

# The X52DF upgrade

WinGD X52DF-1.1 / X52DF-2.1

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## 1 Introduction

WinGD, the marine industry's leading low-speed engine developer, introduces a new version of the popular X52DF engine model, which is prepared for the optional iCER (Intelligent Control by Exhaust Recycling) technology. The new engine will be designated either as the X52DF-1.1 (the non-iCER version) or the X52DF-2.1 (with the iCER application), highlighting a major step in the product development. The new engines follow the engine designation of WinGD. More details of the engine designation are available in the online [Low-speed Engines 2021 booklet](#).

The primary applications for the X52DF-1.1/2.1 engines follow the path of the X52DF, while introducing the new engine control system, WiCE (WinGD Integrated Control Electronics) which is a precondition for the optional iCER (X-DF2.0) interface. In addition, WinGD implemented several upgrades to the engine design with a strong focus on optimising the production costs.

## 1.1 Engine designation

The technology level is based on today's X52DF engine, shown in the 'X52DF-1.X' in the first digit. The second digit was chosen for the revision level, introducing the WiCE engine control system to the X52DF, and by these purposes becoming an 'X52DF-1.1'. In conjunction with the iCER (X-DF2.0 technology application), the engine will be named as the X52DF-2.1 version.

## 1.2 Overview of the technical upgrades

The X52DF-1.1/2.1 engines contain several design upgrades which were already validated on other X-DF engines, along with some enhancements based on service experience learnings. Some of these include, for example:

- WinGD's new control system WiCE
- Bedplate with flexible main bearing girder design
- Several smaller updates (not listed in detail here)

Table 1-1: Comparison of the new X52DF engine executions

Engine name	X52DF-1.1	X52DF-2.1
Available cylinder numbers	5 to 8	5 to 7 <sup>*)</sup>
Rating field	Full size (e.g. as X52DF)	Full size (e.g. as X52DF)
Bedplate concept	Flexible main bearing girders	Flexible main bearing girders
Engine control system	WiCE	WiCE
Fuel gas supply system	GVU or iGPR	GVU or iGPR
Integrated Cylinder Lubricant Auto Transfer (iCAT) system	Optional	Optional
TC aft end side option	Yes	No
iCER (X-DF2.0) application	No	Yes

<sup>\*)</sup> For non-iCER versions, the 5- to 8-cylinder engines can be selected. For iCER versions, the 5- to 7-cylinder engines, with one turbocharger, can be selected.

## 2 Main engine parameters

The X52DF-1.1 rating field will remain with the same power output and maximum cylinder pressure (200 bar) as the X52DF. The X52DF-1.1 will be available with 5 to 8 cylinders, while the X52DF-2.1 will be offered with 5 to 7 cylinders. The engine weight and dimensions are the same as for the X52DF.

## 2.1 X52DF-1.1/2.1 engine features

For the X52DF-1.1 engine launch, the performance figures of the X52DF will be used. For the X52DF-2.1, the lower energy and gas consumption figures apply as a benefit of the iCER technology. The new [Low-speed Engines 2021 booklet](#) already provides new figures and will be updated in one of the next GTD releases, after having evaluated the full potential of the iCER technology.

Table 2-1: X52DF-1.1/2.1 summary values for maximum continuous rating

X52DF-1.1/2.1 rating field	R1	R2	R3	R4
rpm	105	105	79	79
kW / cylinder	1490	1240	1120	930

