

# SCR System

Selective Catalytic Reduction

Original Bypass-Integrated  
Structure

## Space Saving

The bypass-integrated structure  
requires connection of only one duct  
between the engine and SCR system.

Patented



# The DAIHATSU - DEC Marine SCR System Engineered to Achieve the Highest Levels of Space Saving and Running Cost Reduction

Marine diesel engines installed on ocean-going vessels must be gentle to the global environment at all times.

Daihatsu SCR system reduces NOx contained in the engine exhaust gas through chemical reactions, to produce a clean exhaust.

We adopted a patented bypass-integrated structure and optimized the electronic control and operation devices to enable easy onboard installation, save installation space and reduce running cost.



Catalyst

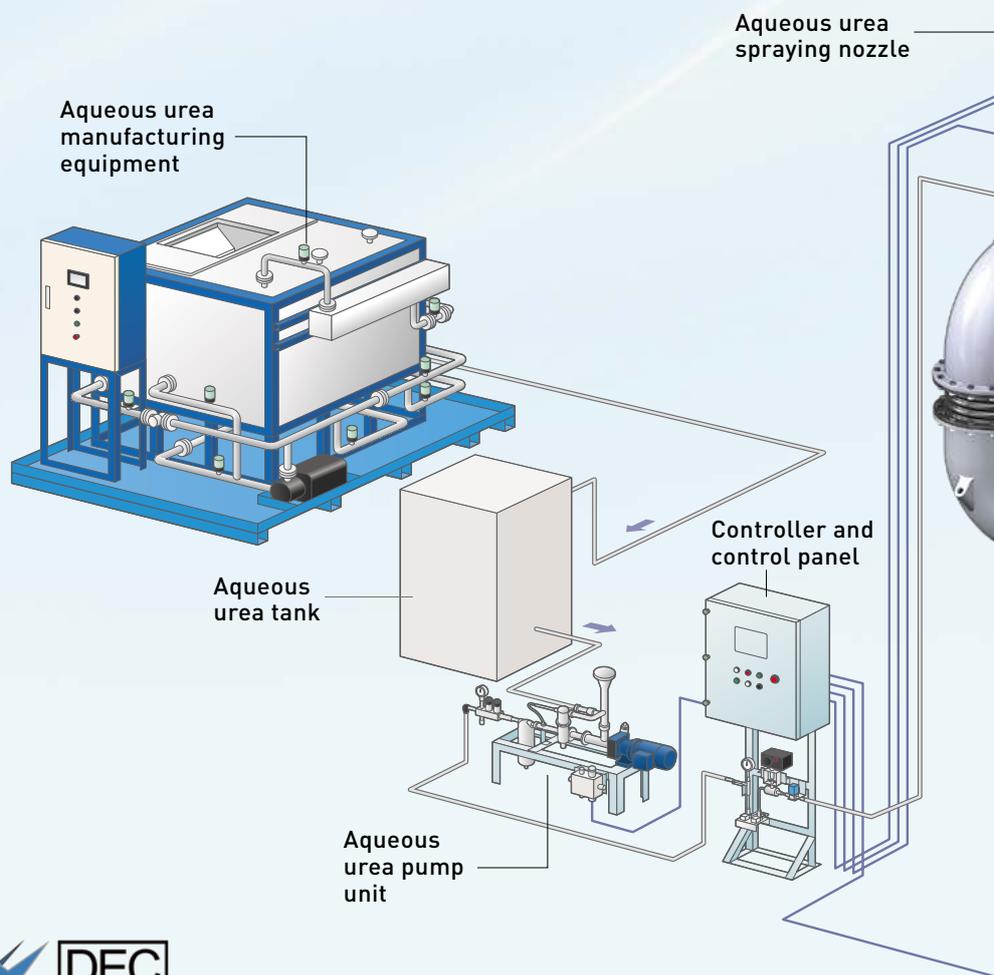


Aqueous urea spraying pump unit



Controller and control panel

Connection of single duct to SCR reactor

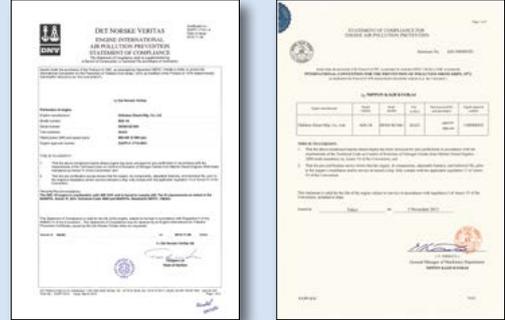


**SCR**  
System  
Selective Catalytic Reduction



## Compliance with IMO NOx Tier III standards

The NOx removal performance of the SCR system complies with the IMO NOx Tier III standards effective 2016. It clears the ECA (Emission Control Area) emission regulation.



Statement of Compliance for IMO NOx Tier III

## Compact design for easy onboard installation

The SCR reactor can be mounted vertically or horizontally\* to enable flexible installation according to the engine room layout. The aqueous urea nozzle sprays the reducing agent in an extremely fine mist so that the vaporization distance is minimized.

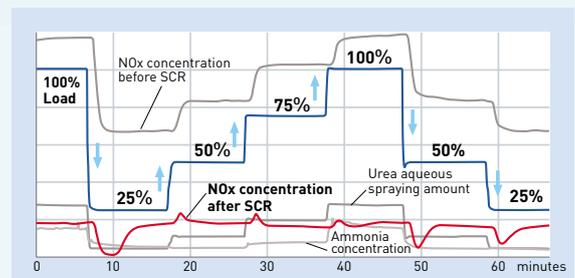
The duct connected to the SCR reactor has a switching damper, and the bypass duct is built into the reactor (patented) to eliminate the need for the installation of a separate bypass line.



\*Horizontal mounting is possible for models up to SCR81B.

