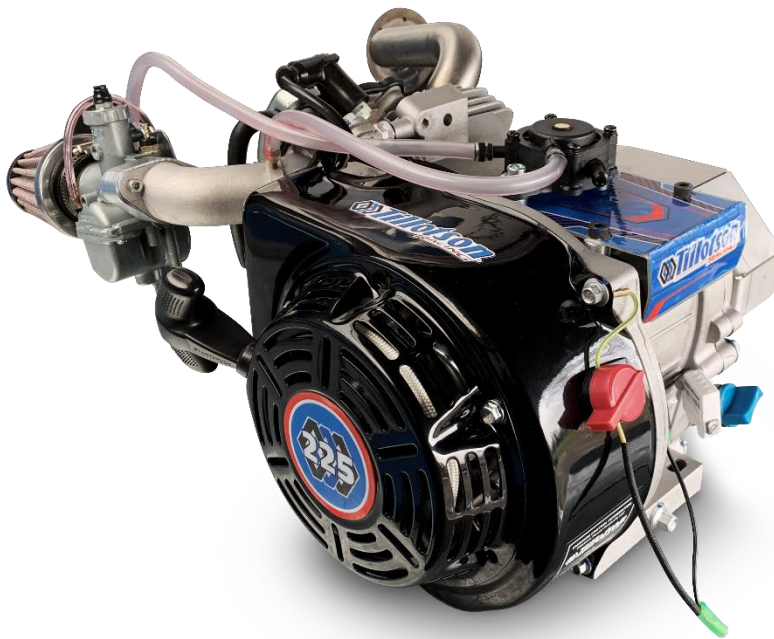




## Tillotson TPP-225RS Engine Rulebook USA 2021





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## **Section A: Engine**

### **1. Tillotson TPP-225RS Engine:**

- 1.1 The engine must remain as original from factory.
- 1.2 No after-market parts are permitted unless stated in TPP-225RS engine fiche document.
- 1.3 No machining or other modification of interior engine surfaces (deburring, honing, grinding, polishing, sanding, media blasting, heat treatment) is permitted.
- 1.4 All parts are subject to visual comparison and must remain in substantially unaltered form when compared to an original part.
- 1.5 Engine and all components must comply with engine fiche document.

### **2. Sealing:**

- 2.1 TPP-225RS engines must be fitted with the original engine ID Seal correlating with the engine ID number as supplied from the Tillotson factory. If an alternative seal number is identified the engine is not valid for competition.
- 2.2 Tillotson are the only sealing agent permitted to open the engines and re-seal as necessary unless there is an appointed sealing agent in the designated country.
- 2.3 Sealing agent must notify Tillotson immediately after changes are made to any engine seal numbers.
- 2.4 Two seal types which are currently in use:

2021 Production



2020 Production



- 2.5 Starting from Engine Serial Number 20110001 only the 2021 Production Engine seal is permitted. Any engine from this Serial Number using the previous model engine seal will not be allowed in competition.

### **3. Material Permitted to Manipulate:**

The following areas of adjustment and cleaning are permitted within reason. Any effect that alters the integrity of the components or which in the sole opinion of the scrutineer extends beyond reasonable cleaning is prohibited.

- 3.1 Valve clearances may be adjusted, and valves may be cleaned; however, valves must remain with the factory specification of 45-degree angle only. Valve seats of additional angles and/or angles not comparable to the factory stock of 30-45-60 degrees are not permitted.
- 3.2 Spark plugs may be cleaned to remove carbon.
- 3.3 The piston and combustion chamber may be cleaned to remove carbon.
- 3.4 Damaged thread repair: It is permitted to use Heli-coil or a similar thread repair insert as long as the part, after repair, is within the dimension, weight or measurements set on the engine fiche document.



