

# FAIRBANKS MORSE **DEFENSE**

---

## **Engine Product Catalog**

---



**POWERING CRITICAL MISSIONS**

*[fairbanksmorsedefense.com](http://fairbanksmorsedefense.com)*



# ENGINE PRODUCT CATALOG

## TABLE OF CONTENTS

FMD Overview ..... V  
Sales & Service Support ..... VI  
Our Locations ..... VII  
Engine Solutions  
    FM PA6B & PA6B STC (4,200 - 8,100 kWb) ..... 4  
    FM PC2.5 CR STC (5,816 - 8,725 kWb)..... 6  
    FM 28/33 D STC (5,460 - 10,000 kWb)..... 8  
    FM 32/44 CR (3,600 - 12,000 kWb)..... 10  
    FM 48/60 CR (7,200 - 19,200 kWb)..... 12  
    FM 251 F (764 - 3,060 kWb)..... 14  
    FM 38 D 8 1/8 (1,566 - 3,628 kWb)..... 16  
    FM 175D (1,740 - 4,440 kWb) ..... 18  
Resources..... III



# Overview

Located in Beloit, Wisconsin, Fairbanks Morse Defense manufactures, procures, assembles, and distributes heavy-duty, medium-speed reciprocating engines that exceed the stringent standards required by the U.S. military.

Fairbanks Morse Defense manufacturing is conducted in its U.S.-based facility. FMD sells its high-performance engines directly to naval marine customers and shipyards. As a principal supplier of reliable diesel engines to the U.S. Navy, U.S. Coast Guard, and the Canadian Coast Guard, FMD enables the defense industry to complete worldwide mission-critical operations. FMD is a leading provider of reliable marine power solutions



# Sales & Service Support

Fairbanks Morse Defense offers an extensive portfolio of services to optimize performance, ensure reliability, and extend your engine's lifecycle – from the day it is commissioned and for the many years that follow. Our support extends from installation through lifecycle maintenance, including rapid mobilization and local shop support. Our OEM certified technicians provide the attention and expertise to take care of every project from beginning to end. With our strategically located service centers, we are committed to supplying genuine OEM parts to meet your operational needs. Through collaborative planning, we proactively identify and create solutions to ensure your operations are not disrupted.

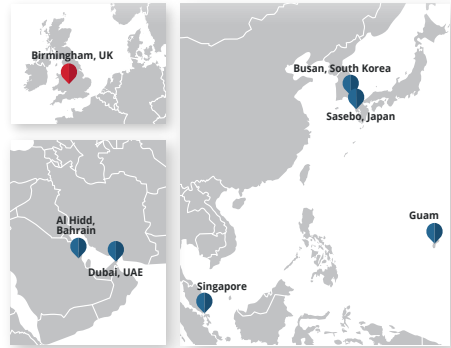
## **Fairbanks Morse Defense**




701 White Ave  
Beloit, Wisconsin 53511

## **OEM Spare Parts & Service**

1-800-356-6955

# Our Locations



-  Service Centers
-  Manufacturing Facilities
-  International Service Partners

## FMD Corporate

### Fairbanks Morse Defense Headquarters

Phone: 1-800-356-6955

## FMD Manufacturing Sites

### American Fan

Phone: 1-866-771-6266

### Federal Equipment Co.

Phone: 1-877-435-4723

### Hunt Valve Company

Phone: 1-800-321-2757

### Maxim Watermakers

Phone: 1-318-629-2460

### Montreal Bronze

Phone: +1 450-477-2069

### Research Tool & Die Works

Phone: 1-310-639-5722

### Ward Leonard

Phone: 1-860-283-5801

### Welin Lambie

Phone: +44 1384-78294

### Fairbanks Morse Defense

Phone: 1-800-356-6955

## FMD Service Centers

### Chesapeake Service Center

### San Diego Service Center

Phone: 619-477-3218

### Seattle Service Center

Phone: 206-246-8133

### Houston Service Center

Phone: 713-896-9455

### Mobile Service Center

Phone: 866-453-5874

### Jacksonville Service Center

Phone: 904-906-6124

### Mayport Mobile Office

Phone: 904-906-6124

[www.FairbanksMorseDefense.com](http://www.FairbanksMorseDefense.com)





**ENGINE  
SOLUTIONS**



# POWERING CRITICAL MISSIONS

## **Reliable Engines For Mission Critical Marine Performance**

Located in Beloit, Wisconsin, Fairbanks Morse Defense manufactures, procures, assembles, and distributes heavy-duty, medium-speed reciprocating engines.

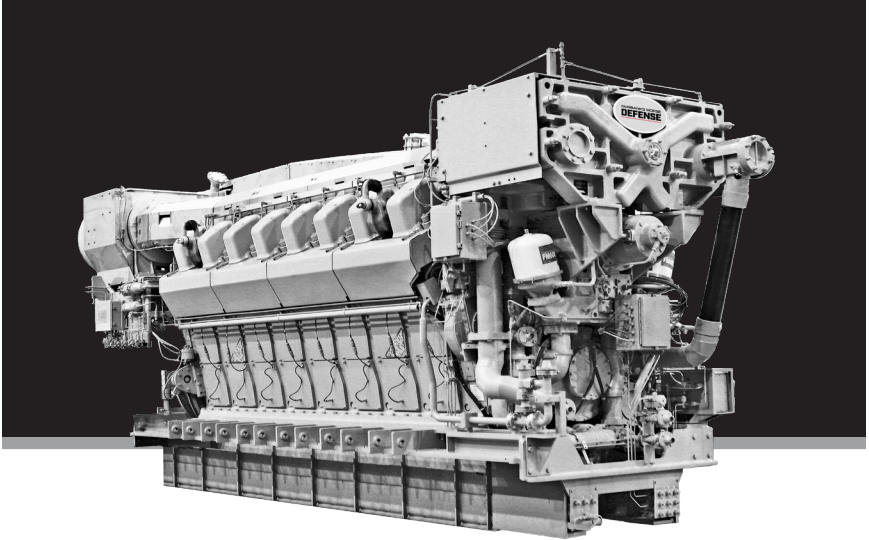
Fairbanks Morse Defense manufacturing is conducted in its U.S.-based facility. FMD sells its high-performance engines directly to naval marine customers and shipyards. As a principal supplier of reliable diesel engines to the U.S. Navy, U.S. Coast Guard, and the Canadian Coast Guard, FMD enables the defense industry to complete worldwide mission-critical operations. Fairbanks Morse Defense is a portfolio company of Arcline Investment and a leading provider of reliable marine power solutions.

## **Leading engine options manufactured in the U.S.**

Fairbanks Morse Defense engines are designed for reliable, efficient performance across a wide range of environments. Representing engine systems built for even the most stringent military requirements, Fairbanks Morse Defense continues to bring to market some of the most durable solutions available.

Fairbanks Morse Defense is an MAN Energy Solutions SE licensee.

# FM PA6B & PA6B STC



## Power Range 4,200 - 8,100 kWb

With over 840 engines in operation, the FM PA6B diesel engine is respected worldwide for its reliability and its incredibly advanced technology.

