

MGO solution



An introduction and discussion on MGO issue

1

- Introduction of MGO issue

2

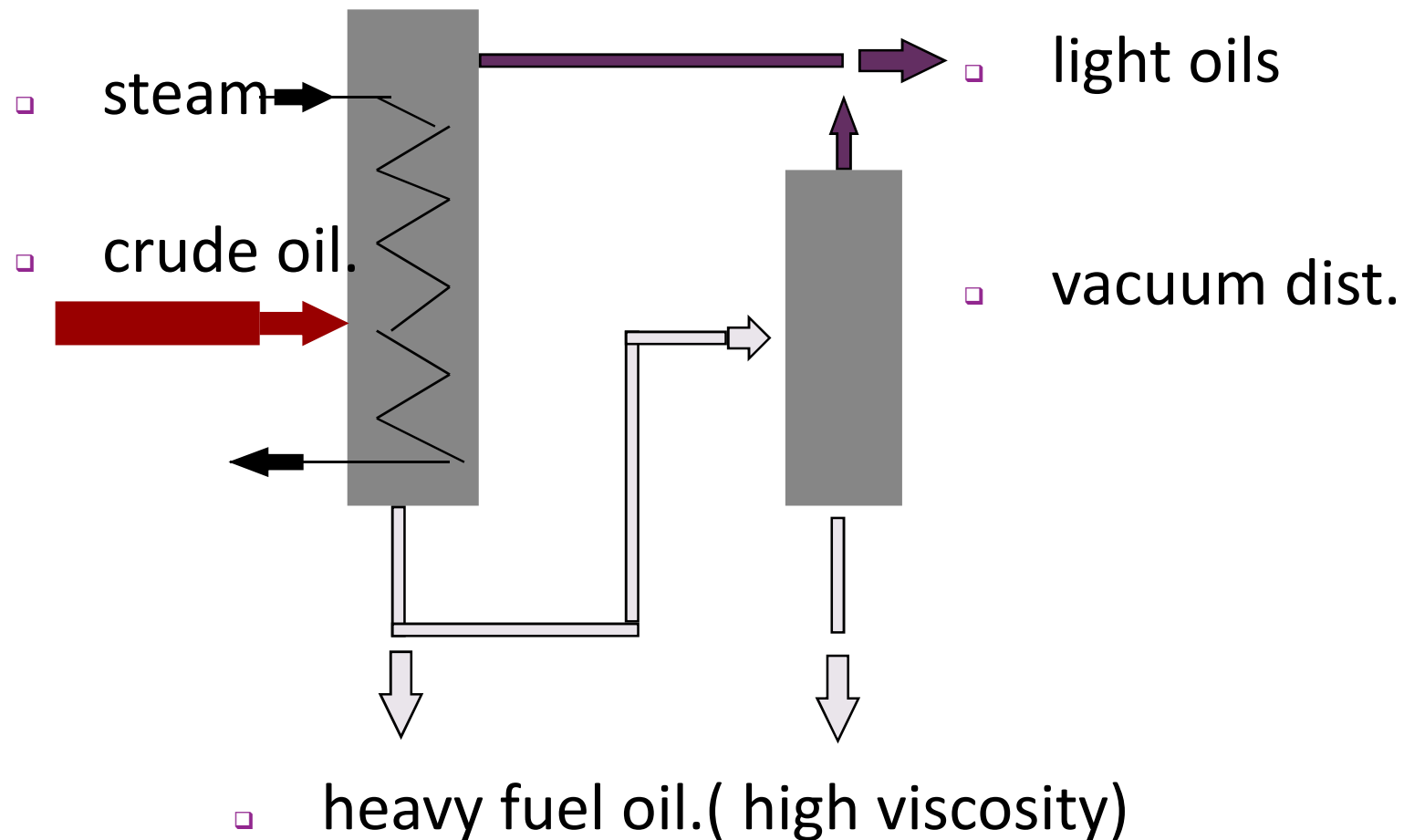
- MGO Cooling Solution

3

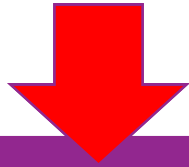
- Fuel Oil Change-over System

FUEL OIL

- atmospheric distillation. (BASIC)



