

TYPE APPROVAL CERTIFICATE

This is to certify:**That the Clutch and Friction Brake Coupling for Shaft**with type designation(s)
Type 48, series 8 & 9

Issued to

**Prodan GmbH
GÄUFELDEN, Germany**

is found to comply with

DNV GL rules for classification – Ships**DNV GL rules for classification – High speed and light craft****Application :****Product(s) approved by this certificate is/are accepted for installation on all vessels classed by DNV GL.**Issued at **Hamburg** on **2018-03-15**This Certificate is valid until **2023-03-14**.DNV GL local station: **Augsburg**for **DNV GL**Approval Engineer: **Stanislav Avanesov**

**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

Oil pressure operated multidisc clutch.

Application/Limitation

The clutches are approved for main propulsion (incl. ice class notations) and for auxiliary purposes, based on the following data:

Series 8	Type	Size	Configuration	Customization	M _{static} (M _ü) Nm	M _{dynamic} (M _s) Nm
	48 -	64/65/66/67	- 8511/8512	- yyy	up to 5584	up to 3723
	48 -	256/257/258/259	- 8511/8512	- yyy	up to 25600	up to 17100
	48 -	750/751/752/753	- 8511/8512	- yyy	up to 49000	up to 32700
	48 -	1100/1101/1102/1103	- 8511/8512	- yyy	up to 115300	up to 76900
	48 -	2200/2201/2202/2203	- 8511/8512	- yyy	up to 229800	up to 153200

Series 9	Type	Size	Configuration	Customization	M _{static} (M _ü) Nm	M _{dynamic} (M _s) Nm
	48 -	64	- 9511/9512	- yyy	up to 1257	up to 838
	48 -	128	- 9511/9512	- yyy	up to 2266	up to 1511
	48 -	180	- 9511/9512	- yyy	up to 6780	up to 4520
	48 -	256	- 9511/9512	- yyy	up to 4254	up to 2836
	48 -	360	- 9511/9512	- yyy	up to 12952	up to 8635
	48 -	550	- 9511/9512	- yyy	up to 13660	up to 9106
	48 -	750	- 9511/9512	- yyy	up to 20786	up to 13857
	48 -	1100	- 9511/9512	- yyy	up to 30130	up to 20086
	48 -	2200	- 9511/9512	- yyy	up to 67463	up to 44976
	48 -	4500	- 9511/9512	- yyy	up to 119804	up to 79869
	48 -	6000	- 9511/9512	- yyy	up to 175435	up to 116957

Outer flange housing 8511 and 9511
Inner flange housing 8512 and 9512
Hub housing 8513 and 9513
yyy: Starts at 500 and stands for customisation

Pressure: 18 bar to 34 bar
n_{max} (rpm): Based on the speed of up to 46 m/s at the outmost point of the clutch diameter

General:

The permissible rated torque is found by dividing M_{dynamic} by at least 1,3 and M_{static} by at least 1,8, the minimum of these applies. Normally M_{static} is not to exceed 2,5 times the rated torque. Special vibration conditions may require deviations of the a.m. limits.

Ice class notations:

The torque requirements may have to be increased for plants with ice class notation. See the Rules Pt.4, Ch.4, Sec.3 B 102. If the ice class application factor K_{Aice} > 1.4, the torque capacities are to be increased by the ratio K_{Aice}/1.4.

K_A = application factor for ice notation

- determined by means of specially approved ice impact response evaluations (simulations).
- or $K_A = 1 + T_{ice}/T_0$ u I/It

Tice = acc. to actual ice class notation
T0 = rated transmitted torque
u = gear ratio
I = equivalent mass moment of inertia on the engine side of the coupling
I_t = equivalent mass moment of inertia of the entire rotating system.

Type Approval documentation

Marking of product

The product to be marked with manufacturer's name or trademark and type number identification

Periodical assessment

For retention of the Type Approval, a DNV GL surveyor shall perform a survey after 2 and 3,5 years before the expiry date of this certificate to verify that the conditions of the type approval are complied with.

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.

Other conditions

The connection between clutch outer part and driven member and clutch hub and input shaft to be approved in each separate case.

For single propulsion plants, the clutch is to be of such design that sufficient torque transmission can be arranged in event of loss of hydraulic pressure.