# TYPE-CERTIFICATE DATA SHEET

No. E.127

**for Engine**
GTD-350 Series Engine

**Type Certificate Holder**
Pratt & Whitney Rzeszów S.A.

ul. Hetmańska 120
35-078, Rzeszów
POLAND

For Models:
GTD-350 II series
GTD-350 III series
GTD-350 IV series
GTD-350 III series, W version
GTD-350 IV series, W version
GTD-350 III series, W2 version
GTD-350 IV series, W2 version

Intentionally left blank

 

**TABLE OF CONTENTS**



 

## I. General

### 1. Type / Models

GTD-350
GTD-350 II series
GTD-350 III series
GTD-350 IV series
GTD-350 III series, W version
GTD-350 IV series, W version
GTD-350 III series, W2 version
GTD-350 IV series, W2 version

### 2. Type Certificate Holder

Pratt & Whitney Rzeszów S.A.
(formerly: Wytwornia Sprzetu Komunikacyjnego S.A.)
ul Hetmańska 120
35-078 Rzeszów

Design Organisation Approval No.: EASA.21J.115

### 3. Manufacturer

As Type Certificate Holder (Production Organisation Approval No, PL.21G.001).

### 4. Date of Application

CC-38 Application was made to CAA-Poland before existence of EASA. Date not known.

### 5. EASA Type Certification Date

Certificate date 08 July 1968
III series model certification date 12 July 1972
IV series model certification date 03 March 1978
W version model certification date 26 February 1993
W2 version model certification date 10 January 2003

EASA Type-Certification is granted in accordance with Article 3 of EU Commission Regulation (EU) 748/2012 based on CAA-Poland TC No CC-38.

## II. Certification Basis

### 1. EASA Certification Basis

#### 1.1. Airworthiness Standards

BCAR, Section C, Chapter C4 - 6 Issue 6, 15th June 1966
JAR E Change 10 dated 15 August 1999 (W2 version)

#### 1.2. Special Conditions (SC)

None

#### 1.3. Equivalent Safety Findings (ESF)

None

**1.4. Deviations**

None

**1.5. Environmental Protection**

ICAO Annex 16 Volume II, 2nd Edition, 1993 - Emission and Fuel Venting

## III. Technical Characteristics

**1. Type Design Definition**

GTD-350: 16.0.5000

**2. Description**

Free power turbine, axial-centrifugal compressor, seven axial stages, one centrifugal stage, single stage compressor turbine, double-stage power turbine, single combustion chamber.

**3. Equipment**

The engine equipment list is included in the Type Design Definition.

**4. Dimensions**

All engine version

| | |
|---|---|
| Length | 1385 mm |
| Width | 626 mm |
| Height | 760 mm |

**5. Dry Weight**

| GTD-350 | Series II | Series III | Series IV | Series III and IV W version | Series III and IV W2 version |
|---|---|---|---|---|---|
| Engine dry weight (kg) | 137,7 + 2,7 | 139,3 + 2,8 | 139,3 + 2,8 | 139,3 + 2,8 | 139,3 + 2,8 |

Engine dry weight, including basic engine, control and ignition systems mounted at the engine.

**6. Ratings**

The engine performance declared is guaranteed under International Standard Atmosphere (ISA) conditions at sea level, dry air, pressure 760 mm Hg (101,3 kPa) and temperature +15°C (288°K) with no power extraction for aircraft accessories, no air bleed, and with lemniscate inlet.
Serial production engines described in the Type Certification herein must be capable to produce at least 100% of power declared at declared speed and air parameters at the engine inlet.

Maximum cruise (I cruise)

| GTD-350 | Series II | Series III | Series IV | Series III and IV W version | Series III and IV W2 version |
|---|---|---|---|---|---|
| Shaft power (kW) | 210 | 210 | 210 | 210 | 210 |

Nominal (60 minutes)

| GTD-350 | Series II | Series III | Series IV | Series III and IV W version | Series III and IV W2 version |
|---|---|---|---|---|---|
| Shaft power (kW) | 235 | 235 | 235 | 235 | 235 |

Take-off (6 minutes)

| GTD-350 | Series II | Series III | Series IV | Series III and IV W version | Series III and IV W2 version |
|---|---|---|---|---|---|
| Shaft power (kW) | 290 | 290 | 290 | 313 | 320 |

30 minute OEI

| GTD-350 | Series II | Series III | Series IV | Series III and IV W version | Series III and IV W2 version |
|---|---|---|---|---|---|
| Shaft power (kW) | - | - | - | - | 320 |