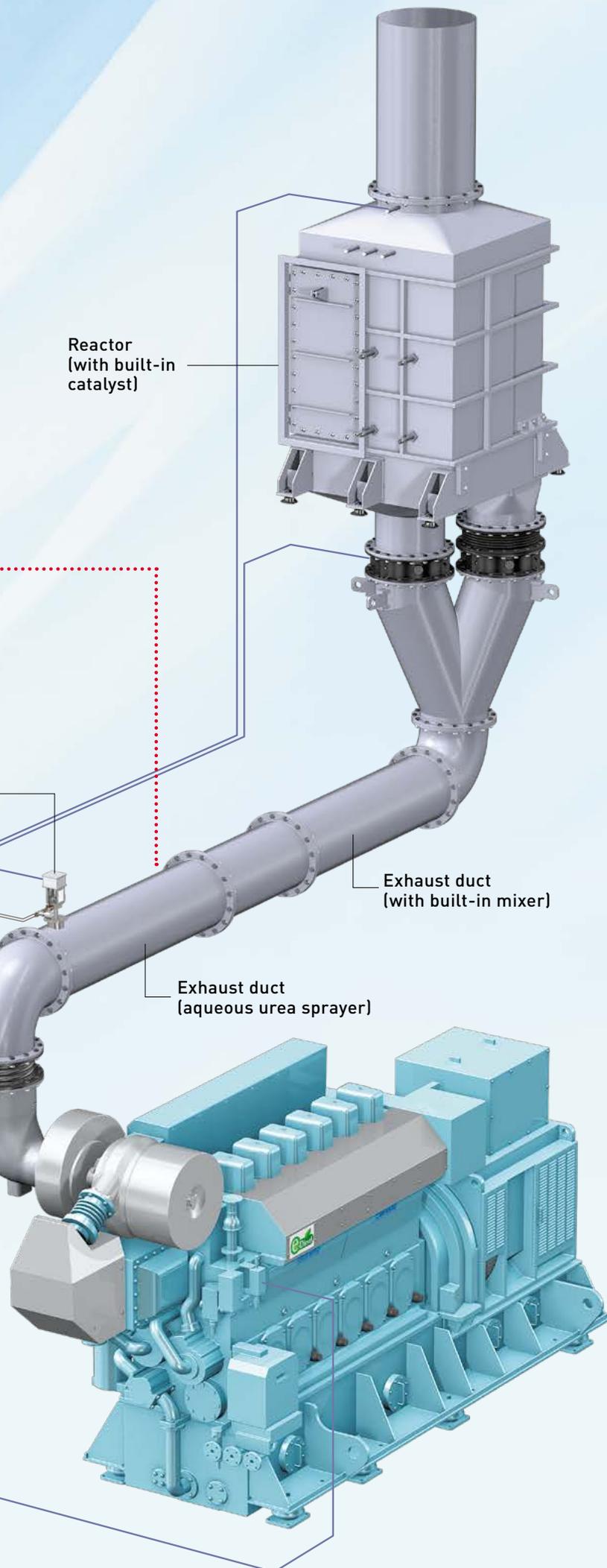
## Low running cost

The unique aqueous urea nozzle and electronically controlled auto-operation optimize the amount of aqueous spraying and maintain NOx below the regulation value at all times.