## Key Advantages

- Excellent fuel efficiency
- Increased reliability and safety
- Simplified installation
- Redesigned connecting rod, crankshaft, cylinder head and liner with anti-bore polishing ring

# FM PA6B & PA6B STC

## Engine Specifications

Specifications	
Cylinder Configuration	12V, 16V, 18V, 20V
Cylinder Bore-mm (in)	280 (11.02)
Piston Stroke-mm (in)	330 (12.99)
Cycle	4 Stroke
Displacement/Cylinder - L (cu in)	20.3 (1,240)
Fuel Type	MGO, MDO, F-76

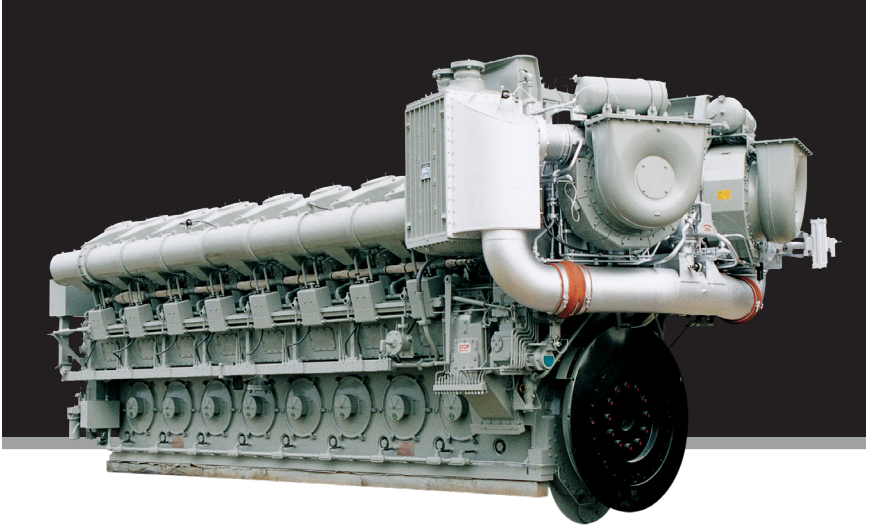
Power Ratings		
Cylinders	PA6B Generator 900 RPM   60 Hz kWe	PA6B STC Propulsion 1,050 RPM   kWb
12V	4,032	4,860
16V	5,376	6,480
18V	6,048	-
20V	6,720	8,100

\* Assuming a 96% generator efficiency

Engine Dimensions				
Cylinders	Length (mm)	Width (mm)	Height (mm)	Dry Weight Tons (Metric)
12V	5,619	2,340	3,130	27.0
16V	6,539	2,340	3,130	35.1
18V	7,398	2,665	3,169	39.1
20V	7,858	2,665	3,169	41.7

Dimensions are for size estimation only. For installation obtain certified prints.

# FM PC2.5 CR STC



## Power Range 5,816 - 8,725 kWb

The FM PC2.5 CR STC engine is well suited for marine applications with high torque at low speeds, and delivers excellent power production in relation to installed weight.

## Key Advantages

- Low fuel consumption
- Ease of maintenance
- Improved low-load operation
- Lower emissions
- High reliability and availability

# FM PC2.5 CR STC

## Engine Specifications

Specifications	
Cylinder Configuration	12V, 14V, 16V, 18V
Cylinder Bore-mm (in)	400 (15.75)
Piston Stroke-mm (in)	460 (18.11)
Cycle	4 Stroke
Displacement/Cylinder - L (cu in)	57.8 (3,528)
Output/Cylinder - kWm (HP)	485 (650)
Fuel Type	MGO, MDO, F-76

Power Ratings			
Cylinders	RPM	HP/Cyl.	kWb
12V	520	650	5,816
14V	520	650	6,786
16V	520	650	7,755
18V	520	650	8,725

Engine Dimensions				
Cylinders	Length (mm)	Width (mm)	Height (mm)	Dry Weight Tons (Metric)
12V	6,854	5,076	3,775	67
14V	7,594	5,816	3,775	76
16V	8,334	6,555	3,775	84
18V	9,074	7,295	3,775	91

Dimensions are for size estimation only. For installation obtain certified prints.

# FM 28/33 D STC



## Power Range 5,460 - 10,000 kWb

The FM 28/33D STC combines world-class engineering and state-of-the-art technology to produce the most powerful and fuel-efficient 1,000 rpm diesel engine in the world.

## Key Advantages

- Reduced component count eases installation and maintenance
- 52 Degree Vee angle minimizes width and facilitates installation
- Electronically controlled injection system improves SFC, performance and transient response
- Sequential turbo charging improves SFC, reduces soot
- Best-in-class fuel efficiency
- Industry-leading power rating



# FM 28/33 D STC

## Engine Specifications

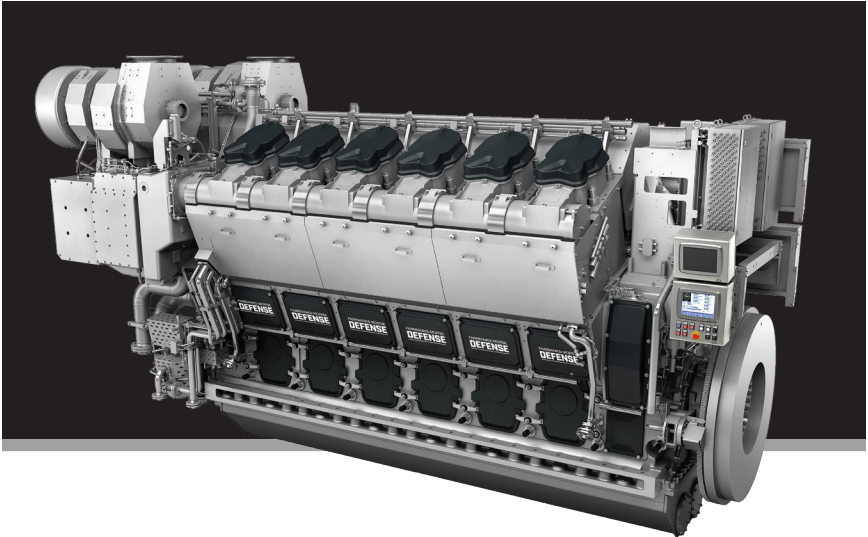
Specifications	
Cylinder Configuration	12V, 16V, 20V
Cylinder Bore-mm (in)	280 (11.0)
Piston Stroke-mm (in)	330 (13.0)
Cycle	4 Stroke
Displacement/Cylinder - L (cu in)	20.3 (1,240)
Fuel Type	MGO, MDO, F-76

Power Ratings		
Cylinders	FERRY	NAVY
	1,000 RPM   kWb	1,032 RPM   kWb
12V	5,460	6,000
16V	7,280	8,000
20V	9,100	10,000

Engine Dimensions				
Cylinders	Length (mm)	Width (mm)	Height (mm) Deep Oil Sump	Weight with Flywheel (t)
12V	6,217	2,473	3,682	36.4
16V	7,137	2,473	3,682	43.9
20V	8,057	2,473	3,682	51.6

Dimensions are for size estimation only. For installation obtain certified prints.