#### 4. Engine Components:

- 4.1 Engine ignition switch and wires must remain in original location. It is not permitted to alter the wiring.
- 4.2 It is mandatory to use the original Air filter, P/N: T-AIRFILTER-01. No modification to the filter element is permitted.
- 4.3 A breathable rain sock or protective shield may be attached for wet-weather competition. It is not permitted for the protective shield to create any ram-aireffect.
- 4.4 Oil breather valve cover: It is recommended to connect the oil breather pipe to a catch container. The container must be vented to the atmosphere.
- 4.5 Pulse signal from the engine must be taken from the inlet manifold to the fuel pump connection. The length of the pulse hose is recommended not to exceed 28cm.
- 4.6 Only original Fuel Pump is permitted. P/N: FP-10A
- 4.7 It is recommended to use the latest clutch guard as supplied (T-CLU-GRD-01). It is permitted to modify the chain guard if necessary due to chassis design. A minimum of 2 bolts must be used to mount the supplied chain guard. The use of an alternative chain guard is also permitted.
- 4.8 A maximum of one in-line fuel filter is recommended to ensure that dirt and contamination within the fuel system does not affect engine performance. A fuel filter is not mandatory.
- 4.9 Blower housing / starter assembly must be original and properly installed. No taping, covering, or restricting of air of any part of this assembly is permitted.
- 4.10 Exhaust gasket must be original, and one and only one piece must be used. Use of silicone is permitted.
- 4.11 It is not grounds for disqualification if the exhaust nuts loosen during a race so long as the exhaust remains attached to the head with at least two nuts.
- 4.12 Use of an O2, EGT or CO2 sensor is permitted.
- 4.13 Exhaust protection is recommended. The exhaust should be completely wrapped with a non-asbestos insulation material or sleeve.
- 4.14 No aftermarket kill switch may be allowed and the OEM kill switch must be as supplied by manufacture.

#### 5. Exhaust:

- 5.1 Exhaust Model TILL4625 (T-EXH-001) as supplied with the engine is mandatory for all competitions unless of special exemptions as requested by the organizing Club, Series or Track.
- 5.2 There are two versions permitted:
  - 2020 Version: Silencer Welded to Header Pipe (RLV P/N:TILL4625)
  - 2021 Version: Silencer (RLV P/N:EXF4125) mounted to Header Pipe (RLV P/N:EXF5200) by T-Bolt Clamp (RLV P/N:FAS6580).
- 5.3 If the track, club or organizing series wish to use an alternative exhaust option for reduced noise limits the following exhaust option is recommended:
  - RLV P/N:EXF4110 (using Header Pipe RLV P/N:EXF5200 and Mounting Kit RLV P/N:MNT5910)



## 6. Clutch:

- 6.1 The original clutch is recommended. P/N: T-NORAM-CLU-21T
- 6.2 The use of one of the following alternative clutches is permitted.
  - Noram GE Heavy
  - Noram GE Light
  - Noram GE Ultimate Heavy
  - Noram Ultimate GE Light
  - Max-Torque S-S
  - Max-Torque Draggin Skin
  - Premier Magnum Heavy
  - Premier Magnum Light
  - Premier Stinger
  - Inferno by Hilliard Fire
  - Inferno by Hilliard Flame
  - Inferno by Hilliard Blaze
  - Inferno by Hilliard Fury
- 6.3 All clutches must be original as supplied by the manufacturer and no tuning, modification or manipulating of material is permitted. The use of either 35 or 219 pitch is allowed for both clutch options.
- 6.4 It is recommended that the clutch is mounted inboard. It is permitted to mount the clutch outboard if necessary due to chassis design but doing so can put extra stress on the crankshaft.

## 7. Spark Plugs:

- 7.1 The original spark plug supplied with the engine is recommended. The following spark plugs are permitted for use:
  - Autolite AR3910X
  - E3-106
- 7.2 Sealing washer must be in place and remain original on the stock spark plug used. Temperature thermocouple is permitted once the sealing washer is not modified.

***During technical inspections, a new stock part can be used as reference to compare a competitor's part for legality.***



## **Section B: Carburetor**

### **1. Tillotson FM22-1A Carburetor:**

- 1.1 The carburetor must remain as original from the factory.
- 1.2 No after-market parts are permitted.
- 1.3 No machining or other modification of the surface finish is permitted.
- 1.4 Only the Tillotson supplied jets and slides are permitted for use.
- 1.5 All parts are subject to visual comparison and must remain in substantially unaltered form when compared with an original part.
- 1.6 Carburetor and all components must comply with carburetor fiche document.

