ALTERNATIVE ENERGY
SOLUTIONS

FUEL EFFICIENCY · PRODUCT PRESENTATION

HYDRAULICA

Hydraulically supported fuel valves for 2- and 4-stroke diesel engines

VERSION 2025-05-23 · PUBLIC

WHY HYDRAULICA

- Engineering experts for the maritime and stationary energy transition
- HYDRAULICA is a proven design
- Emission compliance for existing diesel engines
- Robust and reliable fuel and emission saving solution
- Verified functionality, performance and durability
- Can be combined with blueEGR, our system for NOx reduction on any marine or stationary application

KEY FIGURE

2–8 %

fuel savings in the business case calculations for five vessels, payback 0.65 to 1.69 years.

01

TECHNOLOGY

How hydraulically supported fuel valves work

WHAT HYDRAULICA DOES



OIL PRESSURE ON THE VALVE

While the engine runs, a defined hydraulic oil pressure acts on the fuel valve. The spring no longer bounces and no fuel drips into the combustion chamber after the fuel pump closes.



MODIFIED FUEL VALVE

Hydraulic oil is supplied on top of or into the spring chamber, depending on the valve design, and the fuel oil leakage opening is closed. Best done before scheduled valve maintenance.



BETTER COMBUSTION

Combustion improves especially outside the optimised MCR range: lower fuel consumption, fewer emissions, longer Time Between Overhaul (TBO) and longer service life of engine parts.



2- AND 4-STROKE

Works on 2-stroke and 4-stroke diesel engines.

TECHNICAL SET-UP

HPU Hydraulic Pump Unit

80 × 40 × 100 CM

Oil tank underneath, operating and standby pump for redundancy, all electrical equipment. Uses the engine lube oil. Capacity can serve several engines.

VPC Variable Pressure Controller

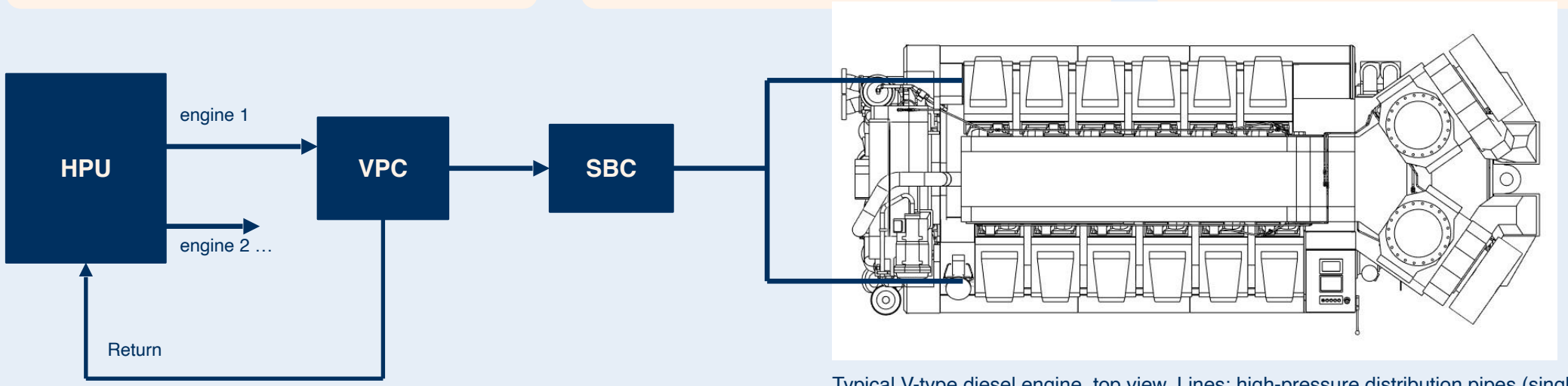
40 × 20 × 60 CM

Distribution block, proportional valve and current calculator. The calculation sets the right pressure.

SBC Separation Block Cabinet

40 × 20 × 50 CM

Installed as close to the engine as possible. Shut-off device and pressure monitoring.