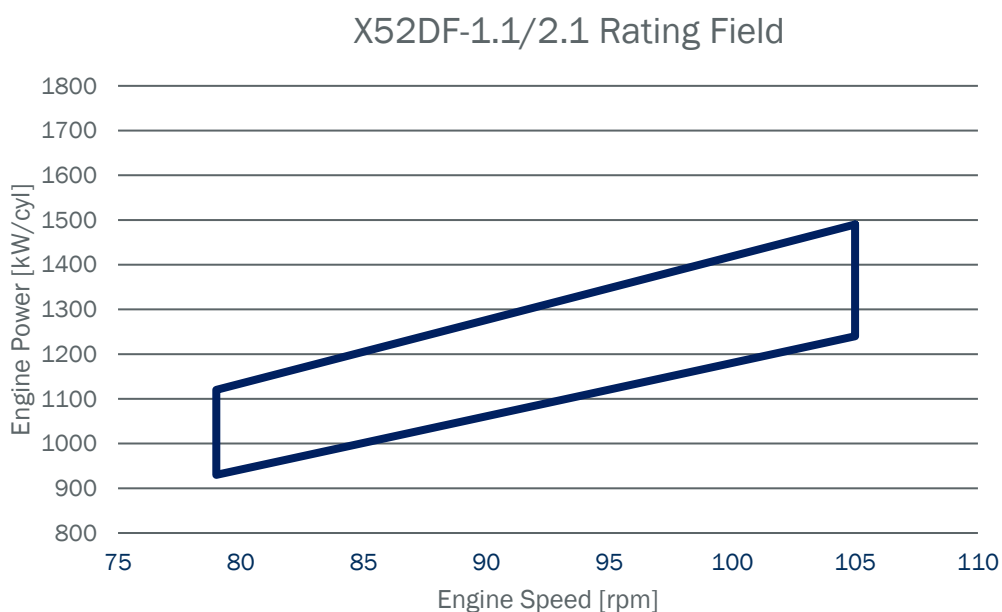


Figure 2-1:  
The layout field of both the X52DF-1.1 (5 to 8 cylinders) and the X52DF-2.1 (5 to 7 cylinders).

### 3 Timeline information

The first engine shop test is targeted for 2023-Q1. Both the X52DF-1.1 and the X52DF-2.1 will have the same drawing schedule.

Table 3-1: Project planning tools availability

Engine	X52DF-1.1	X52DF-2.1
GTD	2021-06	
MIM	2021-06	
MIDS	2021-06	
OM, MM, SPC	Subject to order	Subject to order

### 4 Interface with the WinGD X-DF2.0 technology (iCER system)

The engine upgrades introduced with the X52DF-1.1 are fully compatible with the optional X-DF2.0 technology that includes the introduction of the iCER system. Since several design groups are affected this must be checked in detail then.

The engine naming follows the concept mentioned in the introduction part of this document.