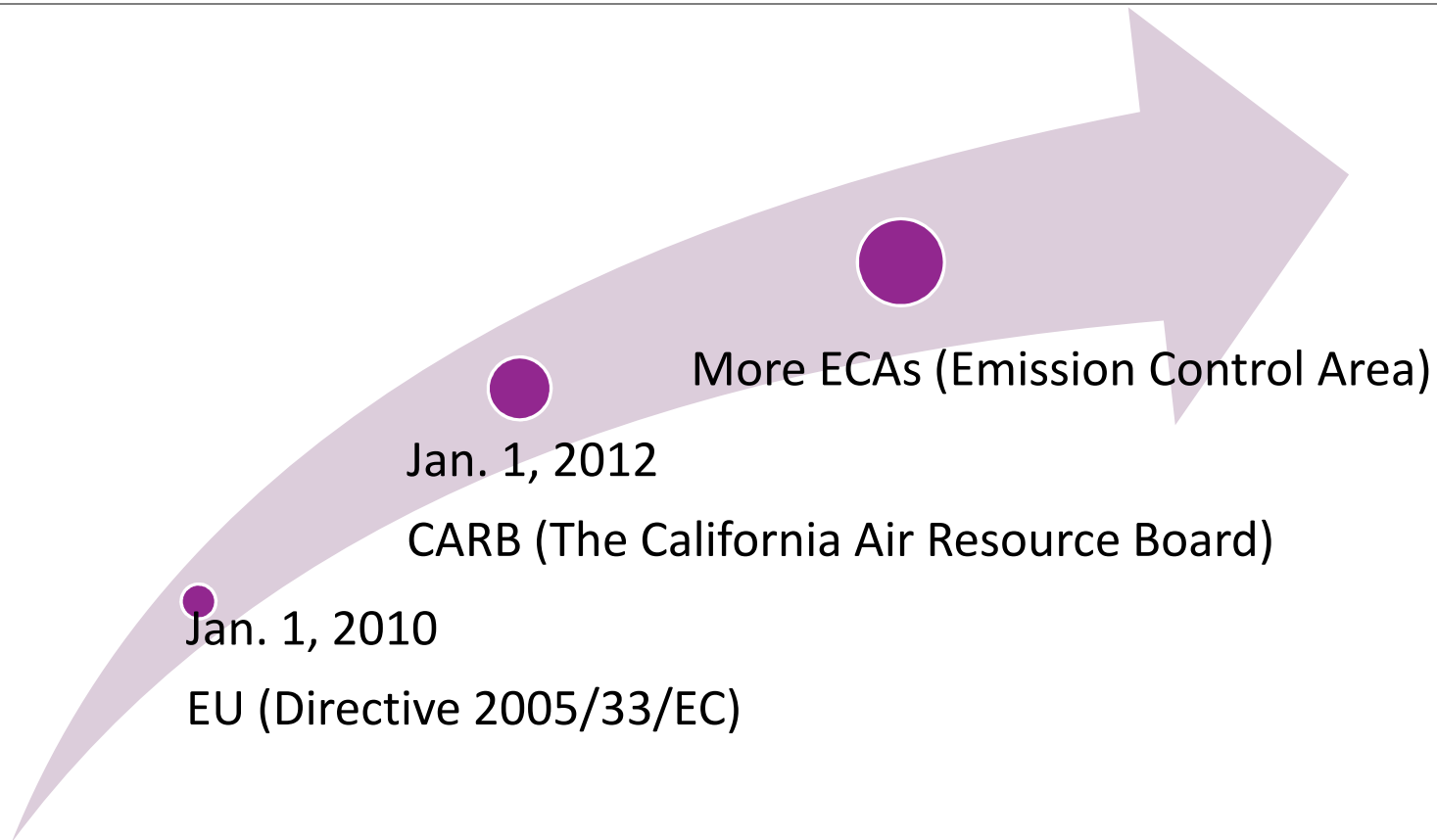
COMPARISON OF HFO & LSF



HFO	LFO
Thick (high viscosity)	Thin (low viscosity)
Dirty	Clean
High pollution	Low pollution
Cheap (HFO380, \$600/t, 201104)	Expensive (DO, \$965/t, 201104)

Why LSF?