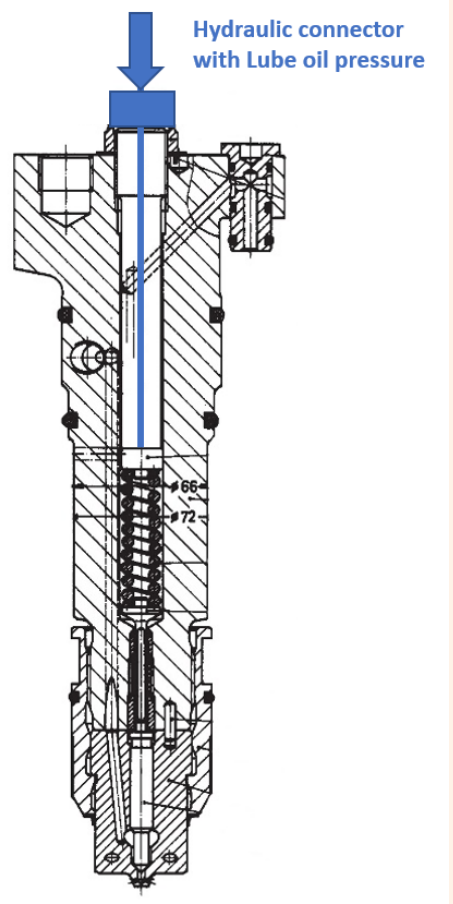
Typical V-type diesel engine, top view. Lines: high-pressure distribution pipes (single- or double-walled).

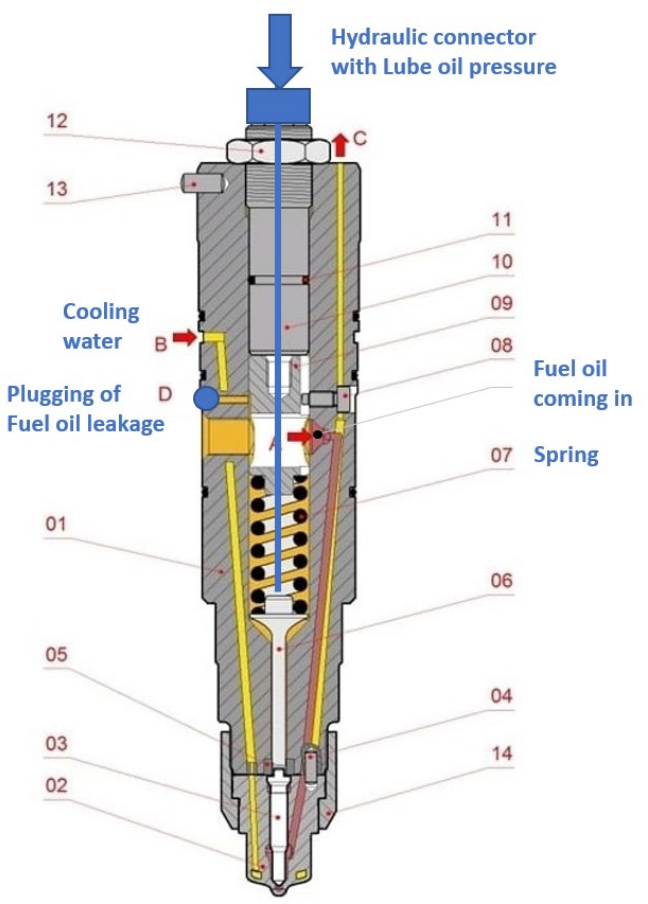
LUBE OIL ON THE FUEL VALVE

- The fuel valves are modified so that lube oil keeps the opening pressure on top of or inside the spring chamber
- A hydraulic connector gives the lube oil access to the fuel valve

EXAMPLES

Typical 4-stroke medium-speed fuel valves with applied hydraulic oil. Blue: hydraulic connector with lube oil pressure.





02

WHY HYDRAULICA

Better combustion, approved by class

STANDARD VALVES AT PART LOAD

- A standard fuel valve is designed for a fixed MCR of around 85 to 100 %, depending on the application
- At part load, poorer atomisation causes drips, coating and coke deposits – combustion gets worse
- The result: high fuel consumption and worse emission values

THE SOLUTION

HYDRAULICA

solves these problems by keeping the fuel valve stable over the whole load range.