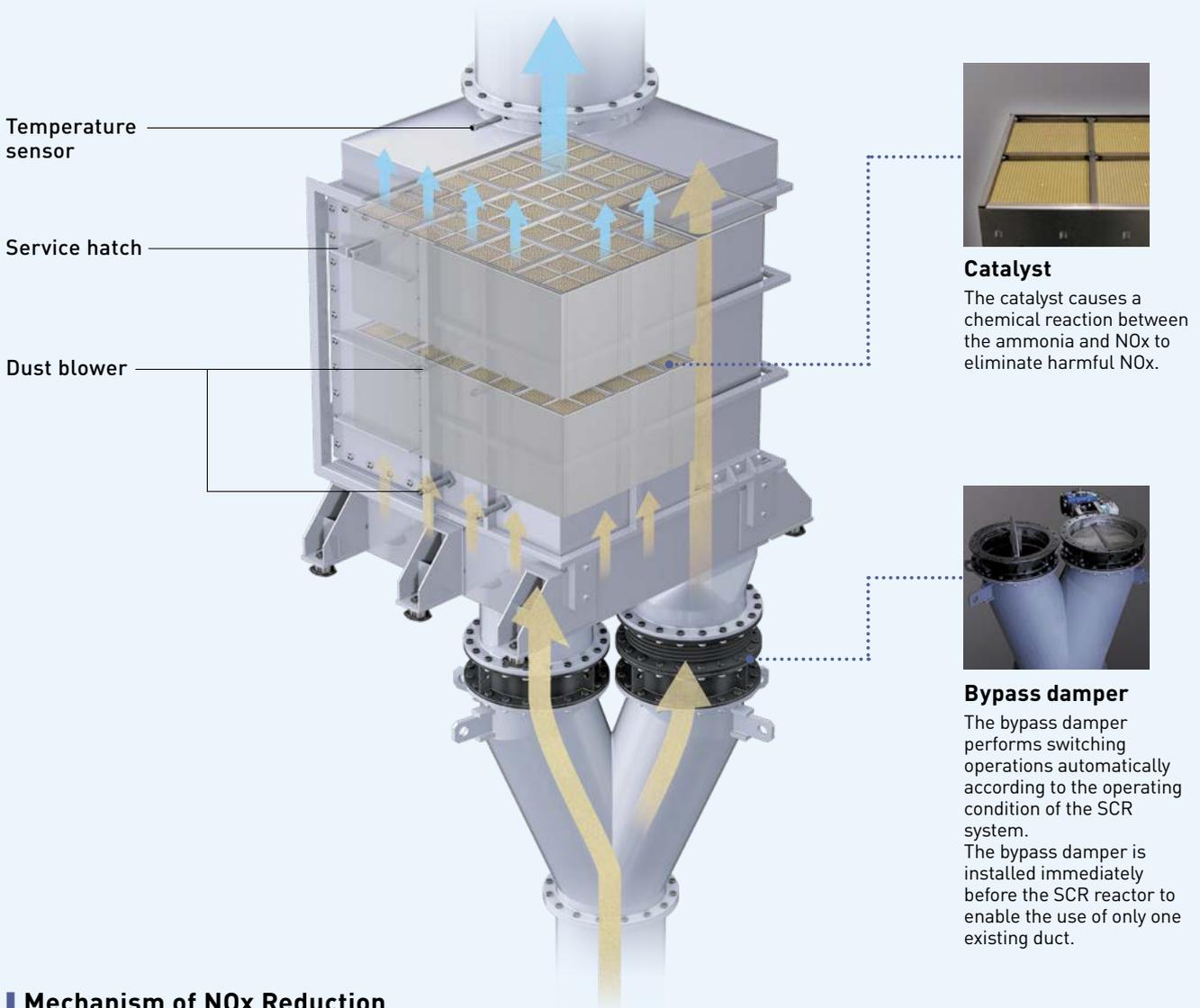
## High vibration resistance

The anti-vibration support for the SCR reactor provides excellent vibration resistance to minimize the effect of vibration transmitted from the hull.



# Catalyst Reduces NOx Contained in the Exhaust Gas into Harmless Nitrogen and Water

The spraying of aqueous urea into the high-temperature exhaust gas produces ammonia through hydrolysis. This ammonia reacts with NOx and reduces it into harmless nitrogen and water.

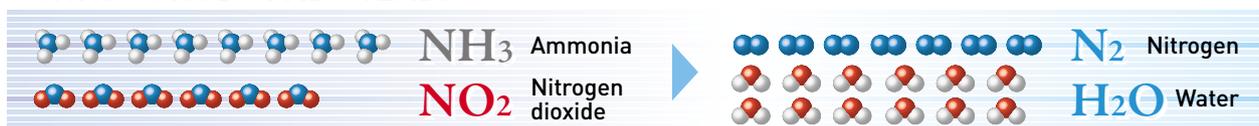
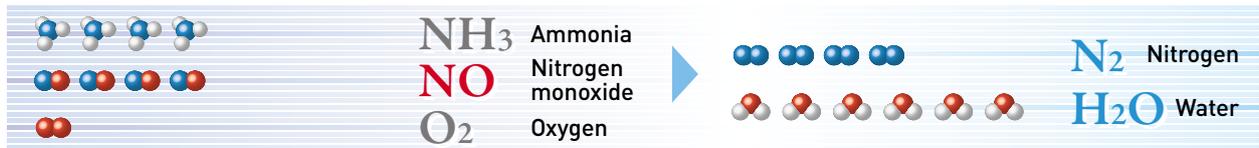


## Mechanism of NOx Reduction

- Reducing agent (aqueous urea) is hydrolyzed into ammonia when it contacts the high-temperature exhaust gas.