Sulfur emission below 0.1% m/m



Marine Distillate Fuels – ISO 8217:2010

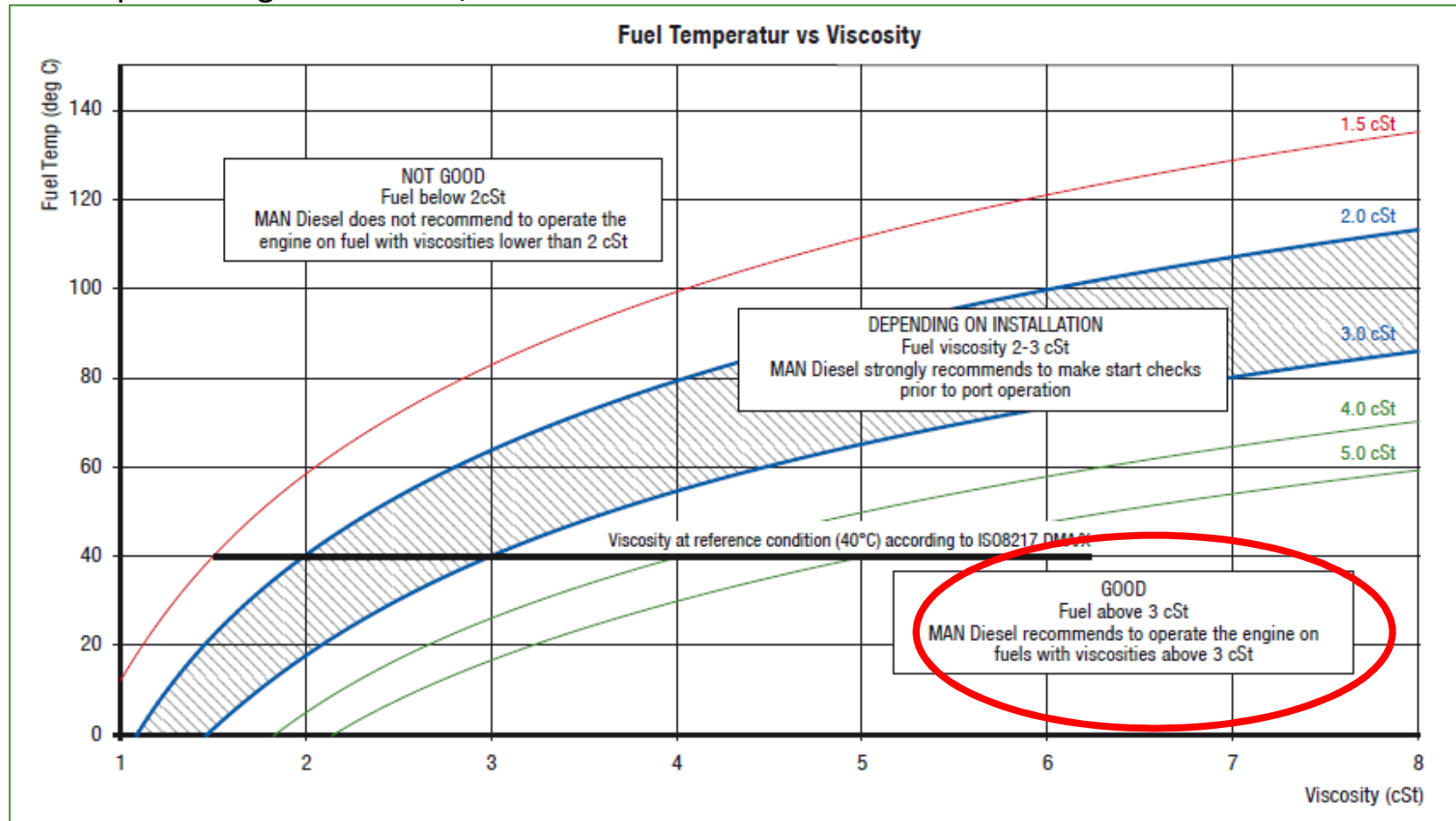
Charateristic	Unit	Limit	DMX	DMA	DMB	RMG380	Test Metod Reference
Density at 15C	kg/m ³	max.	-	890.0	900.0	991.0	ISO 3675 or ISO 12185
Viscosity at 40°C	mm ² /s (b)	min.	1.4	2.0		380	ISO 3104
	mm ² /s (b)	max.	5.5	6.0	11.0	@50° C	ISO 3104
Flash point	°C	min.	43	60	60	60	ISO 3016
Sulphur	% (m/m	max.	0.1	0.1	2.0	4.5	ISO 8754 or ISO 14596

Wartsila – Lowest Viscosity Request

Engine type, 4-stroke	Minimum fuel injection viscosity, cSt	
Wärtsilä 20	1.8	1.8
Wärtsilä 26	2.0	
Wärtsilä Vaasa 32/32 LN	2.0	
Wärtsilä 32	2.0	2.0
Wärtsilä 38	2.0	2.0
Wärtsilä 46	2.8	2.0
Wärtsilä 64	2.8	
Sulzer S20	3.0	
Sulzer Z40, ZA40, ZA40S	2.0	

MAN's recommendation on LSF

- Not less than 2 cSt on running
- Not less than 3 cSt for start-up of the main engine
- Temperature gradient 2 °C / minute



Risk?