## **Section C: Oil**

### **1. Tillotson T4 Racing Oil by Xeramic:**

- 1.1 'Tillotson T4 Racing Oil by Xeramic' is the only oil permitted for use in the T225RS engine for competition.
- 1.2 Recommended volume of oil to be filled is 500ml. A minimum of 450ml of oil must be present in each engine after the race or will result in disqualification from the session, heat or final just competed in.
- 1.3 Any additives or substances mixed with the oil is strictly prohibited.
- 1.4 Failure of the DYE test will result in penalties decided by event organisers.

## **Section D: General Rules**

- 1. Only Tillotson authorized personnel are permitted to make changes to the rules package, fiche documentation or technical specification.
- 2. Tillotson distributors and their dealers are not authorised to alter any technical specifications or competition rules relating to the engine.
- 3. Any alterations, corrections and/or addendums will be submitted to sanctioning bodies and posted at [www.tillotson.ie](http://www.tillotson.ie) and will become effective on the date specified in the posting.
- 4. Previous mid-season updates are to be considered void upon publication of an annual update.
- 5. Technical inspection tools are available for the convenience of checking components against the measures set on the fiche document. The tools are available from Tillotson. For further enquiries contact [sales@tillotson.ie](mailto:sales@tillotson.ie).
- 6. Recommended minimum total weight (Kart and Driver combined): Senior: 355lbs (Check event supplementary regulations)
- 7. Pump or station fuel / gas is permitted or as set in the supplementary regulations set by the local track, club or race series where competing (recommend not to use anything higher than 93 octane). Use of fuel additives is not permitted.

***Refusal to adhere to any of the rules set out will be investigated by the race officials and may result in disqualification from the race results.***

## APPENDIX 1

### TPP-225RS Parts List



#### 1.1 TPP-225RS ENGINE PACKAGES

| <u>TILLOTSON P/N</u> | <u>DESCRIPTION</u>  |
|----------------------|---|
| TPP225RS-PKG-USA     | 225RS COMPLETE USA VERSION  |
| TPP225RS-SB1         | 225RS LONG BLOCK ENGINE (LESS FLYWHEEL, IGNITION AND ANCILLARIES) |

#### 1.2 CRANKCASE & ACCESSORIES

| <u>TILLOTSON P/N</u> | <u>DESCRIPTION</u>                    |
|----------------------|---------------------------------------|
| 138220002            | CRANKCASE ASSEMBLY-S                  |
| 138190002            | BEARING, CRANKCASE-S                  |
| 138220028            | CRANKCASE PLATE-S                     |
| 138220026            | HEXAGON SOCKET HEAD CAP SCREW M6*20-S |
| 138220025            | SPACER-TOP MOUNTING PLATE             |
| 138190004            | WASHER, DRAIN PLUG-S                  |
| 138190005            | BOLT, DRAIN PLUG-S                    |
| 138190003            | OIL SEAL-S                            |
| 138220053            | STICKER, TOP MOUNTING PLATE-S         |

#### 1.3 CRANKSHAFT, CONNECTING ROD & PISTON

| <u>TILLOTSON P/N</u> | <u>DESCRIPTION</u>        |
|----------------------|---------------------------|
| 138210107            | CRANKSHAFT ASSEMBLY-S     |
| 138220031            | CONNECTING ROD ASSEMBLY-S |
| 138220017            | HALF-SLEEVE BEARING-S     |
| 138220016            | BOLT, CONNECTING ROD-S    |
| 138220004            | PISTON-S                  |
| 138220006            | PISTON PIN-S              |
| 138220008            | CIRCLIP, PISTON PIN-S     |
| 138220005            | RING SET, PISTON-S        |

#### 1.4 CRANKCASE COVER, CLUTCH & CHAIN GUARDS

| <u>TILLOTSON P/N</u> | <u>DESCRIPTION</u>                |
|----------------------|-----------------------------------|
| 138190017            | GASKET, CRANKCASE-S               |
| 138190016            | DOWEL PIN BUSHING, CRANKCASE-S    |
| 138190002            | BEARING, CRANKCASE-S              |
| 138190018            | CRANKCASE COVER-S                 |
| 138190020            | DIPSTICK ASSEMBLY-S               |
| 138190019            | OIL PLUG ASSEMBLY-S               |
| 138190003            | OIL SEAL-S                        |
| 138190015            | FLANGE BOLT M8*30-S               |
| 138220032            | CHAIN GUARD-S ALUMINIUM TYPE 2020 |
| 138190060            | FLANGE BOLT 5/16*20-S             |
| T-CLU-GRD-01         | CLUTCH GUARD 2021                 |