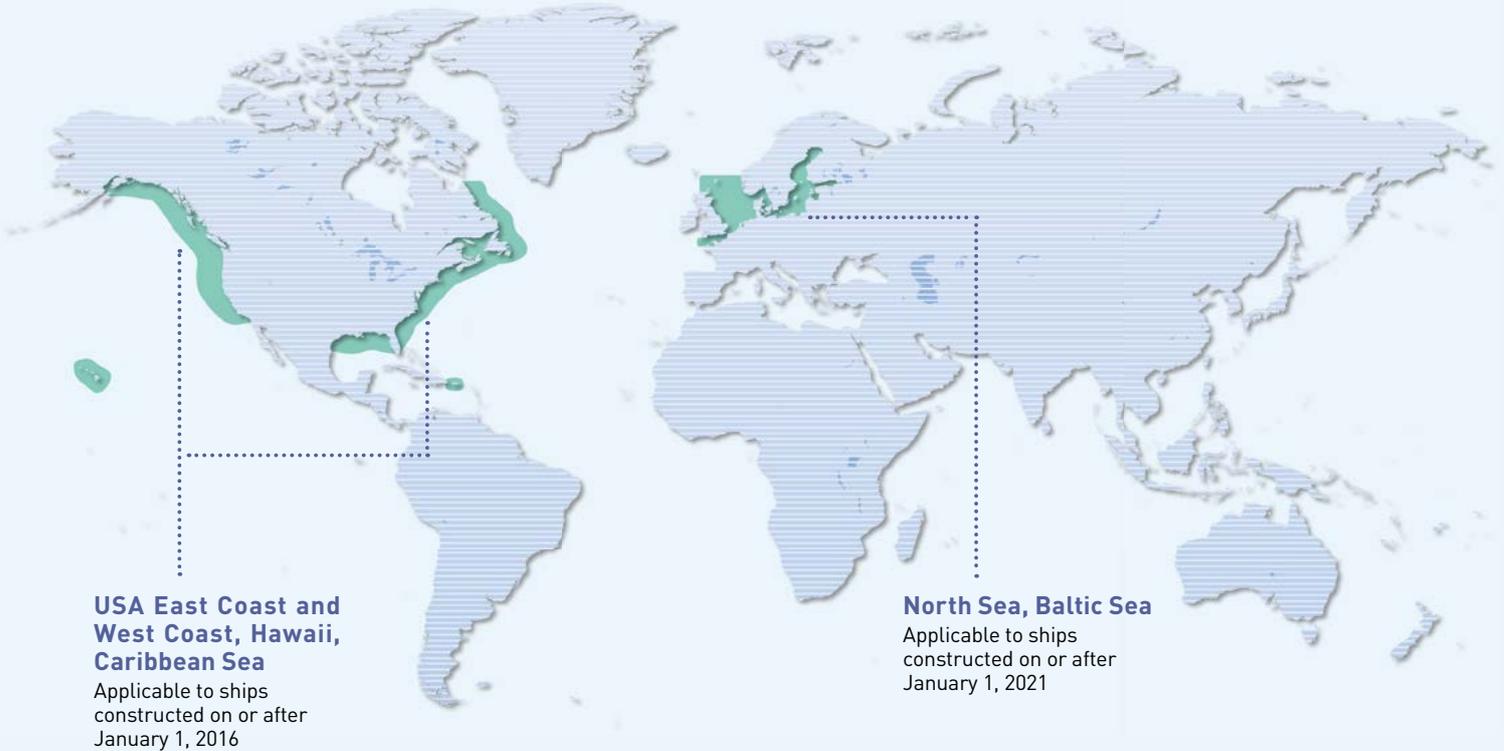


- NOx reacts with ammonia and reduces into harmless N<sub>2</sub> and H<sub>2</sub>O via a catalytic effect.