Keep using
HFO/MDO

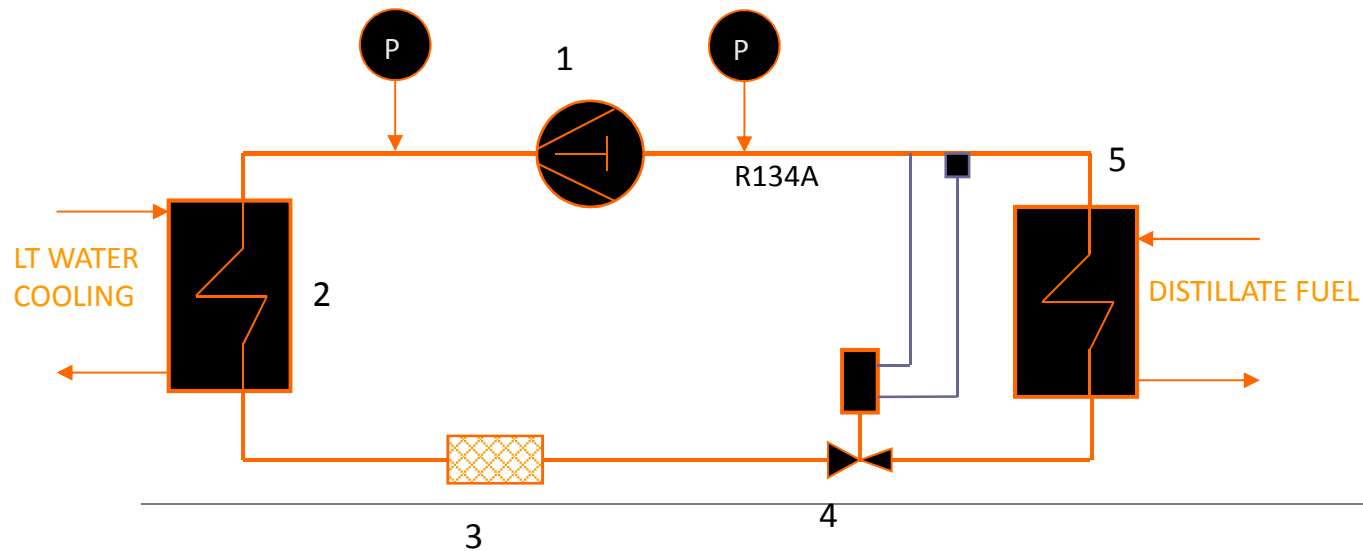


Use LSF without
treatment

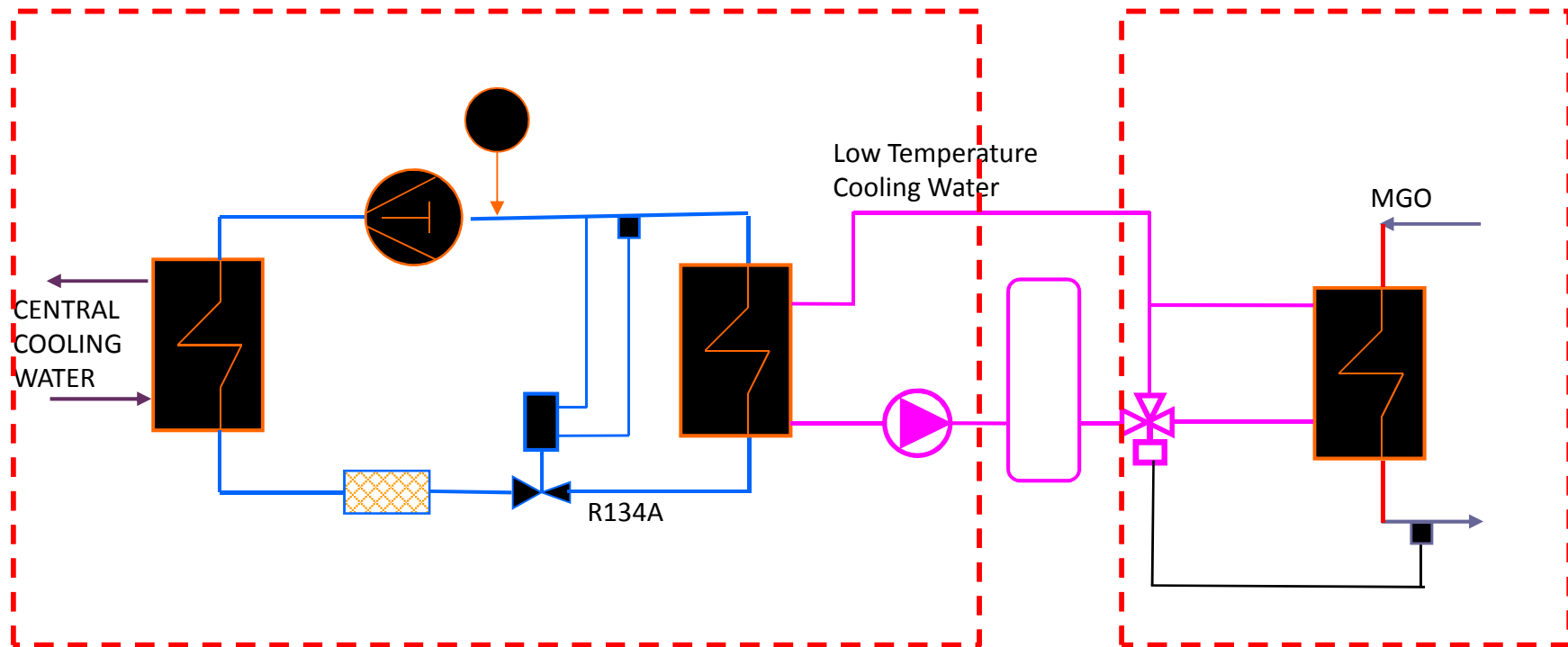


***Engine possibly
shutdown,
Losing Money***

DX Solution ----- not approved by MAN



1	Compressor
2	Condenser
3	Strainer
4	Thermal Expansion Valve
5	Evaporator



Compact chiller unit

Buffer unit

Cooler unit

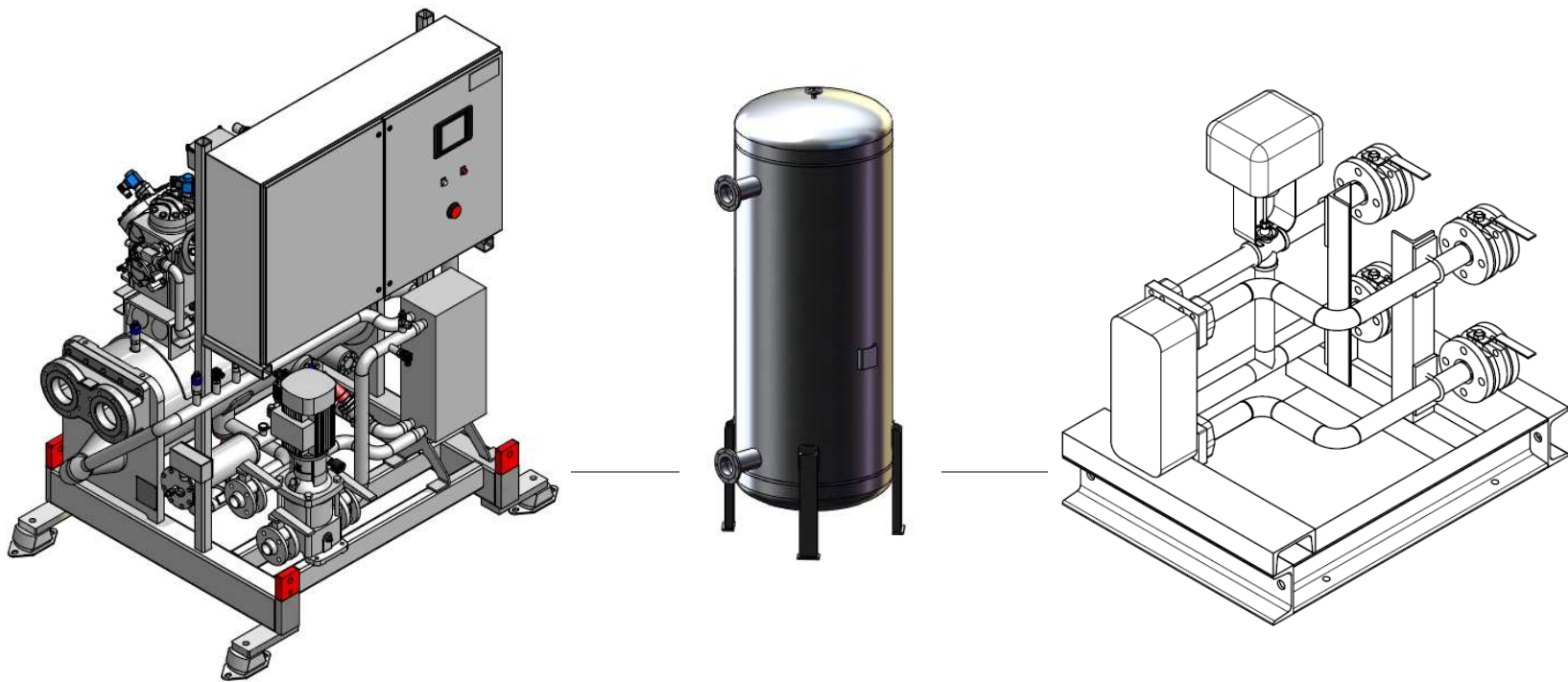
Special to MGO Cooling

1. Big changes to heatload
2. Small volume water in system
3. Possible leakage of chilled water



Rev.	Revision description	Date	Drawn	Approved
000000				
Part name Material To P&I diagram MGO cooling plant		Scale Comments Drawing Checked by Approved Revision details		
		Drawing no. MGR-000000		
		Date 10/00/07		
		Drawing no. 0		
		Drawing no. I/1		

