

# TYPE APPROVAL CERTIFICATE

## This is to certify:

**That the Reduction Gear for Propulsion**

with type designation(s)  
**ZF 500, 500-1A**

Issued to

**ZF Padova S.r.l.**  
**Caselle di Selvazzano PD, PD, Italy**

is found to comply with

**DNV GL rules for classification – Ships**

**DNV GL rules for classification – High speed and light craft**

**DNV GL rules for classification – Yachts**

## Application :

**Product(s) approved by this certificate is/are accepted for installation on all vessels classed by DNV GL.**

**Input torque**      **see page 2**

**Input speed**      **see page 2**

**Reduction ratio**      **see page 2**

Issued at **Hamburg** on **2018-10-15**

This Certificate is valid until **2023-10-14**.

DNV GL local station: **Venice**

for **DNV GL**

Approval Engineer: **Olaf Richter**

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**Burkhard Lilienthal**  
**Head of Section**

This Certificate is subject to terms and conditions overleaf. Any significant change in design or construction may render this Certificate invalid. The validity date relates to the Type Approval Certificate and not to the approval of equipment/systems installed.



## Product description

Single stage reduction gear, with or without reversing gear, with built-in clutch(es)

ZF 500 horizontal version, ZF 500-1A down angle version

Ratios ZF 500: 0.925:1, 1.000:1, 1.125:1, 1.237:1, 1.500:1, 1.774:1, 1.966:1, 2.185:1,  
2.480:1, 2.625:1, 2.917:1

Ratios ZF 500-1A: 1.000:1, 1.216:1, 1.485:1, 1.767:1, 1.964:1, 2.192:1, 2.478:1, 2.609:1

## Application/Limitation

The approval is valid for main Diesel propulsion systems, more than one propulsion plant per vessel,  
Maximum application factor  $K_A = 1.20$ . Max. input speed 2600 rpm for all ratios.

Approved ratings according to ZF selection guide:

| Duty ratio | Continuous<br>max. power [kW] max. torque [Nm] |      | Medium<br>max. power [kW] max. torque [Nm] |      | Light<br>max. power [kW] max. torque [Nm] |      | Pleasure<br>max. power [kW] max. torque [Nm] |      |
|------------|------------------------------------------------|------|--------------------------------------------|------|-------------------------------------------|------|----------------------------------------------|------|
| ZF 500     |                                                |      |                                            |      |                                           |      |                                              |      |
| 0.925:1    | 576                                            | 2117 | 592                                        | 2174 | 842                                       | 3092 | 924                                          | 3393 |
| 1.000:1    | 576                                            | 2117 | 592                                        | 2174 | 842                                       | 3092 | 924                                          | 3393 |
| 1.125:1    | 646                                            | 2374 | 700                                        | 2573 | 842                                       | 3092 | 924                                          | 3393 |
| 1.237:1    | 646                                            | 2374 | 700                                        | 2573 | 842                                       | 3092 | 924                                          | 3393 |
| 1.500:1    | 646                                            | 2374 | 700                                        | 2573 | 842                                       | 3092 | 924                                          | 3393 |
| 1.774:1    | 646                                            | 2374 | 700                                        | 2573 | 842                                       | 3092 | 924                                          | 3393 |
| 1.966:1    | 646                                            | 2374 | 700                                        | 2573 | 842                                       | 3092 | 924                                          | 3393 |
| 2.185:1    | 593                                            | 2176 | 642                                        | 2358 | 842                                       | 3092 | 924                                          | 3393 |
| 2.480:1    | 541                                            | 1985 | 586                                        | 2151 | 727                                       | 2671 | 798                                          | 2931 |
| 2.625:1    | 517                                            | 1898 | 560                                        | 2057 | 676                                       | 2484 | 742                                          | 2725 |
| 2.917:1    | 485                                            | 1780 | 517                                        | 1899 | 575                                       | 2112 | 631                                          | 2318 |
| ZF 500-1A  |                                                |      |                                            |      |                                           |      |                                              |      |
| 1.000:1    | 646                                            | 2374 | 700                                        | 2573 | 842                                       | 3093 | 1017                                         | 3737 |
| 1.216:1    | 646                                            | 2374 | 700                                        | 2573 | 842                                       | 3093 | 1017                                         | 3737 |
| 1.485:1    | 646                                            | 2374 | 700                                        | 2573 | 842                                       | 3093 | 972                                          | 3570 |
| 1.767:1    | 646                                            | 2374 | 700                                        | 2573 | 842                                       | 3093 | 940                                          | 3452 |
| 1.964:1    | 646                                            | 2374 | 700                                        | 2573 | 842                                       | 3093 | 935                                          | 3434 |
| 2.192:1    | 593                                            | 2176 | 642                                        | 2358 | 774                                       | 2842 | 849                                          | 3118 |
| 2.478:1    | 541                                            | 1985 | 586                                        | 2151 | 663                                       | 2434 | 727                                          | 2670 |
| 2.609:1    | 517                                            | 1899 | 560                                        | 2058 | 629                                       | 2310 | 690                                          | 2534 |

Duties as per ZF selection guide:

| Duty Hours/year | Continuous<br>Unlimited |           | Medium<br><3500 |           | Light<br><2000 |           | Pleasure<br><500 |           |
|-----------------|-------------------------|-----------|-----------------|-----------|----------------|-----------|------------------|-----------|
| Load profile    | time [%]                | power [%] | time [%]        | power [%] | time [%]       | power [%] | time [%]         | power [%] |
|                 | 75                      | 100       | 40              | 100       | 10             | 100       | 2                | 100       |
|                 | 13                      | 92        | 25              | 70        | 15             | 54        | 8                | 54        |
|                 | 12                      | 6         | 35              | 6         | 40             | 20        | 20               | 35        |
|                 |                         |           |                 |           | 35             | 6         | 70               | 6         |

Pleasure duty for DNVGL class notations LC Naval, Patrol, Yacht, Crew.

## **Type Approval documentation**

### **Marking of product**

Manufacturer's name or trademark. Type number designation.

### **Periodical assessment**

For retention of the Type Approval, a DNV GL surveyor shall perform an assessment after 2 years and after 3.5 years to verify that the conditions of the type approval are complied with. A renewal assessment will be performed at renewal of the certificate.

The objective of the Periodical Assessment is to verify that the conditions for the Type Approval are not altered since the Type Approval Certificate was issued. The main scope of the Periodical Assessment will normally include:

- Verification of the Type Approval applicant's production and quality system w.r.t. ensuring continued consistent production of the Type Approved products at the Type Approval applicant's own premises and at other companies that are given the responsibility for manufacturing of the products
- Review of the Type Approval documentation and that this is still used as basis for the production
- Review of possible changes to the design, the material and the performance of the product
- Verification of the product marking

In cases where the Type Approved product is manufactured at other companies, the Periodical Assessment shall verify that the Type Approval applicant has a quality control system for consistent production at their licensees/subcontractors. Furthermore Periodical Assessment shall be carried out randomly at these companies.

When a Type Approved product is manufactured at other companies, the Type Approval applicant takes the sole responsibility for the conformity of the product to the applicable requirements.

### **Other conditions**

The approval does not cover:

- Fastening and foundation of the gearbox incl. chocking calculations
- Connection to propeller shaft
- Lubrication / hydraulic diagram incl. instrumentation (measuring devices, sensors and alarms)

END OF CERTIFICATE