## 1.5 CLUTCH & COMPONENTS (OPTIONAL)

| <u>TILLOTSON P/N</u> | <u>DESCRIPTION</u>             |
|----------------------|--------------------------------|
| T-NORAM-CLU-21T      | NORAM CLUTCH, 21T-S            |
| T-NORAM-KEY-01       | NORAM KEYWAY VERSION SHORT     |
| T-NORAM-KEY-02       | NORAM KEYWAY VERSION LONG 2021 |
| T-CLU-SPACER-01      | CLUTCH MACHINED SPACER         |
| T-CLU-BOLT-01        | CLUTCH BOLT                    |
| T-CLU-WASH-01        | CLUTCH WASHER                  |
| T-CLU-WASH-02        | CLUTCH SPRING WASHER           |
| T-CLU-SPR-01         | NORAM CLUTCH SPRING GREEN      |

## 1.6 CYLINDER HEAD & COMPONENTS

| <u>TILLOTSON P/N</u> | <u>DESCRIPTION</u>          |
|----------------------|-----------------------------|
| 138190037            | FLANGE BOLT M6*12-S         |
| 138190088            | VALVE COVER-S               |
| 138190096            | TUBE, BREATHER-S            |
| 138190038            | GASKET, VALVE COVER-S       |
| 138190021            | FLANGE BOLT M8*60-S         |
| T-E3-106             | SPARK PLUG, E3              |
| 138210100            | CYLINDER HEAD ASSEMBLY-S    |
| 138190056            | STUD, EXHAUST MANIFOLD-S    |
| 138220033            | STUD, INTAKE MANIFOLD-S     |
| 138220030            | CYLINDER HEAD GASKET-S      |
| 138190022            | PIN, DOWEL, CYLINDER HEAD-S |
| 138220014            | FLANGE BOLT M6*16-S         |
| 138210125            | AIR LEADING COVER-S         |

## 1.7 VALVE TRAIN & CAMSHAFT ASSEMBLY

| <u>TILLOTSON P/N</u> | <u>DESCRIPTION</u>       |
|----------------------|--------------------------|
| 138190035            | VALVE LOCKING NUT-S      |
| 138190034            | VALVE ADJUSTING NUT-S    |
| 138190033            | ROCKER ARM-S             |
| 138190030            | ROCKER ARM SUPPORT-S     |
| 138190031            | PLATE, PUSH ROD GUIDE-S  |
| 138190032            | PUSH ROD-S               |
| 138190013            | TAPPET, VALVE-S          |
| 138220012            | CAMSHAFT ASSEMBLY-S      |
| 138210101            | VALVE, INTAKE-S          |
| 138210102            | VALVE, EXHAUST-S         |
| 138210112            | VALVE SEAL-S             |
| 138220029            | VALVE SPRING (26LBS)-S   |
| 138210103            | RETAINER, VALVE SPRING-S |
| 138210104            | VALVE COLLET-S           |



## 1.8 CARBURETTOR, AIR FILTER, FUEL PUMP & ACCESSORIES

| <u>TILLOTSON P/N</u> | <u>DESCRIPTION</u>                          |
|----------------------|---|
| 138190050            | GASKET, INTAKE MANIFOLD-S                   |
| 138220034-PLATE      | INTAKE MANIFOLD ASSEMBLY WITH ADAPTER PLATE |
| 138220073            | SPRING WASHER, M6 INTAKE STUD               |
| 138220020            | STYLE 1 HEXAGON NUT,M6 INTAKE STUD          |
| FP-10A               | FUEL PUMP                                   |
| 138220035            | GASKET, CARBURETOR-S                        |
| FM22-1A              | CARBURETOR, FM22-1A                         |
| 306222598            | CARBURETOR MOUNTING BOLTS, M6 x 16mm        |
| T-AIRFILTER-01       | AIR FILTER-S                                |
| 138190055            | FUEL LINE CLIP-S                            |
| 138190092            | FUEL LINE PULSE CONNECTION                  |
| 138190093            | PULSE FUEL LINE PROTECTIVE SLEEVE-S         |