# NOx Emission Regulation (ECA) Will Be Applicable to the North Sea and Baltic Sea in the Future

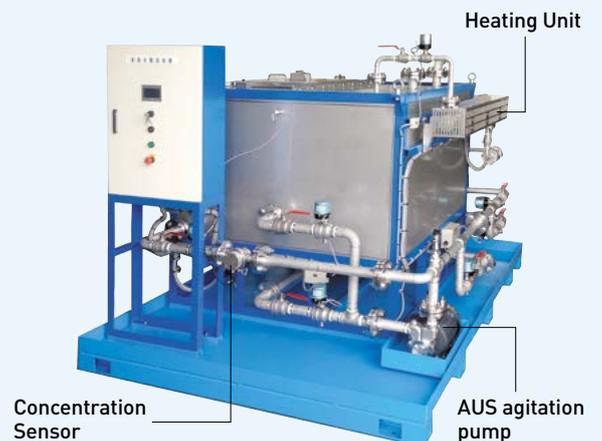
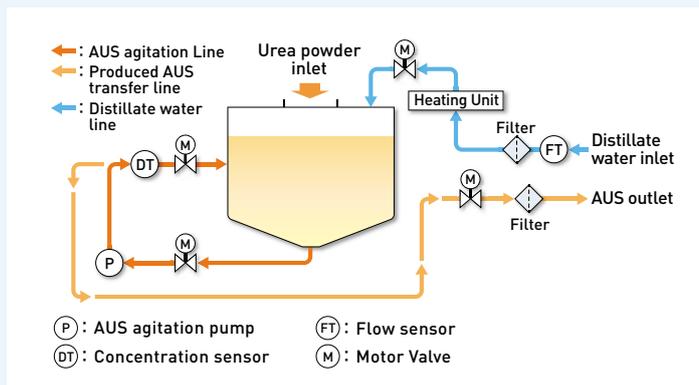
It has been announced that the North Sea and Baltic Sea will be designated as ECA for NOx, and the NOx emission regulation will apply to new ships constructed on or after January 2021.



# The Aqueous Urea Solution Generator (AUS) for Greater Space Saving and Lower Running Cost

Using urea powder and pure water, the Aqueous Urea Solution Generator produces the necessary amount of aqueous urea when needed, thus