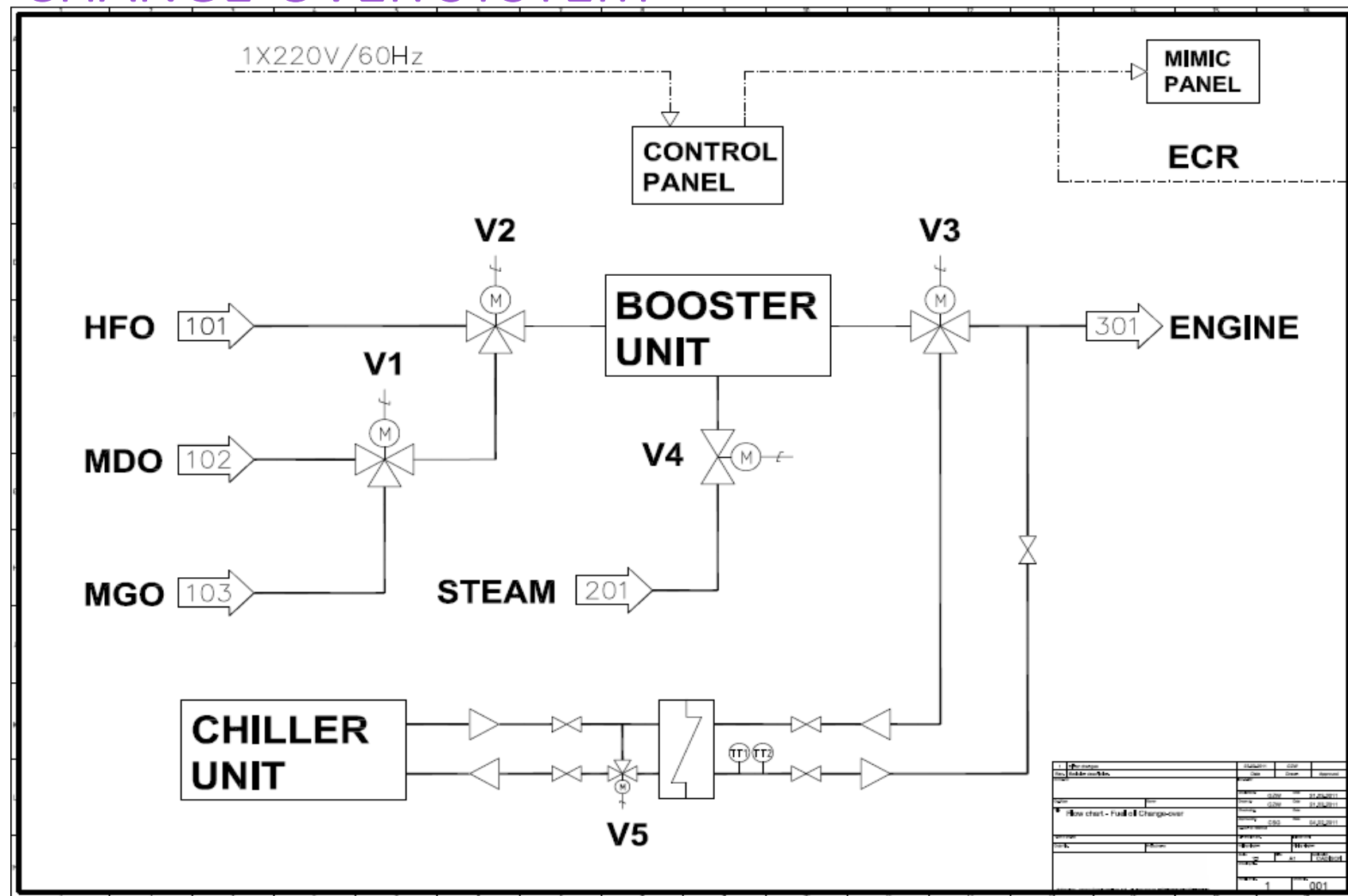
Our equipment for MGO Cooling



Possible risk during fuel oil change-over

1. Heating on MGO
2. Cooling on HFO
3. Rapid temperature change
4. Steam heating available in case of cooling
5. Mistaken operations