## 7. Control System

| GTD-350 | Series II | Series III | Series IV | Series III and IV W version | Series III and IV W2 version |
|---|---|---|---|---|---|
| Fuel Metering Pump | PNRP-2 (NR-40T) | PNRP-3 (NR-40T) | PNRP-3 (NR-40T) | PNRP-3 (NR-40T) | PNRP-3 (NR-40T) |
| Free Turbine hydro mechanical speed limiter | OOWT-2 (RO-40T) | OOWT-3 (RO-40T) | OOWT-3 (RO-40T) | OOWT-3 (RO-40T) | OOWT-3 RO-40T) |
| Turbine Synchronizer | ST-1 (SO-40) | ST-1 (SO-40) | ST-1 (SO-40) | ST-1 (SO-40) | ST-1 (SO-40) |
| Air Bleed Pick Up | ASUP-2 (DS-40T) | ASUP-2 (DS-40T) | ASUP-2 (DS-40T) | ASUP-2 (DS-40T) | ASUP-2 (DS-40T) |
| Air Bleed valve with icing protection valve | ZZUP-1 | ZZUP-2 | ZZUP-3 | ZZUP-3 | ZZUP-3 |
| Electromagnetic valve | EMT-244 | MK-4-2 or MK-4-2A | MK-4-2 or MK-4-2A | MK-4-2 or MK-4-2A | MK-4-2 or MK-4-2A |
| Fuel spray nozzle | Single nozzle, double channel - centrifugal | Single nozzle, double channel - centrifugal | Single nozzle, double channel - centrifugal | Single nozzle, double channel - centrifugal | Single nozzle, double channel - centrifugal |

## 8. Fluids (Fuel, Oil, Coolant, Additives)

Refer to the Maintenance Manual of the models.

### 9. Aircraft Accessory Drives

| Powered from gas turbine | Rotation | Speed Ratio | Max. Torque Nm (kGm) | Max. Overhang Moment Nm (kGm) |
|---|---|---|---|---|
| Starter generator | CC | 0.25 | - | 15.696 (1.6) |

CC - counter-clockwise

### 10. Maximum Permissible Air Bleed Extraction

Max. allowed air bleed for helicopter use at nominal range - 0,03 kg/s

## IV. Operating Limitations

### 1. Temperature Limits

Maximum allowable gas temperature in service (ºC):

| GTD-350 | Series II | Series III | Series IV | Series III and IV W version | Series III and IV W2 version |
|---|---|---|---|---|---|
| 30 minutes OEI | - | - | - | - | 1000 |
| Take–off (6 minutes) | 985 | 970 | 970 | 985 | 985 |
| Nominal (60 minutes) | 940 | 920 | 920 | 920 | 920 |
| Maximum cruise | 900 | 890 | 890 | 890 | 890 |
| Idle | 790 | 790 | 790 | 790 | 790 |
| During acceleration | 1005 | 990 | 990 | 990 | 990 |
| During starting on ground | See Operating and Servicing Instructions for engine GTD-350 Doc. No 16.0.375 | | | | |
| During flight | 870 | 870 | 870 | 870 | 870 |

 

**2. Speed Limits**

Engine Operative speed (%):

30 minutes OEI

| GTD-350 | Series II | Series III | Series IV | Series III and IV W version | Series III and IV W2 version |
|---|---|---|---|---|---|
| Gas generator | - | - | - | - | max 97 |
| Output shaft | - | - | - | - | 97 |

Take-off (6 minutes)

| GTD-350 | Series II | Series III | Series IV | Series III and IV W version | Series III and IV W2 version |
|---|---|---|---|---|---|
| Gas generator | max 96 | max 96 | max 96 | max 96 | max 97 |
| Output shaft | 97 | 97 | 97 | 97 | 97 |

Nominal (60 minutes)

| GTD-350 | Series II | Series III | Series IV | Series III and IV W version | Series III and IV W2 version |
|---|---|---|---|---|---|
| Gas generator | max 90 | max 90 | max 90 | max 90 | max 90 |
| Output shaft | 101 | 101 | 101 | 101 | 101 |

Maximum cruise (I cruise)

| GTD-350 | Series II | Series III | Series IV | Series III and IV W version | Series III and IV W2 version |
|---|---|---|---|---|---|
| Gas generator | max 87.5 | max 87.5 | max 87.5 | max 87.5 | max 87.5 |
| Output shaft | max 104 | max 104 | max 104 | max 104 | max 104 |

NOTE: 100% of the gas generator speed corresponds to 45000 rpm.
100% of the power turbine speed corresponds to 24000 rpm and 5904 rpm of engine output shaft and 246 rpm of helicopter rotor, and corresponds to 81,3% of helicopter instrument indications

**3. Torque Limits**

None

**4. Pressure Limits**

Pressure of fuel and oil (kPa)

4.1 Fuel Pressure

| GTD-350 | Series II | Series III | Series IV | Series III and IV W version | Series III and IV W2 version |
|---|---|---|---|---|---|
| fuel pressure at the fuel metering pump inlet | 39 to 118 | 39 to 118 | 39 to 118 | 39 to 118 | 39 to 118 |

4.2 Oil Pressure

| GTD-350 | Series II | Series III | Series IV | Series III and IV W version | Series III and IV W2 version |
|---|---|---|---|---|---|
| at ground idle rating | min 147 | min 147 | min 147 | min 147 | min 147 |
| at cruise rating and above | 245 to 343 | 245 to 343 | 245 to 343 | 245 to 343 | 245 to 343 |

**5. Time Limited Dispatch (TLD)**

The engine is not approved for Time Limited Dispatch in accordance with CS-E 1030.

