgation and publication.

ACCEPTORS

The organizations and individuals listed below have accepted this recorded standard of the industry as their standard of practice in the production, labeling, and descriptions of Diesel and fuel-oil engines (export classifications). Such endorsement does not signify that they may not find it necessary to deviate from the standard, nor that producers so listed guarantee all of their products in this field to conform with the requirements of this standard. Therefore specific evidence of compliance should be obtained where required.

ASSOCIATIONS

Diesel Engine Manufacturers Association, New York, N. Y. (In principle.)

FIRMS

Allis-Chalmers Manufacturing Co., Milwaukee, Wis.
American Locomotive Co., Diesel Engine Division, Auburn, N. Y.
Anderson Diesel Engine Co., Philadelphia, Pa.
Atlas Imperial Diesel Engine Co., Oakland, Calif.
Baldwin De La Vergne Sales Corporation, Philadelphia, Pa.
Buckeye Machine Co., The, Lima, Ohio.
Buda Co., The, Harvey, Ill.
Caterpillar Tractor Co., Peoria, Ill.
Chicago Pneumatic Tool Co., New York, N. Y.
Climax Engineering Co., Clinton, Iowa.
Consolidated Shipbuilding Corporation, New York, N. Y.
Continental Gin Co., Birmingham, Ala.
Continental Motors Corporation, Muskegon, Mich.
Cooper-Bessemer Corporation, The Mount Vernon, Ohio.
Cummins Engine Co., Columbus, Ind.
Enterprise Engine & Foundry Co., San Francisco, Calif.
Fairbanks, Morse & Co., Chicago, Ill.
Fulton Iron Works Co., St. Louis, Mo.
General Machinery Corporation, Hooven, Owens, Rentschler Division, Hamilton, Ohio.
General Motors Corporation, Cleveland Diesel Engine Division, Cleveland, Ohio.
General Motors Corporation, Electro-Motive Division, La Grange, Ill.
Hill Diesel Engine Co., Lansing, Mich.
Ingersoll-Rand Co., New York, N. Y.
International Harvester Export Co., Chicago, Ill.
National Supply Co., The, Springfield, Ohio.
Nordberg Manufacturing Co., Milwaukee, Wis.
Palmer Bros. Engines, Inc., Cos Cob, Conn.
Rathbun-Jones Engineering Co., The, Toledo, Ohio.
Red Wing Motor Co., Red Wing, Minn.
Sheppard Co., R. H., Hanover, Pa.
Sterling Engine Co., Buffalo, N. Y.
Venn-Severin Machine Co., Chicago, Ill.
Vernon Tool Co., Ltd., Western Engine Co. Division, Alhambra, Calif.
Waukesha Motor Co., Waukesha, Wis.
Witte Engine Works, Kansas City, Mo.
Worthington Pump & Machinery Corporation, Buffalo, N. Y.

COMMERCIAL STANDARDS

CS No. Item

0-40. Commercial standards and their value to business (third edition).
1-42. Clinical thermometers (third edition).
2-30. Mopsticks.
3-40. Stoddard solvent (third edition).
4-29. Staple porcelain (all-clay) plumbing fixtures.
5-40. Pipe nipples; brass, copper, steel, and wrought iron.
6-31. Wrought-iron pipe nipples (second edition). Superseded by CS5-40.
7-29. Standard weight malleable iron or steel screwed unions.
8-41. Gage blanks (third edition).
9-33. Builders' template hardware (second edition).
10-29. Brass pipe nipples. Superseded by CS5-40.
11-41. Moisture regains of cotton yarns (second edition).
12-40. Fuel oils (fifth edition).
13-42. Dress patterns (third edition).
14-39. Boys' button-on waists, shirts, junior and polo shirts (made from woven fabrics) (second edition).
15-29. Men's pajamas.
16-29. Wall paper.
17-42. Diamond core drill fittings (third edition).
18-29. Hickory golf shafts.
19-32. Foundry patterns of wood (second edition).
20-42. Staple vitreous china plumbing fixtures (third edition).
21-39. Interchangeable ground-glass joints, stopcocks, and stoppers (fourth edition).
22-40. Builders' hardware (nontemplate) (second edition).
23-30. Feldspar.
24-30. Standard screw threads.
25-30. Special screw threads.
26-30. Aromatic red cedar closet lining.
27-36. Mirrors (second edition).
28-32. Cotton fabric tents, tarpaulins, and covers.
29-31. Staple seats for water-closet bowls.
30-31. Colors for sanitary ware.
31-38. Wood shingles (fourth edition).
32-31. Cotton cloth for rubber and pyroxylin coating.
33-32. Knit underwear (exclusive of rayon).
34-31. Bag, case, and strap leather.
35-42. Plywood (hardwood and eastern red cedar) (second edition).
36-33. Fourdrinier wire cloth (second edition).
37-31. Steel bone plates and screws.
38-32. Hospital rubber sheeting.
39-37. Wool and part wool blankets (second edition) (Withdrawn as commercial standard, July 14, 1941).
40-32. Surgeons' rubber gloves.
41-32. Surgeons' latex gloves.
42-35. Fiber insulating board (second edition).
43-32. Grading of sulphonated oils.
44-32. Apple wraps.
45-40. Douglas fir plywood (domestic grades) (fourth edition).
45E-36. Douglas fir plywood (export grades).
46-40. Hosiery lengths and sizes (third edition).
47-34. Marking of gold-filled and rolled-gold-plate articles other than watchcases.
48-40. Domestic burners for Pennsylvania anthracite (underfeed type) (second edition).
49-34. Chip board, laminated chip board, and miscellaneous boards for bookbinding purposes.
50-34. Binders board for bookbinding and other purposes.
51-35. Marking articles made of silver in combination with gold.