DNV AND RINA



DNV

C-ENERGY TECHNOLOGIES
Fiskebäcks Hamn 34
426 58 Västra Frölunda
Sweden

DNV Ship Classification
Engines & Pressurized Equipment
Brooktorkai 18
20457 Hamburg
Germany

Date: 2023-03-22 **Our reference:** 10701727-2 **Your reference:** Email dated 2023-01-17

Technical evaluation of the C-ENERGY HYDRAULIX system for Diesel engines

Dear Sir,

We have received your above-mentioned request to check and validate your product HYDRAULIX for safety on Diesel engines.

The aim of the product, accordingly to your information, is to save fuel and reduce the CO_2 emissions. We have received your Sales Presentation as well as a further confidential technical drawing regarding the modification in the fuel injector as data basis for review.

Due to the wide range of Marine engines and applications, DNV can at this stage not comprehensively check and validate this product but has in principle no objections against an installation of the HYDRAULIX system on Diesel Engines.

We would like to point out that, each modification of class relevant components on board a vessel is subject of a case-by-case approval.

Sincerely
for DNV

Digitally Signed By: Neddenien, Sven
Location: DNV Hamburg, Germany
Signing Date: 2023-03-22

Sven Neddenien

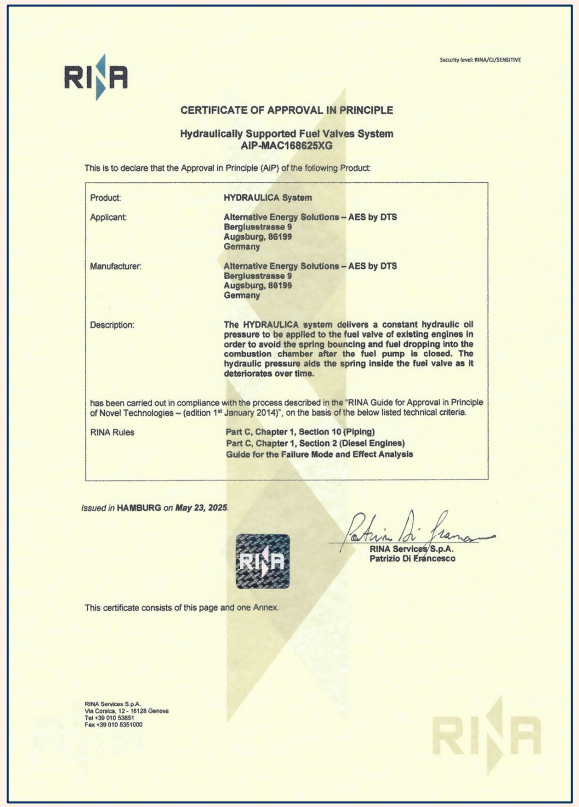
Mobile: +49 173 6141968
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C-ENERGY TECHNOLOGIES

DNV

“Letter of No Objection” in principle for HYDRAULICA on diesel engines (2023)



RINA

Security level: RINA/CLASSIFIED

CERTIFICATE OF APPROVAL IN PRINCIPLE

Hydraulically Supported Fuel Valves System
AIP-MAC168625XG

This is to declare that the Approval in Principle (AiP) of the following Product:

Product:	**HYDRAULICA System**
Applicant:	**Alternative Energy Solutions – AES by DTS** **Bergiusstrasse 9** **Augsburg, 86199** **Germany**
Manufacturer:	**Alternative Energy Solutions – AES by DTS** **Bergiusstrasse 9** **Augsburg, 86199** **Germany**
Description:	**The HYDRAULICA system delivers a constant hydraulic oil pressure to be applied to the fuel valve of existing engines in order to avoid the spring bouncing and fuel dropping into the combustion chamber after the fuel pump is closed. The hydraulic pressure aids the spring inside the fuel valve as it deteriorates over time.**

has been carried out in compliance with the process described in the "RINA Guide for Approval in Principle of Novel Technologies – (edition 1st January 2014)", on the basis of the below listed technical criteria.