## 1.9 STARTER, RECOIL, FLYWHEEL & IGNITION COIL

| <u>TILLOTSON P/N</u> | <u>DESCRIPTION</u>                       |
|----------------------|--|
| 138220024            | FLYWHEEL ADAPTOR-2019                    |
| 138220063            | FLYWHEEL ADAPTOR-2020                    |
| 138220022            | HEXAGON SOCKET HEAD CAP SCREW M6*12-S    |
| 138220007            | PVL IGNITION COIL, 6500rpm.-S            |
| 138220067            | PVL IGNITION COIL, 6000rpm.-S            |
| 138220068            | PVL IGNITION COIL, 5800rpm.-S            |
| 138220019            | IGNITION COIL STOP WIRE-S                |
| 138220023            | HEXAGON SOCKET HEAD CAP SCREW 3/16 *20-S |
| 138220018            | FLYWHEEL ASSEMBLY-S                      |
| 138220040            | STARTER PULLEY CUP(47mm)-S               |
| 138190042            | NUT, M14-S                               |
| 138220069            | STARTER ASSY, PULL(black)-S              |
| 138190047            | KILL SWITCH-S                            |
| 138220061            | BLOWER HOUSING ONLY (BLACK)              |
| 138220066            | STARTER RECOIL ONLY (BLACK)              |
| 138190037            | FLANGE BOLT M6*12-S                      |

## 1.10 EXHAUST OPTIONS & COMPONENTS

| <u>TILLOTSON P/N</u> | <u>DESCRIPTION</u>           |
|----------------------|------------------------------|
| 138190058            | GASKET, EXHAUST-S            |
| T-EXH-001            | EXHAUST SILENCER-USA VERSION |
| 138220021            | SPRING WASHER GB 93-87 8-S   |
| 138190057            | EXHAUST NUT-S                |
| 138220027            | SPACER, SILENCER BRACKET-S   |
| 138220014            | FLANGE BOLT M6*16-S          |
| T-EXH-SIL-01         | EXHAUST SILENCER-EUR VERSION |
| T-EXH-MAN-01         | EXHAUST MANIFOLD             |
| T-FLEX-01            | EXHAUST FLEX                 |

|                 |                     |
|-----------------|---------------------|
| T-EXH-SPRING-01 | EXHAUST SPRING      |
| 138220054       | EXHAUST WRAP-S      |
| 138220055       | HOSE CLAMP(21-38)-S |

#### 1.11 AUXILIARY PARTS

| <u>TILLOTSON P/N</u> | <u>DESCRIPTION</u> |
|----------------------|--------------------|
| 138220046            | GASKET SET         |
| T-OIL-01             | T4 ENGINE OIL      |

### Contact Information and Resources

Email: [sales@tillotson.ie](mailto:sales@tillotson.ie)

Website: [www.tillotson.ie](http://www.tillotson.ie)