eliminating concerns regarding the deterioration of aqueous urea caused by long storage periods. It supplies aqueous urea of stable quality. Since the equipment allows the reduction of the urea aqueous tank size, less storage space is required. Use of urea powder also reduces the procurement cost.

## Structure



The pipe, valve, and fittings are made of stainless steel from the urea solution outlet to the shipyard storage tank.

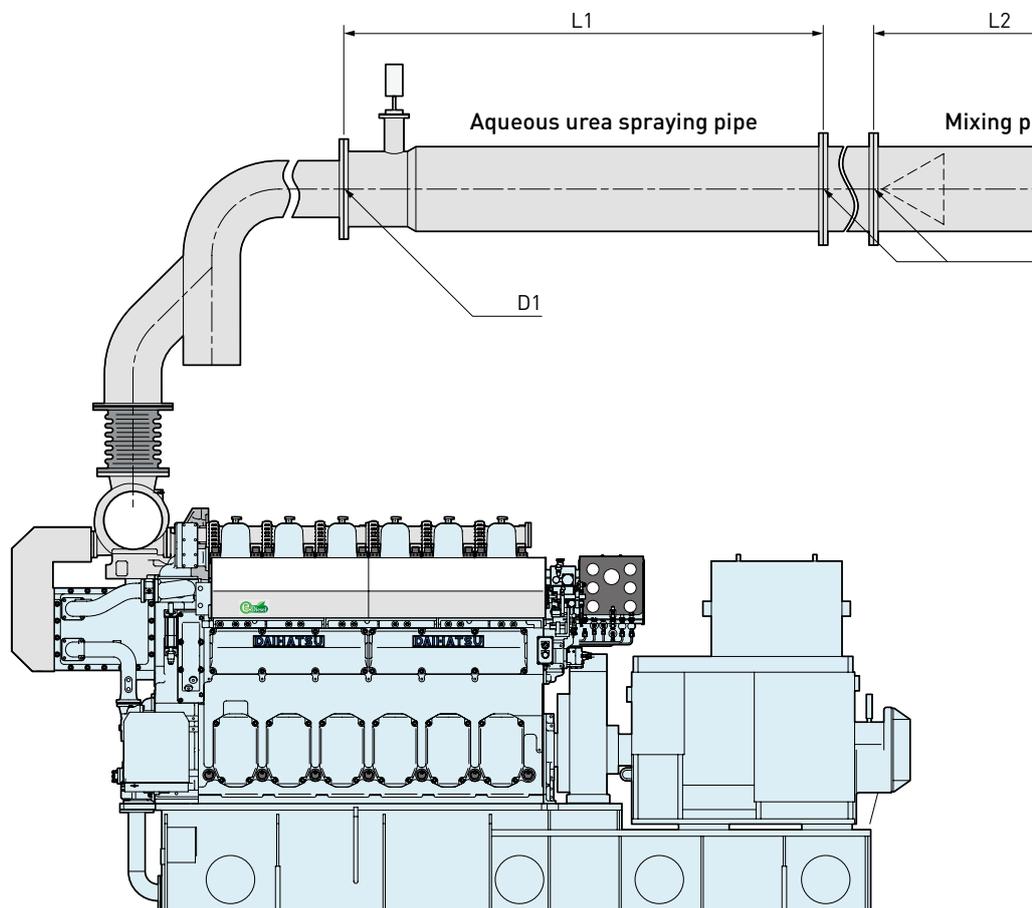
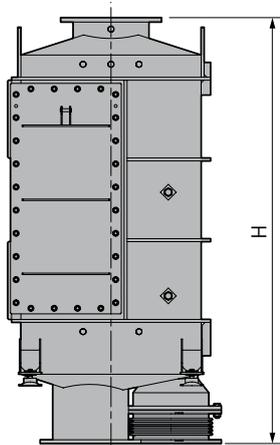
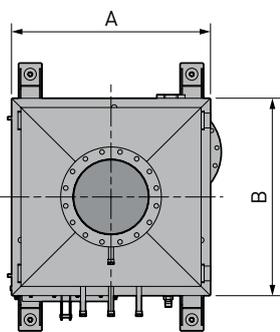
## Dimensions and Mass of SCR Reactors