# FM 32/44 CR



## Power Range 3,600 - 12,000 kWb

The FM 32/44 CR engine boasts the newest technologies in the area of medium speed diesel engines. Using electronic injection, high efficiency turbochargers, electronic hardware and variable valve timing, the FM 32/44 CR is a synthesis of the most advanced large engine technologies available. The common rail technology permits this engine to achieve the highest levels of flexibility for all load ranges and yields significantly better results than any engine with the conventional injection system.

## Key Advantages

- Advanced electronic common rail injection system
- High specific power output
- High efficiency
- Low operating and life cycle costs
- Long maintenance intervals and service life

# FM 32/44 CR

## Engine Specifications

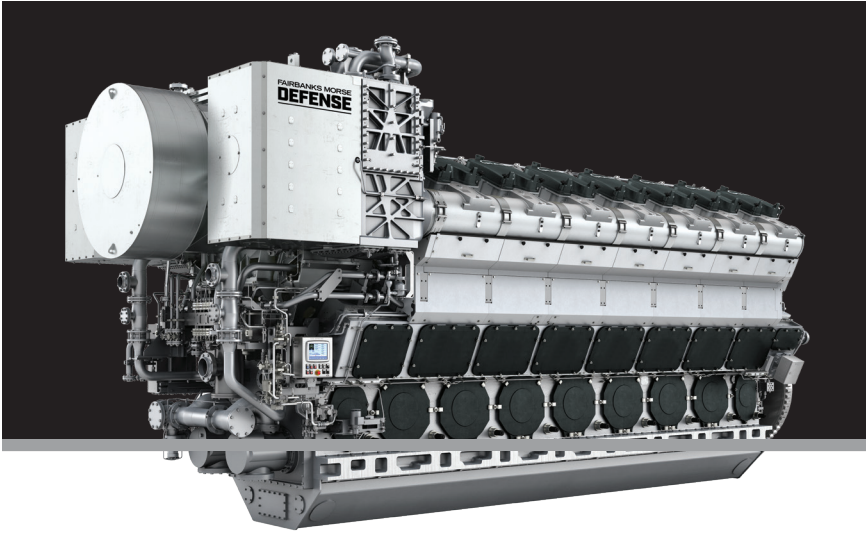
Specifications	
Cylinder Configuration	6L, 7L, 8L, 9L, 10L, 12V, 14V, 16V, 20V
Cylinder Bore-mm (in)	320 (12.6)
Piston Stroke-mm (in)	440 (17.3)
Cycle	4 Stroke
Displacement/Cylinder - L (cu in)	35.4 (2,159)
Fuel Type	MGO, MDO, F-76

Power Ratings			Engine Dimensions			
Cyl.	Generator 720 RPM kWe*	Propulsion 750 RPM kWb	Length (mm)	Width (mm)	Height (mm)	Dry Weight Tons (Metric)
6L	3,492	3,600	5,265	2,174	4,163	39.5
7L	3,938	4,060	5,877	2,359	4,359	44.5
8L	4,656	4,800	6,407			49.5
9L	5,238	5,400	6,937	3,100	4,039	53.5
10L	5,820	6,000	7,556			58
12V	6,984	7,200	5,795			70
14V	7,876	8,120	6,425	4,262	79	
16V	9,312	9,600	7,055		87	
20V	11,640	12,000	8,315		104	

\* Assuming a 97% generator efficiency

Dimensions are for size estimation only. For installation obtain certified prints.

# FM 48/60 CR



## Power Range 7,200 - 19,200 kWb

This reliable, high-output engine is the four-stroke heart of medium and large diesel power, which makes it a versatile engine for both propulsion and auxiliary applications.

### Key Advantages

- Excellent fuel efficiency and low emissions
- Integrated self-diagnosis functions
- Extremely quick and accurate reaction times of the injection system

# FM 48/60 CR

## Engine Specifications

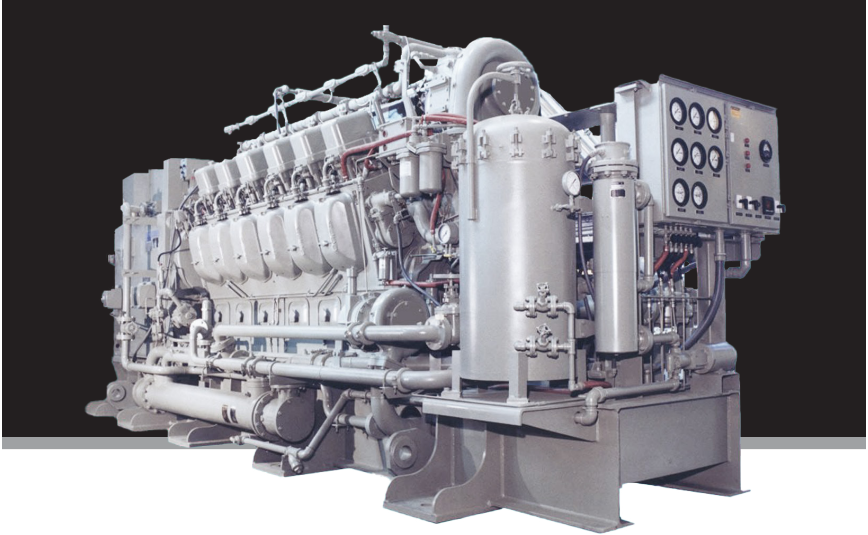
Specifications	
Cylinder Configuration	6L, 7L, 8L, 9L, 12V, 14V, 16V
Cylinder Bore-mm (in)	480 (18.9)
Piston Stroke-mm (in)	600 (23.6)
Cycle	4 Stroke
Displacement/Cylinder - L (cu in)	108.6 (6,627)
Fuel Type	MGO, MDO, F-76

Power Ratings		
Cylinders	Generator 514 RPM 60 Hz kW <sub>e</sub>	Propulsion 500 RPM kW <sub>b</sub>
6L	6,984	7,200
7L	8,148	8,400
8L	9,312	9,600
9L	10,476	10,800
12V	13,968	14,400
14V	16,296	16,800
16V	18,624	19,200

Engine Dimensions				
Cyl.	Length (mm)	Width (mm)	Height (mm)	Dry Weight Tons (Metric)
6V	8,760	3,165	5,300	108
7V	9,540			119
8V	10,540			135
9V	11,360	3,280	5,500	148
12V	10,790			189
14V	11,790	4,730 mm	5,500	213
16V	13,140			240

Dimensions are for size estimation only. For installation obtain certified prints.

# FM 251F



## Power Range 730 - 2,937 kWe

The FM 251F engine is renowned worldwide for efficient and reliable power in the most demanding stationary applications. Featuring a durable cylinder head casting, this rugged engine option offers exceptional commonality of components, and affords high specific output with low specific fuel consumption.