**6. ETOPS Capability**

The engine is not approved for ETOPS capability in accordance with CS-E 1040.

## V. Operating and Service Instructions

| | |
|---|---|
| 16.0.373 | Operating and Servicing Instructions |
| 16.0.381 | Description of the engine |
| 16.0.545 | Installation Manual |
| 16.1.134 | Technical conditions for GTD-350 engine series IV overhaul - part I |
| 16.1.135 | Technical conditions for GTD-350 engine series IV overhaul - part II |

## VI. Notes

Note 1. The following equipment is installed on helicopter:
ITG-1 or ITG-1M gas temperature indicator, oil temperature transmitter, ID-8 pressure transmitter, SKND-11-1A igniter, PSG-14a or PSG-14a series 2 starting control box, DRM-200D current blocking, relay, RN-120V voltage regulator, AZP-8M series IV generator protector against voltage increase, disconnecting and switching contacts, blocking relays, two 12 SAM-28 batteries, SRAP-500 on-board plug.

Note 2. The engine power ratings during operation are to be maintained according to Chapter 2 of Operating and Servicing Instructions for Engine GTD-350 (doc. No. 16.0.373).
For „W2" version engine under ISA conditions (pressure 760 mmHg (101,3 kPa)) and temperature +15°C (288°K), at compressor max rpm conditions, the Nominal rating output power is 350 HP, and at Maximum Cruise rating output power is 320 HP.

Note 3. During transient operation of engine, allowed are: an overspeed surge (30 sec max) of helicopter main rotor up to 86% or speed drop (15 sec max) of helicopter main rotor down to 76%. In case of one engine failure, interruption or switch off during take-off or flight, allowed is speed drop (5 sec max) of helicopter main rotor down to 70%. During engine live no more than 5 such speed drops of helicopter main rotor are allowed. During idling a speed surge (5 sec max) of the helicopter main rotor is allowed provided it does not exceed 92%.

Note 4. GTD-350 engines incorporate a single ignition system

Note 5. The approved service life for GTD-350 engines series II is 2000 hours, and for engines series III and IV is 4000 hours.

Note 6. The GTD-350 engine is provided for various versions of Mi-2 helicopter.
The GTD-350 engine series III model is the same as series II model except that the engine is equipped with modified control system accessories and modified air bleed i.e. NR-40TA fuel metering pump; RO-40TA free (power) turbine speed limiter; ZZUP-2 air bleeding valve.
Additionally the GTD-350 engine series III model has the elements which have increased, in comparison with series II model, efficiency.
The GTD-350 engine series IV model incorporates modified, III bearing assembly, thus the differences to series III model are as follows:
- location of oil and air lines;
- removable oil injector;
- the oil scavenge pipe form III bearing is equipped with oil reservoir;
- incorporation of the graphite sealing;
- the air outlet (for air filter) is relocated from the combustion chamber case to the compressor case;
- the air filter is relocated from power turbine case to gear box case;

Additionally, the GTD-350 engine series IV is equipped with modified ZZUP-3 air bleed valve instead of ZZUP-2.

The GTD-350 engine series III during overhaul is modified (rebuild) according specification of the GTD-350 engine series IV, thus there is no difference between them after overhaul. Such engine has letter "D" suffixed to serial number.
The GTD-350 engines series III and IV "W" version are similar to GTD-350 engines series III after overhaul (i.e. after rebuild to series IV) except they incorporate the axial compressor case with metal spray abradable layer and modified procedure for selection of a turbine nozzles.
GTD-350 engines series III and IV version W2 have modified gas path and specific selection of the gas path parts to improve performances. Version W2 engines are approved for 30 min. OEI rating (435 HP).

## SECTION: ADMINISTRATIVE

### I. Acronyms and Abbreviations

n/a

### II. Type Certificate Holder Record

n/a

### III. Change Record

| Issue | Date | Changes | TC issue |
|---|---|---|---|
| Issue 01 | 12 August 2015 | Transfer from existing Polish TC into EASA TC / Company Name change | 15 December 2015 |

-END-

 