6. Alarm and auto-protection

CHANGE-OVER SYSTEM



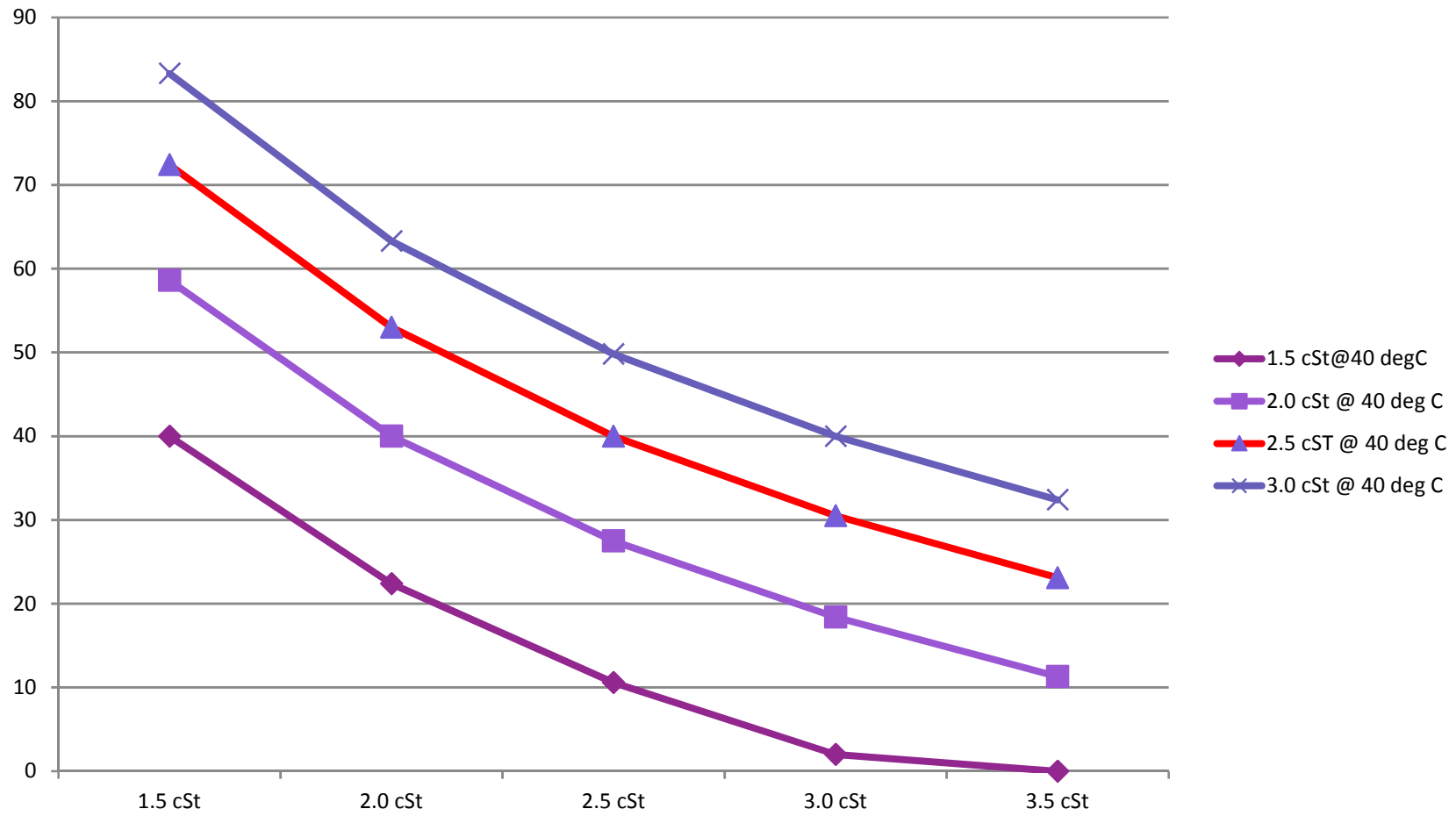
- **Acc. To engine maker's instruction**
- **No modification to booster**
- **Short delivery**
- **Easy operation**
- **Europe quality**
- **Low investment**