## Key Advantages

- Strong, durable cylinder head casting for increased life of critical components
- Commonality of components
- Well established workhorse engine to accommodate multiple applications
- Known for reliability, high specific output and low specific fuel consumption
- Quality iron alloy makes cylinder heads resist high temperatures and pressures

All ratings subject to factory approved application. Ratings are based on: 90°F (32.2°C) ambient temp. 28.25 in Hg (71.8 cm Hg) barometric pressure (min). 1,500 ft (457 m) altitude (max). Standby ratings available.

# FM 251F

## Engine Specifications

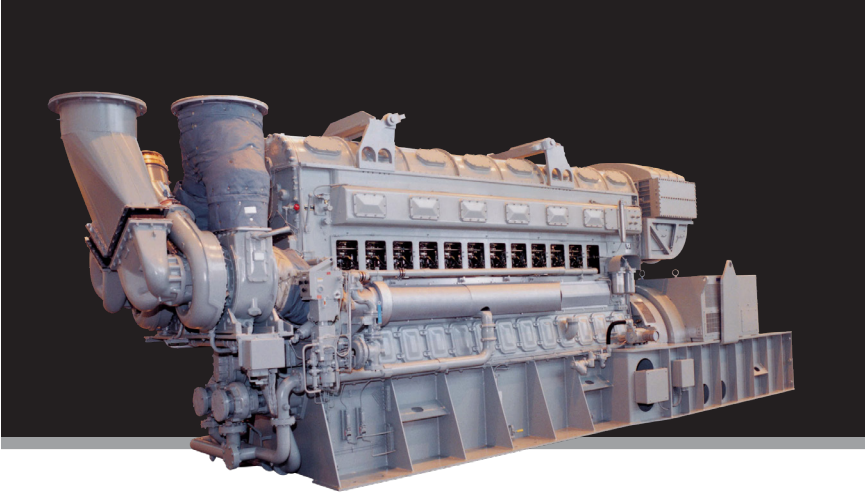
Specifications	
Cylinder Configuration	6L, 8V, 12V, 16V, 18V
Cylinder Bore-mm (in)	229 (9.0)
Piston Stroke-mm (in)	267 (10.5)
Cycle	4 Stroke
Displacement/Cylinder - L (cu in)	10.9 (668)
Fuel Type	MGO, MDO, F-76

Power Ratings				
Cylinders	Rating	900 RPM 60 kWe	1,000 RPM 50 Hz kWe	1,200 RPM 50 & 60 Hz kWe
6L	Continuous	730	870	1,000
	2000 hr/yr	762	906	1,043
	2 hr/yr	812	956	1,097
8V	Continuous	1,040	1,160	-
	2000 hr/yr	1,082	1,205	-
	2 hr/24 hr	1,142	1,275	-
12V	Continuous	1,566	1,740	2,000
	2000 hr/yr	1,630	1,811	2,082
	2 hr/24 hr	1,713	1,912	2,200
16V	Continuous	2,100	2,310	2,670
	2000 hr/yr	2,183	2,400	2,780
	2 hr/24 hr	2,310	2,540	2,937
18V	Continuous	2,350	2,600	-
	2000 hr/yr	2,450	2,714	-
	2 hr/24 hr	2,584	2,863	-

Engine Dimensions				
Cylinders	Length (mm)	Width (mm)	Height (mm)	Dry Weight Tons (Metric)
6L	7,036	2,616	2,870	19.4
8V	6,528	2,692	3,486	21.7
12V	8,573	2,692	3,486	25.4
16V	9,712	2,692	3,486	34.1
18V	10,465	2,692	3,486	38.7

Dimensions are for size estimation only. For installation obtain certified prints.

# FM 38 D 8 1/8



## Power Range 1,506 - 3,165 kWe

The FM 38D 8-1/8 engine combines time-tested design features with modern advances including Enviro-Design® dual-fuel technology. The result is an engine proven to be efficient and reliable, with a long history of satisfied customers.

## Key Advantages

- Designed & developed for a wide array of electrical power generation and heavy industrial applications
- 40+ year service life
- Seismically-qualified for multiple configurations
- Base load (110% overload 2/24 hrs)



# FM 38 D 8 1/8

## Engine Specifications

Specifications	
Cylinder Configuration	6L, 9L, 12L
Cylinder Bore-mm (in)	206 (8.1)
Piston Stroke-mm (in)	254 (10.0)
Cycle	2 Stroke
Displacement/Cylinder - L (cu in)	17.0 (1037)
Fuel Type	MGO, MDO, F-76

Power Ratings		
Cylinders	Aspiration	900 rpm 60 Hz & 1,000 rpm 50 Hz kW
6L	Turbo-Blower	1,506
	Turbocharged	1,580
9L	Turbo-Blower	2,260
	Turbocharged	2,370
12L	Turbo-Blower	3,013
	Turbocharged	3,165

Engine Dimensions				
Cylinders	Length (mm)	Width (mm)	Height (mm)	Dry Weight Tons (Metric)
6L	6,262	2,471	3,307	25
9L	8,186	2,407	3,239	33
12L	9,304	2,662	3,239	38

All ratings subject to factory approved application. Ratings are based on: 90°F (32.2°C) ambient temp. 28.25 in Hg (71.8 cm Hg) barometric pressure (min). 1,500 ft (457 m) altitude (max). Standby ratings available.

Dimensions are for size estimation only. For installation obtain certified prints.

# nFORCER® FM 175D



## Power Range 1,800 – 4,400 kWb

The new nForcer® FM 175D engine boasts a clear and compact design intended to deliver continuous, reliable performance. Maximum power output at lowest weight makes the nForcer® FM 175D the superior choice. Whether you're patrolling in low-load mode or cruising at full power, the easy handling and high availability of the nForcer® FM 175D allows you to focus entirely on your mission.

## Key Advantages

- Advanced electronic common rail injection system
- Engine-mounted control system
- High efficiency turbocharger
- Low operating and life cycle costs
- Four auxiliary power take-offs
- Long maintenance intervals and service life

# nFORCER® FM 175D

## Engine Specifications

Specifications	
Cylinder Configuration	12V, 16V, 20V
Cylinder Bore-mm (in)	175 (6.89)
Piston Stroke-mm (in)	215 (8.46)
Cycle	4 Stroke
Displacement/Cylinder - L (in <sup>3</sup> )	5.17 (315.49)
Fuel Type	MGO, MDO, F-76

Genset Power Ratings					
	Engine Model	MCR (kW)	El. Output (kWe)*	Speed (rpm)	Average Load [%]
Diesel – Electric 60 Hz	12V175D-MEM	1800	1728	1800	75%
	12V175D-MEL	1800	1728	1800	50%
	12V175D-MEM	1920	1843	1800	50%
	12V175D-MEL	1980	1900	1800	50%
	12V175D-MEL	2100	2016	1800	50%
	16V175D-MEM	2160	2073	1800	50%
	12V175D-MEL	2280	2189	1800	50%
	16V175D-MEM	2400	2304	1800	75%
	16V175D-MEM	2560	2458	1800	50%
	20V175D-MEM	3000	2880	1800	75%
	20V175D-MEL	3000	2880	1800	50%
	20V175D-MEM	3200	3072	1800	50%
	20V175D-MEL	3300	3168	1800	50%
	20V175D-MEL	3500	3360	1800	50%
20V175D-MEL	3800	3648	1800	50%	
Diesel – Electric Variable Speed 36 - 60 Hz	12V175D-MEV	1860	1786	1080 - 1800	75%
	12V175D-MEV	2040	1958	1080 - 1800	50%
	12V175D-MEV	2280	2189	1080 - 1800	50%
	16V175D-MEV	2480	2381	1080 - 1800	75%
	16V175D-MEV	2720	2611	1080 - 1800	50%
	16V175D-MEV	3040	2918	1080 - 1800	50%
	20V175D-MEV	3100	2976	1080 - 1800	75%
	20V175D-MEV	3400	3264	1080 - 1800	50%
	20V175D-MEV	3800	3648	1080 - 1800	50%