SCR model		25B	30B	36B	42B	49B	64B	81B	100B	144B	169B	196B	240B
A	mm	1000	1000	1200	1200	1350	1500	1700	1800	2200	2350	2500	2650
B	mm	1000	1200	1200	1350	1350	1500	1700	1800	2200	2350	2500	2800
H	mm	2100	2240	2300	2380	2500	2650	2750	2950	3350	3500	3800	4050
D3		350A	350A	400A	450A	500A	700A	700A	800A	900A	900A	1100A	1200A
Mass (including catalyst)	kg	900	1050	1200	1350	1600	2200	2700	3200	4600	5300	6100	7800

\* Dimensions A and B and reactor mass include lagging (option).

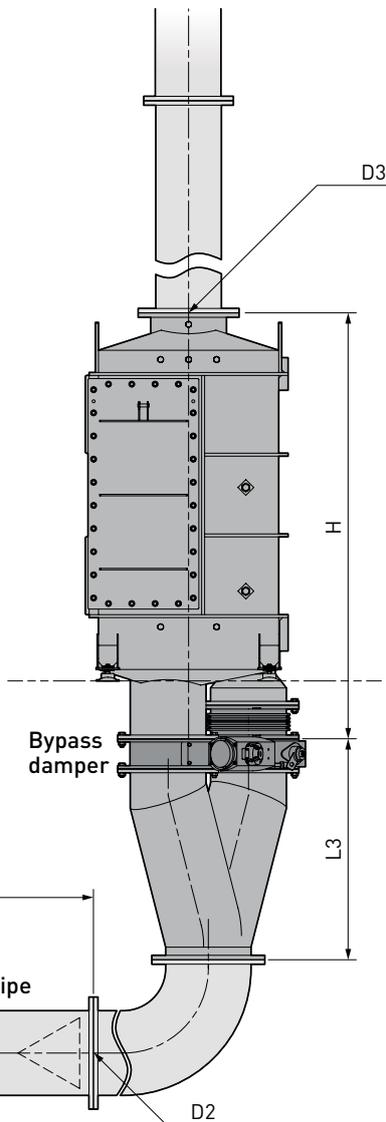
## Dimensions of Piping Parts

SCR model		25B	30B	36B	42B	49B	64B	81B	100B	144B	169B	196B	240B	
Aqueous urea spraying pipe	L1	mm	3000	3000	2570	2300	2470	2070	2180	2680	2273	2373	2870	2970
	D1		400A	400A	400A	450A	500A	700A	700A	800A	900A	900A	1100A	1200A
Mixing pipe	L2	mm	1110	1110	1350	1520	1660A	1960	2200	2480	3070	3340	3610	3900
	D2		400A	400A	450A	550A	600A	700A	800A	900A	1100A	1200A	1300A	1400A
Bypass damper	L3	mm	1070	1070	1200	1330	1300	1300	1580	2010	1890	2030	2610	