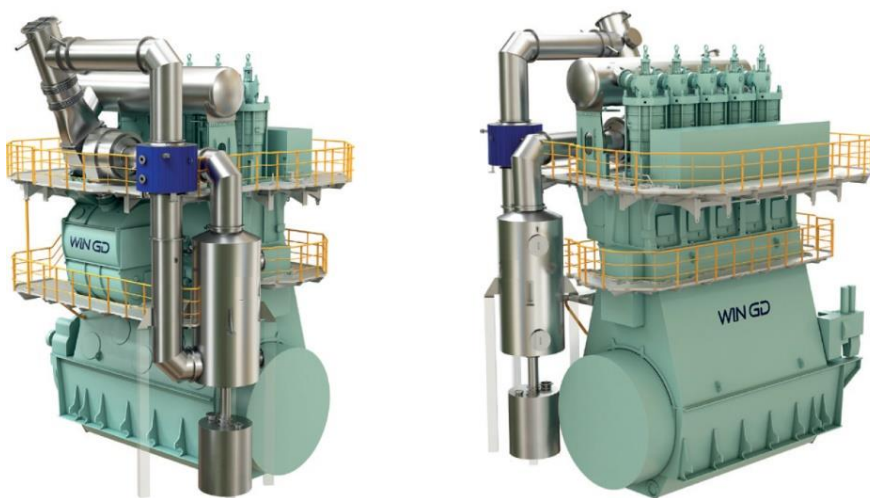
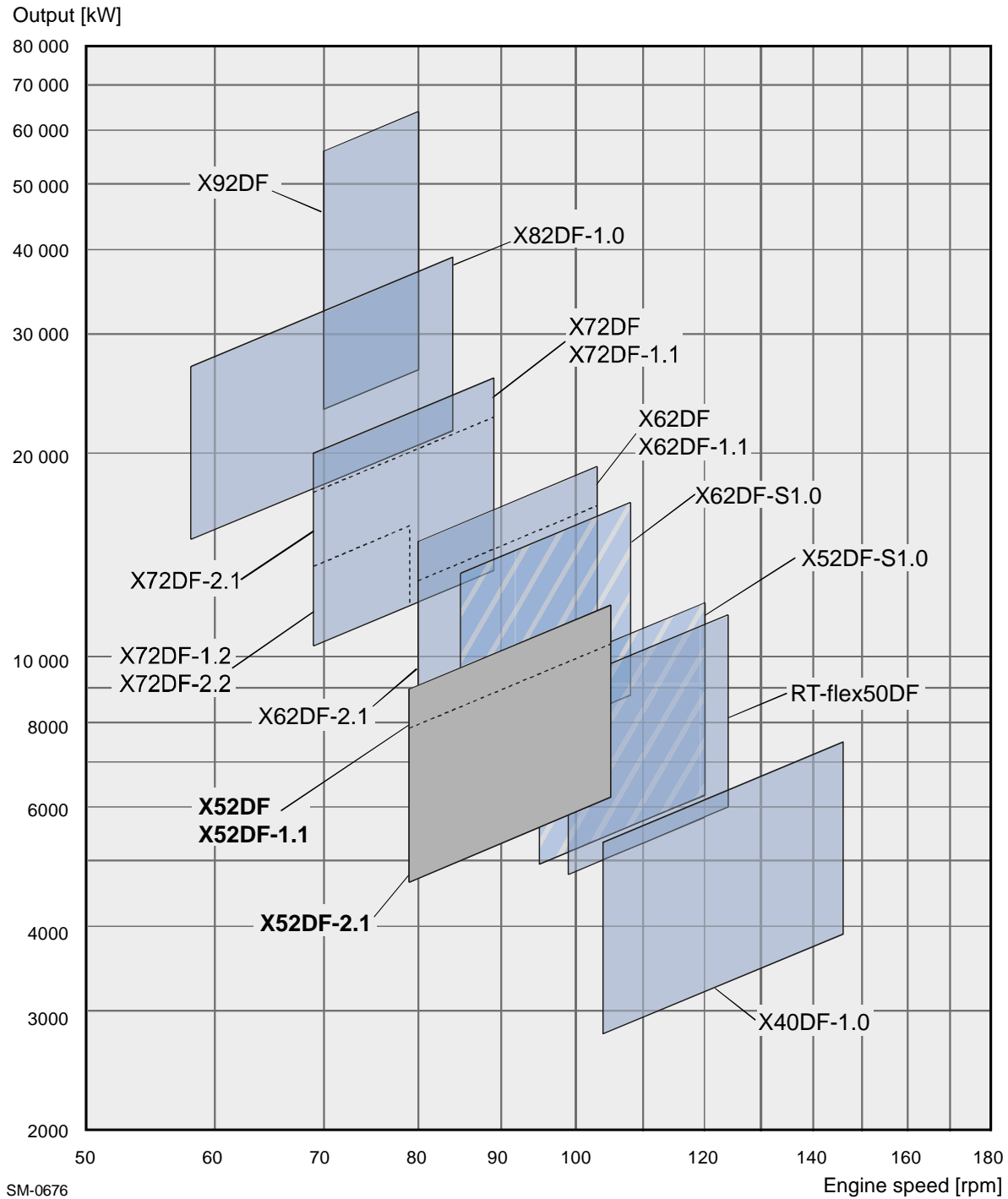


Figure 4-1: Example of an iCER system arrangement

**5 Appendix**

**A Rating field comparison**

**A.1 WinGD portfolio engine rating field, with the new X52DF-1.1 and X52DF-2.1 (iCER) engine**



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**B Key engine figures**

**B.1 X52DF-1.1 Key dimensions and consumption figures**

**X52DF-1.1**

IMO Tier III in gas mode

<b>Cylinder bore</b>	520 mm
<b>Piston stroke</b>	2 315 mm
<b>Speed</b>	79-105 rpm
<b>Mean effective pressure at R1</b>	17.3 bar
<b>Stroke / bore</b>	4.45