\* Assuming a 96% generator efficiency

Engine Dimensions				
Cylinders	Length (mm)	Width (mm)	Height (mm)	Dry Weight Tons (Metric)
12V	2,900	1,661	2,295	8.7
16V	3,420	1,661	2,316	10.8
20V	3,940	1,647	2,297	13

**Note:** Dimensions and weights for Standard Mechanical applications.

Dimensions are for size estimation only. For installation obtain certified prints.

# nFORCER® FM 175D

<b>Mechanical Propulsion</b>			
<b>Engine Model</b>	<b>MCR (kW)</b>	<b>Speed (rpm)</b>	<b>Average Load [%]</b>
12V175D-MH	1740	1800	85%
12V175D-MM	1860	1800	80%
12V175D-MM	1920	1800	75%
12V175D-MM	2040	1800	70%
12V175D-MM	2220	1800	40%
12V175D-MM	2220	1900	65%
12V175D-MM	2400	1800	40%
12V175D-ML	2400	2000	60%
12V175D-ML	2580	2000	60%
16V175D-MM	2480	1800	80%
16V175D-MM	2720	1800	70%
16V175D-MM	2960	1800	40%
16V175D-MM	2960	1900	65%
16V175D-ML	3200	2000	60%
20V175D-MM	3200	1800	80%
20V175D-MM	3400	1800	70%
20V175D-MM	3700	1800	40%
20V175D-MM	3700	1900	65%
20V175D-ML	4000	2000	60%
20V175D-ML	4400	2000	60%

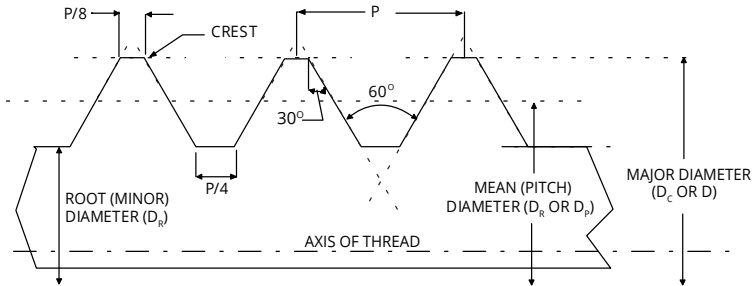
MH: Mechanical Propulsion Heavy Duty  
MM: Mechanical Propulsion Medium Duty  
ML: Mechanical Propulsion Light Duty

# RESOURCES



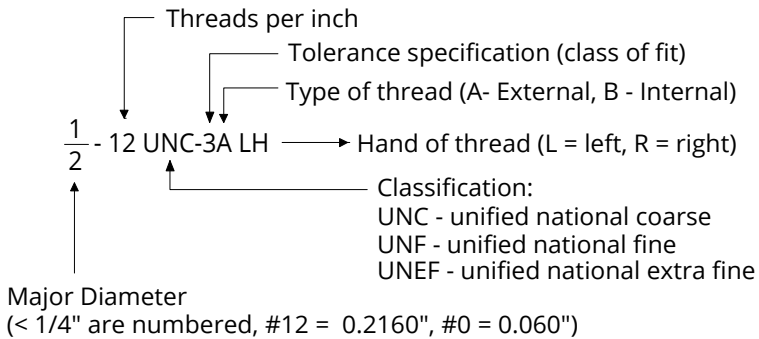
# THREAD STANDARDS

## UNIFIED AND ISO THREAD GEOMETRY

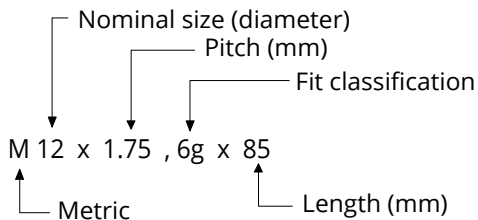


CLASS	UNIFIED		METRIC	
	EXTERNAL THREAD	INTERNAL THREAD	EXTERNAL THREAD	INTERNAL THREAD
LOOSE	1A	1B	8G	7H
STANDARD	2A	2B	6G	6H
CLOSE	3A	3B	4G	5H