YouTube Page: <https://youtube.com/channel/UCZgldHZl8EBj93WnvcKFRHA>

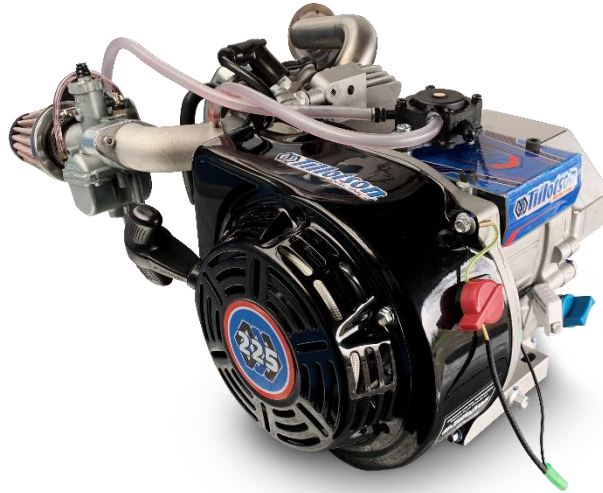


## APPENDIX 2

### Engine Fiche

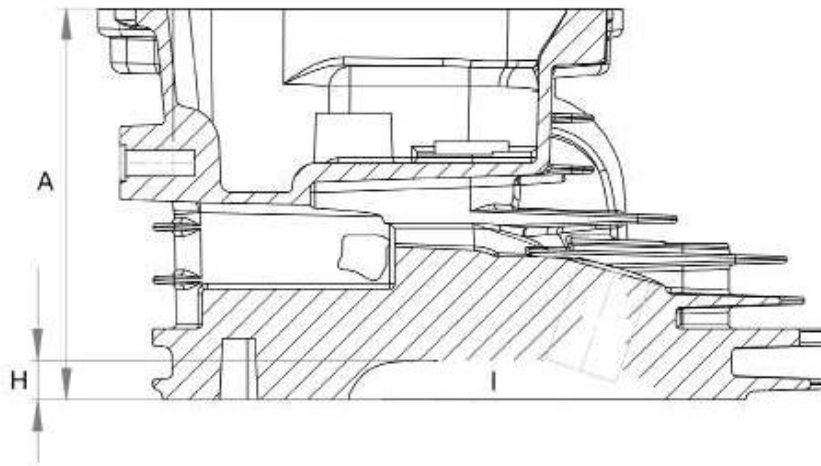
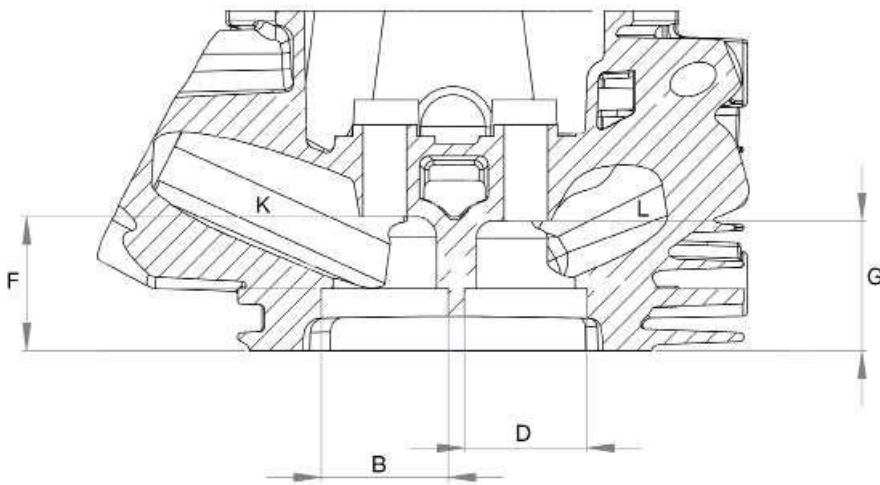


## Tillotson TPP-225RS Engine Fiche USA2021



| Feature                  | Specification   |
|--------------------------|---|
| Engine Type              | 2 Valve 4-Stroke  |
| Fuel Type                | Unleaded Petrol   |
| Cylinder                 | Single/35° Heavy Reinforced Aluminum Block w/Cast Iron Sleeve |
| Cylinder Volume          | 225cc   |
| Bore                     | 72 mm/2.834 in maximum  |
| Stroke                   | 55 mm/2.165 in maximum  |
| Piston - Deck Clearance  | .4mm± .2 mm   |
| Cooling System           | Air   |
| Carburetor               | Tillotson FM22-1A   |
| Cylinder Head            | Aluminum Alloy 2-Valve Over Head Valve                        |
| Combustion Chamber Shape | 26cc Factory Designed   |
| Compression Ratio        | 9:1   |
| Ignition Coil            | PVL/Tillotson 4 Poles Digital Built in Limiter 6500RPMS       |
| Flywheel                 | Digital Ignition Billet Aluminum 29° Advance Timing           |
| Connecting Rod           | Race Spec w/Bearing Inserts                                   |
| Rod Length               | 88 mm/3.4646 in   |
| Camshaft                 | Race Cam with Built in Compression Release                    |
| Engine Oil and Volume    | Tillotson T4 Racing Oil, 500 ml ± 50 ml                       |

Engines must conform to the technical data provided with no modification or machining allowed. Parts must be original as supplied by the manufacturer.