RATED POWER, PRINCIPAL DIMENSIONS AND WEIGHTS

Cyl.	Output in kW at				Length A mm	Length A* mm	Weight tonnes
	105 rpm		79 rpm				
	R1	R2	R3	R4			
5	7 450	6 200	5 600	4 650	5 891	6 990	217
6	8 940	7 440	6 720	5 580	6 831	7 930	251
7	10 430	8 680	7 840	6 510	7 771		288
8	11 920	9 920	8 960	7 440	8 711		323

Dimensions (mm)	B	C	D	G
	3 514	1 205	8 550	
	F1	F2	F3	
	10 350	10 400	9 850	1 910

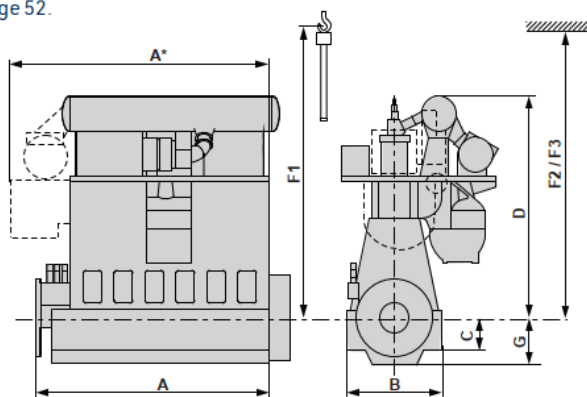
BRAKE SPECIFIC CONSUMPTIONS IN GAS MODE

Rating point		R1	R2	R3	R4
BSEC (energy)	kJ/kWh	7 201	6 962	7 299	7 064
BSGC (gas)	g/kWh	142.7	137.7	144.7	139.7
BSPC (pilot fuel)	g/kWh	1.5	1.8	1.5	1.8

BRAKE SPECIFIC FUEL CONSUMPTION IN DIESEL MODE

Rating point		R1	R2	R3	R4
BSFC (diesel)	g/kWh	184.1	182.1	184.1	182.1

For definitions see page 52.



**B.2 X52DF-2.1 Key dimensions and consumption figures**

*Note:* The performance data will be updated in 2021-05

**X52DF-2.1**

**IMO Tier III in gas mode**

<b>Cylinder bore</b>	520 mm
<b>Piston stroke</b>	2 315 mm
<b>Speed</b>	79-105 rpm
<b>Mean effective pressure at R1</b>	17.3 bar
<b>Stroke / bore</b>	4.45

**RATED POWER, PRINCIPAL DIMENSIONS AND WEIGHTS**

Cyl.	Output in kW at				Length A mm	Weight tonnes
	105 rpm	79 rpm				
	R1	R2	R3	R4		
5	7 450	6 200	5 600	4 650	5 891	217
6	8 940	7 440	6 720	5 580	6 831	251
7	10 430	8 680	7 840	6 510	7 771	288
<b>Dimensions (mm)</b>	<b>B</b>	<b>C</b>	<b>D</b>			
	3 514	1 205	8 550			
	<b>F1</b>	<b>F2</b>	<b>F3</b>	<b>G</b>		
	10 350	10 400	9 850	1 910		

**BRAKE SPECIFIC CONSUMPTIONS IN GAS MODE**

Rating point		R1	R2	R3	R4
BSEC (energy)	kJ/kWh	7 070	6 831	7 169	6 934
BSGC (gas)	g/kWh	140.1	135.1	142.1	137.1
BSPC (pilot fuel)	g/kWh	1.5	1.8	1.5	1.8

**BRAKE SPECIFIC FUEL CONSUMPTION IN DIESEL MODE**

Rating point		R1	R2	R3	R4
BSFC (diesel)	g/kWh	181.3	175.3	183.3	179.3

For definitions see page 52.