### UNIFIED NATIONAL:



### METRIC:



# THREAD DIMENSIONS AND TAP DRILL SIZES

Size	Threads Per Inch		Outside Diameter Inches	Pitch Diameter Inches	Root Diameter Inches	Tap Drill Approx. 75% Full Thread	Decimal Equiv. Of Tap Drill
	NC UNC	NF UNF					
0	—	80	.0600	.0519	.0438	3/64"	.0469
1	64	—	.0730	.0629	.0527	53	.0595
1	—	72	.0730	.0640	.0550	53	.0595
2	56	—	.0860	.0744	.0628	50	.0700
2	—	64	.0860	.0759	.0657	50	.0700
3	48	—	.0990	.0855	.0719	47	.0785
3	—	56	.0990	.0874	.0758	46	.0810
4	40	—	.1120	.0958	.0795	43	.0890
4	—	48	.1120	.0985	.0849	42	.0935
5	40	—	.1250	.1088	.0925	38	.1015
5	—	44	.1250	.1102	.0955	37	.1040
6	32	—	.1380	.1177	.0974	36	.1065
6	—	40	.1380	.1218	.1055	33	.1130
8	32	—	.1640	.1437	.1234	29	.1360
8	—	36	.1640	.1460	.1279	29	.1360
10	24	—	.1900	.1629	.1359	26	.1470
10	—	32	.1900	.1697	.1494	21	.1590
12	24	—	.2160	.1889	.1619	16	.1770
12	—	28	.2160	.1928	.1696	15	.1800
1/4"	20	—	.2500	.2175	.1850	7	.2010
1/4"	—	28	.2500	.2268	.2036	3	.2130
5/16"	18	—	.3125	.2764	.2403	F	.2570
5/16"	—	24	.3125	.2854	.2584	I	.2720
3/8"	16	—	.3750	.3344	.2938	5/16"	.3125
3/8"	—	24	.3750	.3479	.3209	Q	.3320
7/16"	14	—	.4375	.3911	.3447	U	.3680
7/16"	—	20	.4375	.4050	.3726	25/64"	.3906
1/2"	13	—	.5000	.4500	.4001	27/64"	.4219
1/2"	—	20	.5000	.4675	.4351	29/64"	.4531
9/16"	12	—	.5625	.5084	.4542	31/64"	.4844
9/16"	—	18	.5625	.5264	.4903	33/64"	.5156
5/8"	11	—	.6250	.5660	.5069	17/32"	.5312
5/8"	—	18	.6250	.5889	.5528	37/64"	.5781
3/4"	10	—	.7500	.6850	.6201	21/32"	.6562
3/4"	—	16	.7500	.7094	.6688	11/16"	.6875
7/8"	9	—	.8750	.8028	.7307	49/64"	.7656
7/8"	—	14	.8750	.8286	.7822	13/16"	.8125
1"	8	—	1.0000	.9188	.8376	7/8"	.8750
1"	—	12	1.0000	.9459	.8917	59/64"	.9219
1 1/8"	7	—	1.1250	1.0322	.9394	63/64"	.9844
1 1/8"	—	12	1.1250	1.0709	1.0168	1 3/64"	1.0469
1 1/4"	7	—	1.2500	1.1572	1.0644	1 7/64"	1.1094
1 1/4"	—	12	1.2500	1.1959	1.1418	1 11/64"	1.1719
1 3/8"	6	—	1.3750	1.2667	1.1585	1 7/32"	1.2187
1 3/8"	—	12	1.3750	1.3209	1.2668	1 19/64"	1.2969
1 1/2"	6	—	1.5000	1.3917	1.2835	1 11/32"	1.3437
1 1/2"	—	12	1.5000	1.4459	1.3918	1 27/64"	1.4219
1 3/4"	5	—	1.7500	1.6201	1.4902	1 9/16"	1.5625
2"	4 1/2	—	2.0000	1.8557	1.7113	1 25/32"	1.7812
2 1/4"	4 1/2	—	2.2500	2.1057	1.9613	2 1/32"	2.0313
2 1/2"	4 1/2	—	2.5000	2.3376	2.1752	2 1/4"	2.2500
2 3/4"	4	—	2.7500	2.5876	2.4252	2 1/2"	2.5000
3"	4	—	3.0000	2.8376	2.6752	2 3/4"	2.7500
3 1/4"	4	—	3.2500	3.0876	2.9252	3"	3.0000
3 1/2"	4	—	3.5000	3.3376	3.1752	3 1/4"	3.2500
3 3/4"	4	—	3.7500	3.5876	3.4252	3 1/2"	3.5000
4"	4	—	4.0000	3.3786	3.6752	3 3/4"	3.7500



# PIPE DIMENSIONS

## US AND METRIC

NOMINAL PIPE SIZE	OD		SCHEDULE DESIGNATIONS			WALL THICKNESS		WEIGHT		ID	
	IN. MM	IN. MM	ASME			IN.	MM	LBS/FOOT	KG/METER	IN.	MM
1/8	0.405	10.3	10	10S		0.049	1.24	0.19	0.28	0.307	7.82
			STD	40	40S	0.068	1.73	0.24	0.37	0.269	6.84
			XS	80	80S	0.095	2.41	0.31	0.47	0.215	5.84
1/4	0.540	13.7	10	10S		0.065	1.65	0.33	0.49	0.410	10.40
			STD	40	40S	0.088	2.24	0.43	0.63	0.364	9.22
			XS	80	80S	0.119	3.02	0.54	0.80	0.302	7.66
3/8	0.675	17.1	10	10S		0.065	1.65	0.42	0.63	0.545	13.80
			STD	40	40S	0.091	2.31	0.57	0.84	0.493	12.48
			XS	80	80S	0.126	3.20	0.74	1.10	0.423	10.70
1/2	0.840	21.3	5	5S		0.065	1.65	0.54	0.80	0.710	18.00
			10	10S		0.083	2.11	0.67	1.00	0.674	17.08
			STD	40	40S	0.109	2.77	0.85	1.27	0.622	15.76
			XS	80	80S	0.147	3.73	1.09	1.62	0.546	13.84
			160			0.188	4.78	1.31	1.95	0.464	11.74
			XX			0.294	7.47	1.72	2.55	0.252	6.36
3/4	1.050	26.7	5	5S		0.065	1.65	0.69	1.03	0.920	23.40
			10	10S		0.083	2.11	0.86	1.28	0.884	22.48
			STD	40	40S	0.113	2.87	1.13	1.69	0.824	20.96
			XS	80	80S	0.154	3.91	1.48	2.20	0.742	18.88
			160			0.219	5.56	1.95	2.90	0.612	15.58
			XX			0.308	7.82	2.44	3.64	0.434	11.06
1	1.315	33.4	5	5S		0.065	1.65	0.87	1.29	1.185	30.10
			10	10S		0.109	2.77	1.41	2.09	1.097	27.86
			STD	40	40S	0.133	3.38	1.68	2.50	1.049	26.64
			XS	80	80S	0.179	4.55	2.17	3.24	0.957	24.30
			160			0.250	6.35	2.85	4.24	0.815	20.70
			XX			0.358	9.09	3.66	5.45	0.599	15.22
1-1/4	1.660	42.2	5	5S		0.065	1.65	1.11	1.65	1.530	38.90
			10	10S		0.109	2.77	1.81	2.69	1.442	36.66
			STD	40	40S	0.140	3.56	2.27	3.39	1.380	35.08
			XS	80	80S	0.191	4.85	3.00	4.47	1.278	32.50
			160			0.250	6.35	3.77	5.61	1.160	29.50
			XX			0.382	9.70	5.22	7.77	0.896	22.80
1-1/2	1.900	48.3	5	5S		0.065	1.65	1.28	1.90	1.770	45.00
			10	10S		0.109	2.77	2.09	3.11	1.682	42.76
			STD	40	40S	0.145	3.68	2.72	4.05	1.610	40.94
			XS	80	80S	0.200	5.08	3.63	5.41	1.500	38.14
			160			0.281	7.14	4.86	7.25	1.338	34.02
			XX			0.400	10.15	6.41	9.55	1.100	28.00
2	2.375	60.3	5	5S		0.065	1.65	1.61	2.39	2.245	57.00
			10	10S		0.109	2.77	2.64	3.93	2.157	54.76
			STD	40	40S	0.154	3.91	3.66	5.44	2.067	52.48
			XS	80	80S	0.218	5.54	5.03	7.48	1.939	49.22
			160			0.344	8.74	7.47	11.11	1.687	42.82
			XX			0.436	11.07	9.04	13.44	1.503	38.16
2-1/2	2.875	73.0	5	5S		0.083	2.11	2.48	3.69	2.709	68.78
			10	10S		0.120	3.05	3.53	5.26	2.635	66.90
			STD	40	40S	0.203	5.16	5.80	8.63	2.469	62.68
			XS	80	80S	0.276	7.01	7.67	11.41	2.323	58.98
			160			0.375	9.53	10.02	14.92	2.125	53.94
			XX			0.552	14.02	13.71	20.39	1.771	44.96
3	3.500	88.9	5	5S		0.083	2.11	3.03	4.52	3.334	84.68
			10	10S		0.120	3.05	4.34	6.46	3.260	82.80
			STD	40	40S	0.216	5.49	7.58	11.29	3.068	77.92
			XS	80	80S	0.300	7.62	10.26	15.27	2.900	73.66
			160			0.438	11.13	14.34	21.35	2.624	66.64
			XX			0.600	15.24	18.60	27.68	2.300	58.42
3-1/2	4.000	101.6	5	5S		0.083	2.11	3.48	5.18	3.834	97.38
			10	10S		0.120	3.05	4.98	7.41	3.760	95.50
			STD	40	40S	0.226	5.74	9.12	13.57	3.548	90.12
			XS	80	80S	0.318	8.08	12.52	18.64	3.364	85.44
			160			0.438	11.13	14.34	21.35	3.068	77.92
			XX			0.636	16.15	22.87	34.03	2.728	69.30
4	4.500	114.3	5	5S		0.083	2.11	3.92	5.84	4.334	110.08
			10	10S		0.120	3.05	5.62	8.37	4.260	108.20
			STD	40	40S	0.156	3.96	7.24	10.78	4.188	106.38
			XS	80	80S	0.188	4.78	8.67	12.91	4.124	104.74
			160			0.237	6.02	10.80	16.08	4.026	102.26
			XX			0.337	8.56	15.00	22.32	3.826	97.18
4-1/2	5.000	127.0	120			0.438	11.13	19.02	28.32	3.624	92.04
			160			0.531	13.49	22.53	33.54	3.438	87.32
			XX			0.674	17.12	27.57	41.03	3.152	80.06
			STD	40	40S	0.247	6.27	12.55	18.67	4.506	114.46
			XS	80	80S	0.355	9.02	17.63	26.24	4.290	108.96
			XX			0.710	18.03	32.56	48.45	3.580	90.94