**Cylinder Head PN:138210100**

|  |                  |
|--|------------------|
| A. Overall Height                        | 74.02 mm minimum |
| B. Intake Seat ID                        | 24.75 mm +.1 mm  |
| C. Intake Seat Angle                     | 60-45-30         |
| D. Exhaust Seat ID                       | 22.6 mm +. 1 mm  |
| E. Exhaust Seat Angle                    | 60-45-30         |
| F. Bowl Depth Intake                     | 29.3 mm± .2mm    |
| G. Bowl Depth Exhaust                    | 28.4 mm ± .2 mm  |
| H. Combustion Chamber Depth              | 7.0 mm± .2 mm    |
| I. Combustion Chamber Vol                | 19.4cc minimum   |
| J. Valve Head Height from Gasket Surface | 6.5 mm± .3 mm    |
| K. Intake Port Volume                    | 30cc maximum     |
| L. Exhaust Port Volume                   | 24cc maximum     |

**Cylinder Head Gasket PN:138220030**

|           |                 |
|-----------|-----------------|
| Material  | Composite       |
| Thickness | 1.26 mm ± .2 mm |
| Fire Ring | Steel           |

**Rocker Arm PN: 138190033**

|           |                 |
|-----------|-----------------|
| Material  | Steel           |
| Ratio     | 1:1 max         |
| Length    | 54.9 mm minimum |
| Tip Shape | Rectangular     |
| Weight    | 16.5g ± .5g     |

**Guide Plate PN 138190031**

|          |       |
|----------|-------|
| Material | Steel |
|----------|-------|



**Valve Lifter/Tappet** PN: 138190013

| Material       | Mild Steel          |
|----------------|---------------------|
| Overall Length | 34.7 mm $\pm$ .2 mm |
| Stem Diameter  | 8 mm $\pm$ .2 mm    |
| Head Diameter  | 23.6 mm $\pm$ .2 mm |
| Weight         | 19.5 g $\pm$ 1 g    |



**Valve Spring** PN 138220029

| Material       | Steel                                |
|----------------|--------------------------------------|
| Relaxed Height | 26mm $\pm$ .2 mm                     |
| Wire Diameter  | 2.5 mm $\pm$ .2 mm                   |
| Overall O.D.   | 21.1mm $\pm$ .2 mm                   |
| Spring Force   | 26 lbs max @ .815 in (20.7mm) height |



**Valve Spring Retainer & Lock**  
PN: 138210103

| Material        | Steel               |
|-----------------|---------------------|
| Overall Height  | 7.9 mm min          |
| Overall O.D     | 20.7 mm $\pm$ .2 mm |
| Retainer Weight | 6.4 g min           |



**Push Rod** PN: 138190032

| Material          | Steel               |
|-------------------|---------------------|
| Overall Length    | 134 mm $\pm$ .25 mm |
| Ball End Diameter | 5 mm $\pm$ .2 mm    |
| Rod Diameter      | 4 mm $\pm$ .2 mm    |
| Weight            | 11 g $\pm$ .5 g     |



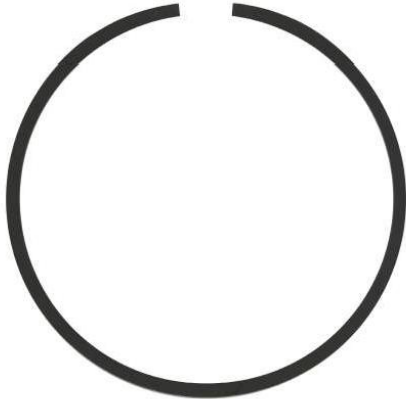
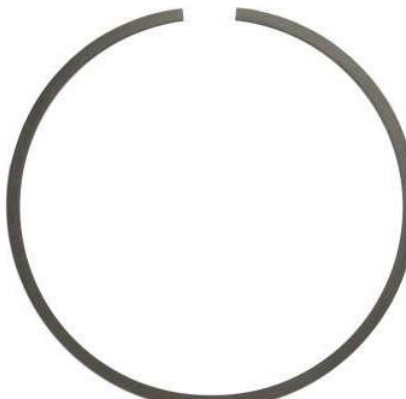
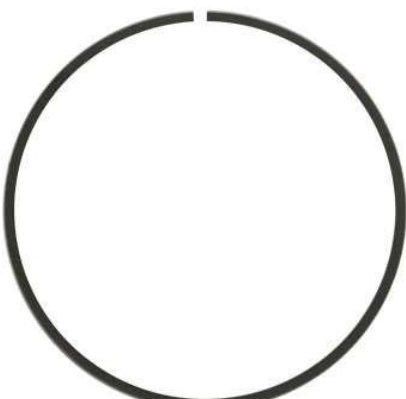