SOME TYPICAL QUESTIONS



We need viscosity control instead of temp. control on MGO, as what Booster does.

No viscosity sensor is so sensitive to so small viscosity value. And it will be unnecessary to worry about high viscosity alarm from MGO. Temp. control is better and safer.



SOME TYPICAL QUESTIONS



We need **manual change-over valves** to save cost.

Ele. Change-over system is friendly to operator, safer due to auto-protection function, and not much more expensive.

SOME TYPICAL QUESTIONS

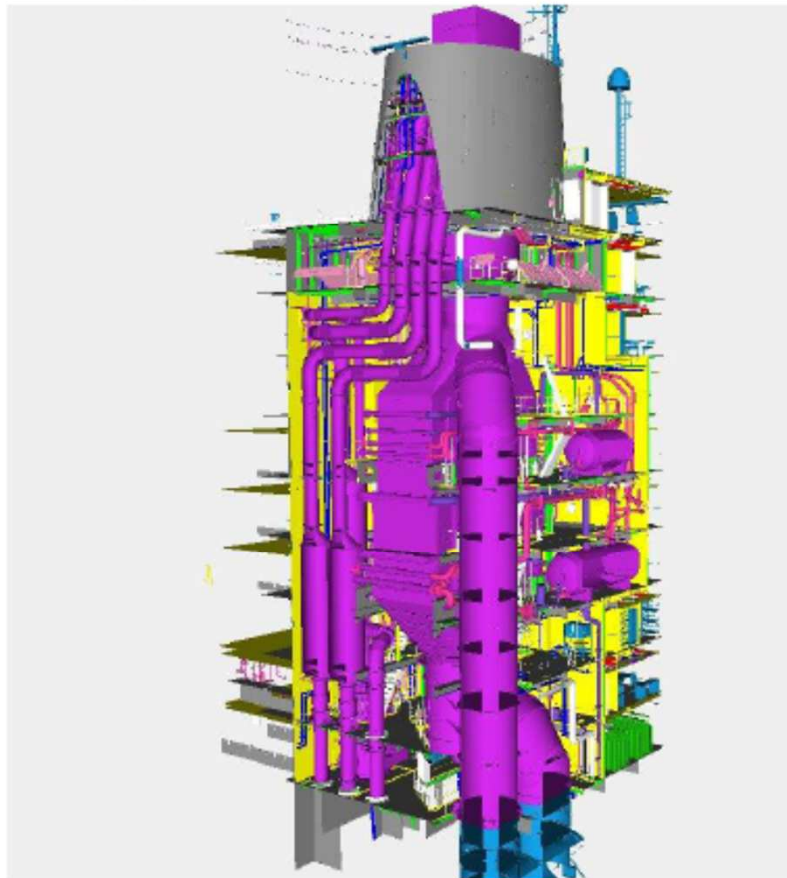


We will buy MGO at higher viscosity. **No chiller** is needed. So **no business** for you.

In case of MGO, cooling is always a must. We can also offer auto change-over system and fresh water cooler unit etc.

Alternative solution for emission control ---- Scrubber

Casing:



Added space for scrubber