## SCR Model Selection Table for Auxiliary Engine

Engine model	Engine output		SCR model	Utility			Power supply
	min <sup>-1</sup>	kWm		Required air pressure	Dust blow Nm <sup>3</sup> /h	Air spray* <sup>1</sup> (per unit)	
6DL-16Ae	1,200	442~530	25B	0.7 ~ 1.0MPaG	0.4	12-16	3-phase 440 or 230 VAC, 50/60 Hz
6DE-18	720/750	375~700	30B		0.5	12-16	
	900	400~660			0.6	12-16	
6DE-18	900	661~860	36B		0.8	12-16	
6DE-20	900	811~1,090	49B		1.1	12-16	
6DE-23	720/750	800~1,280	64B		1.7	20-26	
	900	1,000~1,516			1.7	20-26	
8DEL-23	750	1,280~1,750	100B		2.9	20-26	
	900	1,500~2,200			4.1	20-26	
6DE-28	720/750	1,921~2,140	100B		2.4	20-26	
6DE-33	720/750	2,700~3,600	169B		2.9	20-26	
8DE-33	720/750	3,600~4,800	240B		2.9	20-26	
6DC-32e	720/750	2,300~3,000	144B		0.8	12-16	
8DC-32e	720/750	3,000~4,000	169B		1.4	12-16	
	900	600~810			1.7	20-26	
6DK-20e	720/750	580~800	42B		1.4	12-16	
	900	811~1,060			1.7	20-26	
6DK-26e	720/750	1,200~1,710	81B		1.4	12-16	
	720/750	1,711~1,850			1.7	20-26	
6DK-28e	720/750	1,460~1,700	81B	1.7	20-26		
	720/750	1,701~2,130		2.4	20-26		
8DK-28e	720/750	1,915~2,800	144B	2.9	20-26		
6DK-36e	600	2,950~3,500	169B	3.3	20-26		
8DK-36e	600	4,400~4,650	196B				



- \* Compatible models are added from time to time. For gensets engine models/specifications not listed in the above table, please contact our company.
- \* Please inquire separately for propulsion engine models with SCR compatibility.
- \*<sup>1</sup> Even when the SCR system is in non-operational (bypass operation), air supply is still used at a rate of 0.1 to 0.3 Nm<sup>3</sup>/h for the cooling of the spraying nozzle while the engine is running.

(Note) Be sure to use an engine fuel with a sulfur content of 0.1% or less when using the SCR system.

## Period Inspection Table for SCR System

Inspection interval Hr (SCR operation time) ○: Inspection ●: Replacement

Component	Item [Description of maintenance]	Every day	500	2,000	4,000	8,000	16,000
SCR reactor	Catalyst [Replacement]						●
Aqueous urea spray nozzle	Nozzle [Inspection/Cleaning]			○			
	3-way valve gland [Inspection/Replacement]	○					
	Air flowmeter [Inspection]		○				
Air distributor unit	Strainer element [Inspection/Replacement]		○	●			
Aqueous urea pump unit	Pump unit [Inspection]		○				
	Sealing liquid surface [Inspection/Replenishment]		○				
	Stator [Replacement]					●	
	Aqueous urea strainer element [Replacement]			●			
Aqueous urea flowrate control unit	Aqueous urea flowmeter [Disassembly/Inspection/Cleaning]				○		
	Gland packing in flow regulating valve [Inspection]		○				
Bypass damper	Gland packing [Inspection]		○				



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