RINA Rules	**Part C, Chapter 1, Section 10 (Piping)** **Part C, Chapter 1, Section 2 (Diesel Engines)** **Guide for the Failure Mode and Effect Analysis**

Issued in **HAMBURG** *on* ***May 23, 2025.***

RINA Services S.p.A.
Patrizio Di Francesco

This certificate consists of this page and one Annex.

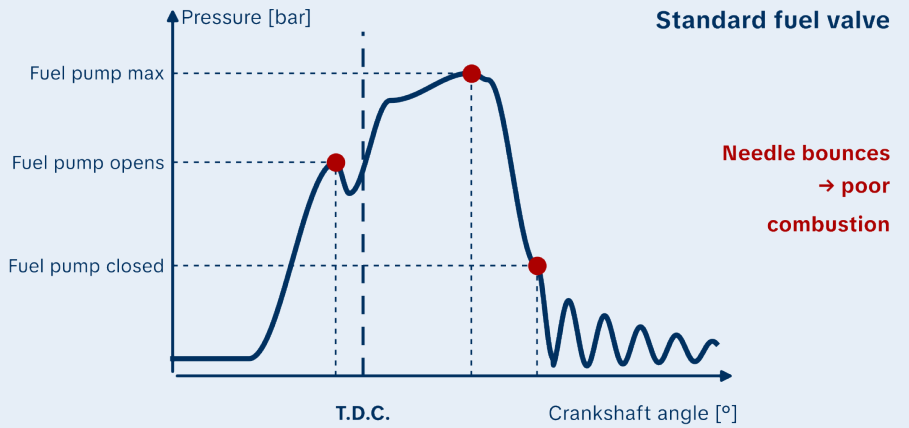
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RINA

Certificate of Approval in Principle (AiP) for the hydraulically supported fuel valve system (2025)

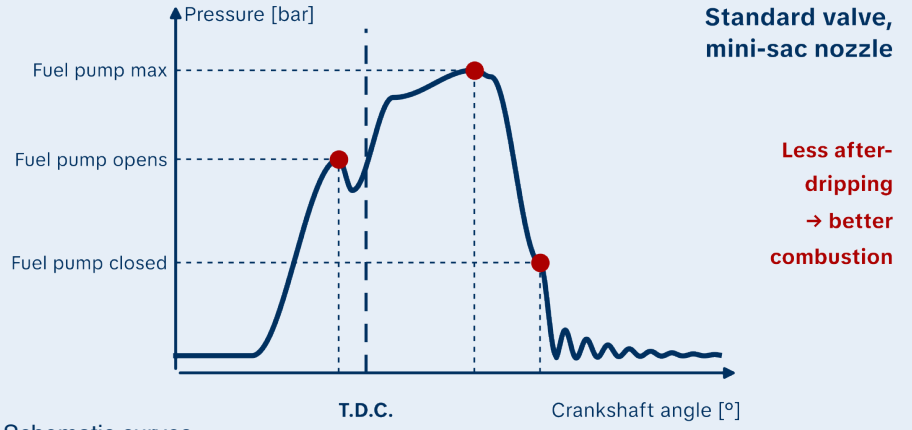
No IMO-relevant components are changed or modified. We support our customers with all class questions.