# AMERICAN WIRE GAUGE

## CONDUCTOR SIZE TABLE

AWG	Diameter [inches]	Diameter [mm]	Area [mm <sup>2</sup> ]	Resistance [Ohms/1000 ft]	Resistance [Ohms / km]	Max Current [Amperes]	Max Frequency
0000 (4/0)	0.46	11.684	107	0.049	0.16072	302	125 Hz
000 (3/0)	0.4096	10.40384	85	0.0618	0.202704	239	160 Hz
00 (2/0)	0.3648	9.26592	67.4	0.0779	0.255512	190	200 Hz
0 (1/0)	0.3249	8.25246	53.5	0.0983	0.322424	150	250 Hz
1	0.2893	7.34822	42.4	0.1239	0.406392	119	325 Hz
2	0.2576	6.54304	33.6	0.1563	0.512664	94	410 Hz
3	0.2294	5.82676	26.7	0.197	0.64616	75	500 Hz
4	0.2043	5.18922	21.2	0.2485	0.81508	60	650 Hz
5	0.1819	4.62026	16.8	0.3133	1.027624	47	810 Hz
6	0.162	4.1148	13.3	0.3951	1.295928	37	1100 Hz
7	0.1443	3.66522	10.5	0.4982	1.634096	30	1300 Hz
8	0.1285	3.2639	8.37	0.6282	2.060496	24	1650 Hz
9	0.1144	2.90576	6.63	0.7921	2.598088	19	2050 Hz
10	0.1019	2.58826	5.26	0.9989	3.276392	15	2600 Hz
11	0.0907	2.30378	4.17	1.26	4.1328	12	3200 Hz
12	0.0808	2.05232	3.31	1.588	5.20864	9.3	4150 Hz
13	0.072	1.8288	2.62	2.003	6.56984	7.4	5300 Hz
14	0.0641	1.62814	2.08	2.525	8.282	5.9	6700 Hz
15	0.0571	1.45034	1.65	3.184	10.44352	4.7	8250 Hz
16	0.0508	1.29032	1.31	4.016	13.17248	3.7	11 k Hz
17	0.0453	1.15062	1.04	5.064	16.60992	2.9	13 k Hz
18	0.0403	1.02362	0.823	6.385	20.9428	2.3	17 kHz
19	0.0359	0.91186	0.653	8.051	26.40728	1.8	21 kHz
20	0.032	0.8128	0.518	10.15	33.292	1.5	27 kHz
21	0.0285	0.7239	0.41	12.8	41.984	1.2	33 kHz
22	0.0254	0.64516	0.326	16.14	52.9392	0.92	42 kHz
23	0.0226	0.57404	0.258	20.36	66.7808	0.729	53 kHz
24	0.0201	0.51054	0.205	25.67	84.1976	0.577	68 kHz
25	0.0179	0.45466	0.162	32.37	106.1736	0.457	85 kHz
26	0.0159	0.40386	0.129	40.81	133.8568	0.361	107 kHz
27	0.0142	0.36068	0.102	51.47	168.8216	0.288	130 kHz
28	0.0126	0.32004	0.081	64.9	212.872	0.226	170 kHz
29	0.0113	0.28702	0.0642	81.83	268.4024	0.182	210 kHz
30	0.01	0.254	0.0509	103.2	338.496	0.142	270 kHz
31	0.0089	0.22606	0.0404	130.1	426.728	0.113	340 kHz
32	0.008	0.2032	0.032	164.1	538.248	0.091	430 kHz
33	0.0071	0.18034	0.0254	206.9	678.632	0.072	540 kHz
34	0.0063	0.16002	0.0201	260.9	855.752	0.056	690 kHz
35	0.0056	0.14224	0.016	329	1079.12	0.044	870 kHz
36	0.005	0.127	0.0127	414.8	1360	0.035	1100 kHz
37	0.0045	0.1143	0.01	523.1	1715	0.0289	1350 kHz
38	0.004	0.1016	0.00797	659.6	2163	0.0228	1750 kHz
39	0.0035	0.0889	0.00632	831.8	2728	0.0175	2250 kHz
40	0.0031	0.07874	0.00501	1049	3440	0.0137	2900 kHz

**Current (ampacity) Notes:** The current ratings shown in the table are for power transmission and have been determined using the rule of 1 amp per 700 circular mils, which is a very conservative rating

# FRACTION - DECIMAL CONVERSION CHART

	IN	MM
	$\frac{1}{64}$	.015625 .3969
$\frac{1}{32}$	$\frac{2}{64}$	.03125 .7938
	$\frac{3}{64}$	.046875 1.1906
$\frac{1}{16}$	$\frac{5}{64}$	.0625 1.5875
	$\frac{7}{64}$	.078125 1.9844
$\frac{3}{32}$	$\frac{9}{64}$	.09375 2.3813
	$\frac{11}{64}$	.109375 2.7781
$\frac{1}{8}$	$\frac{13}{64}$	.125 3.1750
	$\frac{15}{64}$	.140625 3.5719
$\frac{5}{32}$	$\frac{17}{64}$	.15625 3.9688
	$\frac{19}{64}$	.171875 4.3656
$\frac{3}{16}$	$\frac{21}{64}$	.1875 4.7625
	$\frac{23}{64}$	.203125 5.1594
$\frac{7}{32}$	$\frac{25}{64}$	.21875 5.5563
	$\frac{27}{64}$	.234375 5.9531
$\frac{1}{4}$	$\frac{29}{64}$	.250 6.3500
	$\frac{31}{64}$	.265625 6.7469
$\frac{9}{32}$		.28125 7.1438
		.296875 7.5406
$\frac{5}{16}$		.3125 7.9375
		.328125 8.3344
$\frac{11}{32}$		.34375 8.7313
		.359375 9.1282
$\frac{3}{8}$		.375 9.5250
		.390625 9.9219
$\frac{13}{32}$		.40625 10.3188
		.421875 10.7157
$\frac{7}{16}$		.4375 11.1125
		.453125 11.5094
$\frac{15}{32}$		.46875 11.9063
		.484375 12.3032
$\frac{1}{2}$		.500 12.7001