CS No. Item

52-35. Mohair pile fabrics (100-percent mohair plain velvet, 100-percent mohair plain frieze, and 50-percent mohair plain frieze).
53-35. Colors and finishes for cast stone.
54-35. Mattresses for hospitals.
55-35. Mattresses for institutions.
56-41. Oak flooring (second edition).
56E-41. Oak flooring (exports).
57-40. Book cloths, buckrams, and impregnated fabrics for bookbinding purposes except library bindings (second edition).
58-36. Woven elastic fabrics for use in overalls (overall elastic webbing).
59-41. Woven textile fabrics—testing and reporting (third edition).
60-36. Hardwood dimension lumber.
60E-41. Hardwood dimension lumber (exports).
61-37. Wood-slat venetian blinds.
62-38. Colors for kitchen accessories.
63-38. Colors for bathroom accessories.
64-37. Walnut veneers.
65-38. Wool and part-wool fabrics.
66-38. Marking of articles made wholly or in part of platinum.
67-38. Marking articles made of karat gold.
68-38. Liquid hypochlorite disinfectant, deodorant, and germicide.
69-38. Pine oil disinfectant.
70-41. Phenolic disinfectant (emulsifying type) (second edition) (published with CS71-41).
71-41. Phenolic disinfectant (soluble type) (second edition) (published with CS70-41).
72-38. Household insecticide (liquid spray type).
73-38. Old growth Douglas fir standard stock doors.
74-39. Solid hardwood wall paneling.
75-42. Automatic mechanical draft oil burners designed for domestic installations (second edition).
76-39. Hardwood interior trim and molding.
77-40. Sanitary cast-iron enameled ware.
78-40. Ground-and-polished lenses for sun glasses (second edition) published with CS79-40).
79-40. Blown, drawn, and dropped lenses for sun glasses (second edition) (published with CS78-40).
80-41. Electric direction signal systems other than semaphore type for commercial and other vehicles subject to special motor vehicle laws (after market).
81-41. Adverse-weather lamps for vehicles (after market).
82-41. Inner-controlled spotlamps for vehicles (after market).
83-41. Clearance, marker, and identification lamps for vehicles (after market).
84-41. Electric tail lamps for vehicles (after market).
85-41. Electric license-plate lamps for vehicles (after market).
86-41. Electric stop lamps for vehicles (after market).
87-41. Red electric warning lanterns.
88-41. Liquid-burning flares.
89-40. Hardwood stair treads and risers.
90E-41. Crawler mounted, revolving power shovels, lifting cranes, dragline and clamshell excavators (export classifications).
91-41. Factory fitted Douglas fir entrance doors.
92-41. Cedar, cypress and redwood tank stock lumber.
93-41. Portable electric drills (exclusive of high frequency).
94-41. Calking lead.

CS No.	Item
95–41.	Lead pipe.
96–41.	Lead traps and bends.
97–42.	Electric supplementary driving and passing lamps for vehicles (after market).
98–42.	Artists' oil paints.
99–42.	Gas floor furnaces—gravity circulating type.
100–42.	Multiple-coated, porcelain-enameled steel utensils.
101–43.	Flue-connected oil-burning space heaters equipped with vaporizing pot-type burners.
102E–42.	Diesel and fuel-oil engines (export classifications).

NOTICE.—Those interested in commercial standards with a view toward accepting them as a basis of everyday practice may secure copies of the above standards, while the supply lasts, by addressing the Division of Trade Standards, National Bureau of Standards, Washington, D. C.

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