THREE FUEL VALVES COMPARED



Standard fuel valve

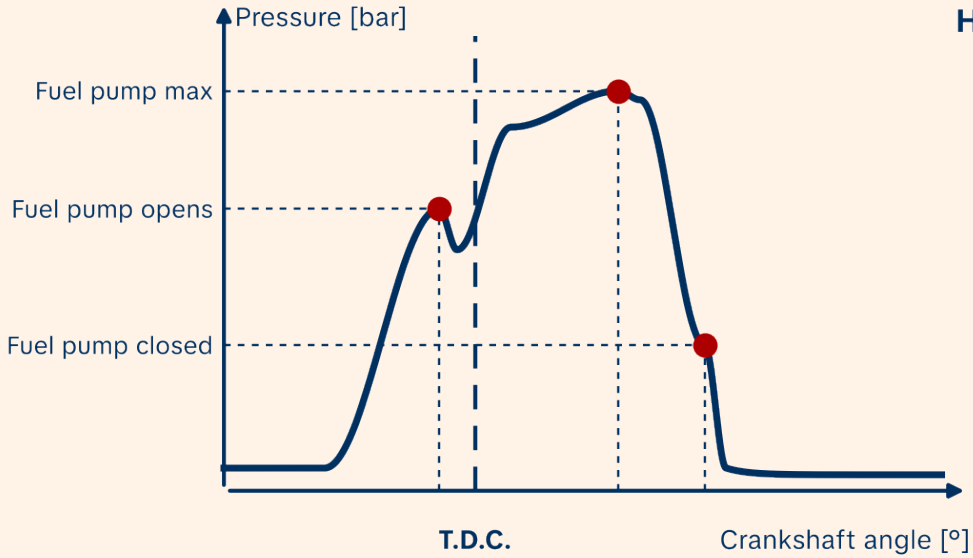
Needle bounces → poor combustion



Standard valve, mini-sac nozzle

Less after-dripping → better combustion

Schematic curves.



HYDRAULICA

No after-dripping → much better combustion

Comparison of three valve types: only the hydraulically supported valve avoids after-dripping – better combustion, less fuel and lower emissions.

03

EXPERIENCE

More than 120 systems in the field

RO-RO CARGO SHIP



2 × Pielstick 12V PC2.5 main engines, diesel-mechanical

Performance of HYDRAULICA:

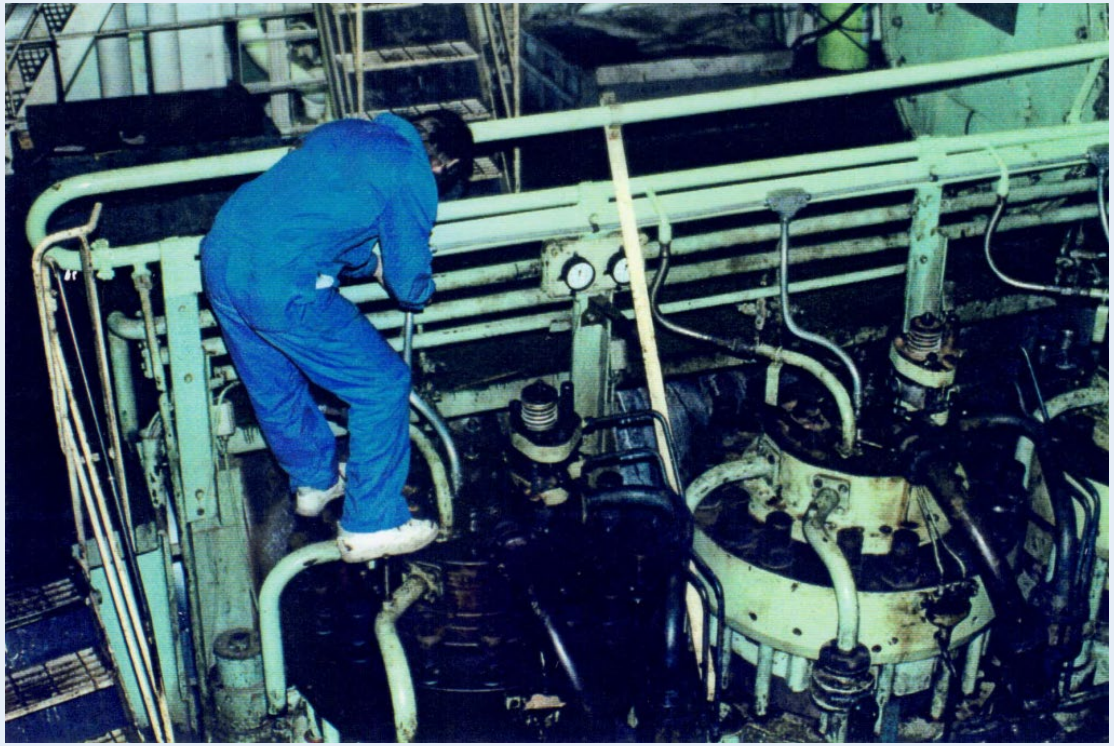
- High fuel savings
- CO_2 reduction in line with the fuel savings
- Particles visibly reduced