	IN	MM
	$\frac{33}{64}$	.515625 13.096
$\frac{17}{32}$	$\frac{35}{64}$	.53125 13.493
	$\frac{37}{64}$	.546875 13.890
$\frac{9}{16}$	$\frac{39}{64}$	.5625 14.287
	$\frac{41}{64}$	.578125 14.684
$\frac{19}{32}$	$\frac{43}{64}$	.59375 15.081
	$\frac{45}{64}$	.609375 15.478
$\frac{5}{8}$	$\frac{47}{64}$	.625 15.875
	$\frac{49}{64}$	.640625 16.271
$\frac{21}{32}$		.65625 16.668
		.671875 17.065
$\frac{11}{16}$		.6875 17.462
		.703125 17.859
$\frac{23}{32}$		.71875 18.256
		.734375 18.653
$\frac{3}{4}$		.750 19.050
		.765625 19.447
$\frac{25}{32}$		.78125 19.843
		.796875 20.240
$\frac{13}{16}$		.8125 20.6375
		.828125 21.0345
$\frac{27}{32}$		.84375 21.431
		.859375 21.8282
$\frac{7}{8}$		.875 22.2251
		.890625 22.6220
$\frac{29}{32}$		.90625 23.0188
		.921875 23.4157
$\frac{15}{16}$		.9375 23.8126
		.953125 24.2095
$\frac{31}{32}$		.96875 24.6063
		.984375 25.0032
1		1.000 25.4001

# SHEET METAL GAUGE CHART

Gauge	Steel	Galvanized Steel	Stainless Steel	Aluminium	Electrical Steel
	in (mm)	in (mm)	in (mm)	in (mm)	in (mm)
3	0.2391 (6.07)	—	—	—	—
4	0.2242 (5.69)	—	—	—	—
5	0.2092 (5.31)	—	—	—	—
6	0.1943 (4.94)	—	—	0.162 (4.1)	—
7	0.1793 (4.55)	—	0.1875 (4.76)	0.1443 (3.67)	—
8	0.1644 (4.18)	0.1681 (4.27)	0.1719 (4.37)	0.1285 (3.26)	—
9	0.1495 (3.80)	0.1532 (3.89)	0.1563 (3.97)	0.1144 (2.91)	—
10	0.1345 (3.42)	0.1382 (3.51)	0.1406 (3.57)	0.1019 (2.59)	—
11	0.1196 (3.04)	0.1233 (3.13)	0.1250 (3.18)	0.0907 (2.30)	—
12	0.1046 (2.66)	0.1084 (2.75)	0.1094 (2.78)	0.0808 (2.05)	—
13	0.0897 (2.28)	0.0934 (2.37)	0.094 (2.4)	0.072 (1.8)	—
14	0.0747 (1.90)	0.0785 (1.99)	0.0781 (1.98)	0.0641 (1.63)	—
15	0.0673 (1.71)	0.0710 (1.80)	0.07 (1.8)	0.057 (1.4)	—
16	0.0598 (1.52)	0.0635 (1.61)	0.0625 (1.59)	0.0508 (1.29)	0.0625 (1.59)
17	0.0538 (1.37)	0.0575 (1.46)	0.056 (1.4)	0.045 (1.1)	0.0560 (1.42)
18	0.0478 (1.21)	0.0516 (1.31)	0.0500 (1.27)	0.0403 (1.02)	0.0500 (1.27)
19	0.0418 (1.06)	0.0456 (1.16)	0.044 (1.1)	0.036 (0.91)	0.0453 (1.15)
20	0.0359 (0.91)	0.0396 (1.01)	0.0375 (0.95)	0.0320 (0.81)	0.0375 (0.952)
21	0.0329 (0.84)	0.0366 (0.93)	0.034 (0.86)	0.028 (0.71)	0.0340 (0.860)
22	0.0299 (0.76)	0.0336 (0.85)	0.031 (0.79)	0.025 (0.64)	0.0310 (0.787)
23	0.0269 (0.68)	0.0306 (0.78)	0.028 (0.71)	0.023 (0.58)	0.0280 (0.711)
24	0.0239 (0.61)	0.0276 (0.70)	0.025 (0.64)	0.02 (0.51)	0.0250 (0.635)
25	0.0209 (0.53)	0.0247 (0.63)	0.022 (0.56)	0.018 (0.46)	0.0220 (0.559)
26	0.0179 (0.45)	0.0217 (0.55)	0.019 (0.48)	0.017 (0.43)	0.0185 (0.470)
27	0.0164 (0.42)	0.0202 (0.51)	0.017 (0.43)	0.014 (0.36)	0.0170 (0.432)
28	0.0149 (0.38)	0.0187 (0.47)	0.016 (0.41)	0.0126 (0.32)	0.0155 (0.394)
29	0.0135 (0.34)	0.0172 (0.44)	0.014 (0.36)	0.0113 (0.29)	0.0140 (0.356)
30	0.0120 (0.30)	0.0157 (0.40)	0.013 (0.33)	0.0100 (0.25)	0.0125 (0.318)
31	0.0105 (0.27)	0.0142 (0.36)	0.011 (0.28)	0.0089 (0.23)	0.0100 (0.254)
32	0.0097 (0.25)	—	—	—	—
33	0.0090 (0.23)	—	—	—	—
34	0.0082 (0.21)	—	—	—	—
35	0.0075 (0.19)	—	—	—	—
36	0.0067 (0.17)	—	—	—	—
37	0.0064 (0.16)	—	—	—	—
38	0.0060 (0.15)	—	—	—	—
33	0.0071	0.18034	0.0254	206.9	678.632
34	0.0063	0.16002	0.0201	260.9	855.752
35	0.0056	0.14224	0.016	329	1079.12
36	0.005	0.127	0.0127	414.8	1360
37	0.0045	0.1143	0.01	523.1	1715
38	0.004	0.1016	0.00797	659.6	2163
39	0.0035	0.0889	0.00632	831.8	2728
40	0.0031	0.07874	0.00501	1049	3440



**FAIRBANKS MORSE**  
**DEFENSE**

---

**Fairbanks Morse Defense**

701 White Avenue  
Beloit, Wisconsin 53511 USA  
1-800-356-6955

©2023 Fairbanks Morse Defense. All rights reserved.

Form XXXX

October XX, 2023

*[fairbanksmorsedefense.com](https://www.fairbanksmorsedefense.com)*