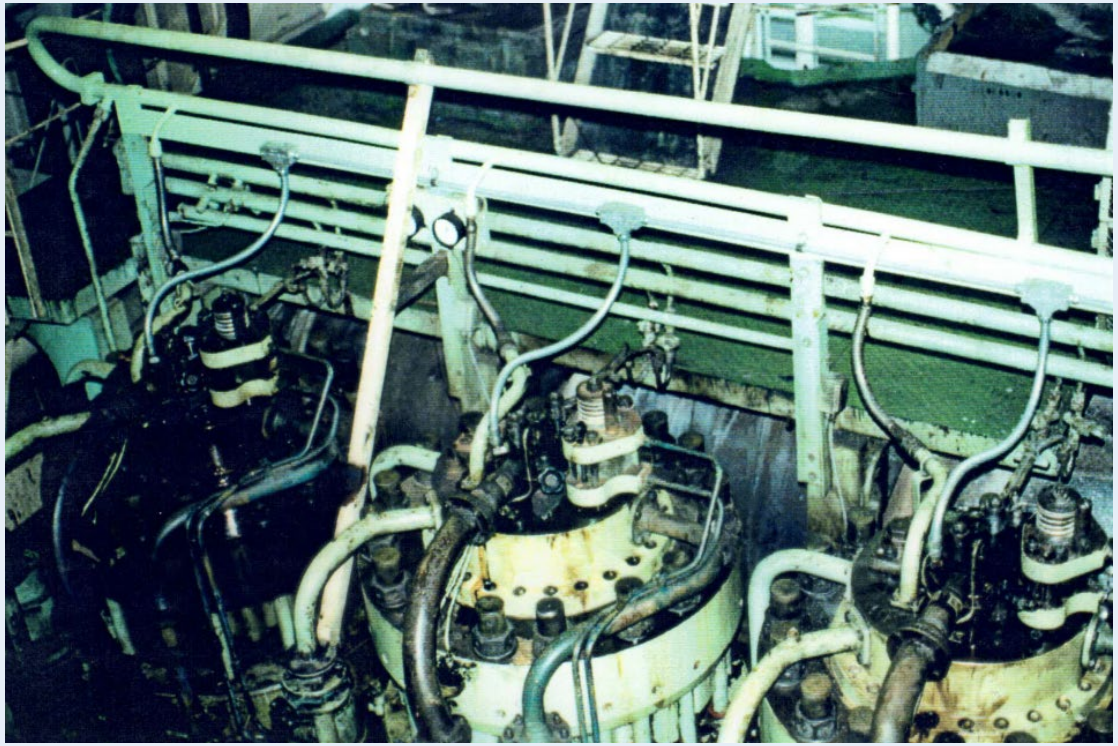
BUSINESS CASE WITH FUEL SAVINGS

	Unit	**Container ship 812 TEU** 1 × MaK 9M43, 8.4 MW, 4-stroke, 75 %, 5,540 rh · North and Baltic Sea	**Container ship 862 TEU** 1 × MaK 9M43C, 8.5 MW, 4-stroke, 85 %, 4,315 rh · North Sea	**Container ship 2,272 TEU** 3 × Götaverken, 58 MW, 2-stroke, 7,000 rh · worldwide	**Coastal tanker** 1 × 6 MW, 4-stroke, 5,000 rh · North and Baltic Sea	**Ro-Ro ferry** 2 × Pielstick PC 2.5, 12 MW, 4-stroke, 4,600 rh · North and Baltic Sea
Fuel consumption per year	t	5,652	5,590	70,000	4,320	5,621
Fuel savings	%	6	5	2	4	8
Investment incl. parts & service (budget)	€	160,000	160,000	485,000	155,000	330,000
Fuel costs per year	€	3,007,503	2,974,512	37,247,910	2,298,728	2,991,114
Fuel savings per year	t	339	280	1,400	173	450
Fuel cost savings per year	€	180,450	148,726	744,958	91,949	239,289
Payback	years	**0.89**	**1.08**	**0.65**	**1.69**	**1.38**

Assumptions as of 24.02.2022 (12-month averages): MGO 0.1 % S bunker price Rotterdam 622.50 USD/t, 0.8548 EUR/USD = 532.11 €/t. Savings depend on engine maker and set-up. Reduced maintenance and spare parts not included. Sources: shipandbunker.com, oanda.com, ecb.europa.eu.

INSTALLATION ON A SULZER RND90





HYDRAULICA on a 2-stroke Sulzer RND90 diesel engine. Right: the double-walled HYDRAULICA lube oil supply pipes to each fuel valve.

A PROVEN PRINCIPLE SINCE 1989

1989–1995

45 engines

The original HYDRAULICA principle is installed on 45 engines.

FROM 1996

≈ 80 systems

A larger company takes over and installs around 80 more systems – over 120 in total.

2001

Shelved

The system is shelved due to competing interests with OEM spare part sales.

2025

Relaunch

Driven by emission rules and fuel costs, AES relaunches a technically upgraded HYDRAULICA, also for newer engine types.

> 120 HYDRAULICA systems installed on diesel engines in the field

45 ENGINES, 1989–1995

NO.	TYPE	COMPANY	COUNTRY	NAME	ENGINES	ENGINE TYPE	FUEL	YEAR
1	Marine	Frigomaris GmbH	Germany	SNOW DRIFT	1	Sulzer 8RND90	IF360	1989
2	Marine	Stena Marine Management AB	Sweden	STENA FREIGHTER	2	Pielstick 12PC2.5V	IF180	1990
3	Marine	Nordstrom & Thulin	Sweden	GRAIP	2	Pielstick 12PC2.5V	IF180	1991
4	Marine	Wallenius Lines AB	Sweden	ANIARA	2	Pielstick 16PC2.5V	IF180	1991
5	Stationary	Gotlands Energieverk K. S. V.	Sweden	Power plant	2	Pielstick 8PC4.2V	IF180	1991
6	Marine	Northern Marine Management Ltd.	UK	KYOWA	1	Sulzer 6RND68M	IF360	1991
7	Marine	Scandi Line A/S	Norway	SANDEFJORD	2	Pielstick 12PC2.0V	IF180	1992
8	Marine	Stena Marine Management AB	Sweden	STENA CARRIER	2	Pielstick 12PC2.5V	IF180	1992
9	Marine	Stena Marine Management AB	Sweden	STENA NORDICA	4	Pielstick 12PC2.5V	IF180	1992
10	Marine	DFDS A/S	Denmark	PRINCE of SCANDINAVIA	4	Pielstick 12PC3.0V	IF360	1992
11	Marine	Star Cruise	Malaysia	STAR AQUARIUS	2	Sulzer 9ZAL40S	IF180	1992
12	Marine	Ferm Int. Ship Management	Sweden	UNITED STAR	2	Wichmann 9AXAG	IF180	1992
13	Marine	National Swedish Adm. of Shipping & Navigation	Sweden	SCANDIA	2	Hedemora V16A/12	MDO	1993
14	Stationary	Bermuda Electric Co. Ltd	Bermuda	Power plant	1	Pielstick 18PC3.0V	Hago	1993
15	Stationary	PT Indocement Tunggal Prakarsa	Indonesia	Power plant	9	Pielstick 18PC4.0V	IF180	1993
16	Marine	Barber Ship Management A/S	Norway	TAPIOLA	1	Sulzer 9RND90M	IF360	1993
17	Marine	Mediterranean Shipping Company	Italy	MSC CARLA	3	Götaverken 850/1700 VGS	IF360	1994
18	Marine	Leif Hoegh & Co. A/S	Norway	HOEGH CAIRN	1	MAN 8KSZ70/125	IF360	1994
19	Marine	DFDS A/S	Denmark	HAMBURG	2	Stork 20TM410	IF360	1995
		Total			**45**			

HYDRAULICA HELPS WITH

Better combustion	Better and cleaner combustion
Lower fuel consumption	Short payback and fuel cost savings
Emission improvements	Unrestricted operation
Lower spare part costs	Longer service life of spare parts and engine
Fewer maintenance hours	Longer maintenance intervals

ALTERNATIVE ENERGY SOLUTIONS

CONTACT

THANK YOU

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Disclaimer: All data provided by AES in this document is non-binding. It serves informational purposes only and is not guaranteed in any way. Depending on each specific project, the data may change and will be assessed and determined individually for each project, depending on its particular characteristics, especially site and operational conditions.