**Intake Valve** PN: 138210101

| Material       | Alloy Steel         |
|----------------|---------------------|
| Overall Length | 63.8 mm min         |
| Stem Diameter  | 4.8 mm min          |
| Head Diameter  | 27 mm $\pm$ .2 mm   |
| Valve Margin   | 2.3 mm $\pm$ 0.5 mm |
| Valve Angle    | 45°                 |
| Weight         | 21 g $\pm$ .25 g    |
| Valve Marking  | IN Z81 YF           |

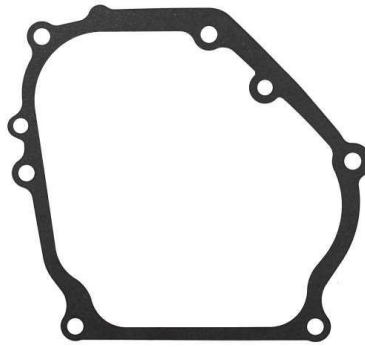


**Exhaust Valve** PN 138210102

| Material       | Alloy Steel         |
|----------------|---------------------|
| Overall Length | 63.8 mm min         |
| Stem Diameter  | 4.8 mm min          |
| Head Diameter  | 25 mm $\pm$ .2 mm   |
| Valve Margin   | 2.3 mm $\pm$ 0.5 mm |
| Valve Angle    | 45°                 |
| Weight         | 19.5 g $\pm$ .5 g   |
| Valve Marking  | EX Z81 YF           |

|  |   |   |            |                         |  |                    |                               |                    |   |  |                |                     |                         |                  |                |                |            |   |              |  |                |                |                  |                 |                 |              |        |              |
|--|---|---|------------|-------------------------|--|--------------------|-------------------------------|--------------------|---|--|----------------|---------------------|-------------------------|------------------|----------------|----------------|------------|---|--------------|--|----------------|----------------|------------------|-----------------|-----------------|--------------|--------|--------------|
|   |   |    |            |                         |  |                    |                               |                    |   |  |                |                     |                         |                  |                |                |            |   |              |  |                |                |                  |                 |                 |              |        |              |
| <b>Piston Top Ring PN:13822005</b>   | <b>Piston Second Ring PN:13822005</b>   | <b>Piston Oil Scraper Ring PN:13822005</b>  |            |                         |  |                    |                               |                    |   |  |                |                     |                         |                  |                |                |            |   |              |  |                |                |                  |                 |                 |              |        |              |
| <table><tr><td>Material</td><td>Steel</td></tr><tr><td>Thickness</td><td>1 mm± .05 mm</td></tr></table>  | Material  | Steel   | Thickness  | 1 mm± .05 mm            | <table><tr><td>Material</td><td>Steel</td></tr><tr><td>Thickness</td><td>1 mm± .05mm</td></tr></table> | Material           | Steel                         | Thickness          | 1 mm± .05mm   | <table><tr><td>Material</td><td>Steel</td></tr><tr><td>Thickness</td><td>.40mm±.05mm</td></tr></table> | Material       | Steel               | Thickness               | .40mm±.05mm      |                |                |            |   |              |  |                |                |                  |                 |                 |              |        |              |
| Material   | Steel   |   |            |                         |  |                    |                               |                    |   |  |                |                     |                         |                  |                |                |            |   |              |  |                |                |                  |                 |                 |              |        |              |
| Thickness  | 1 mm± .05 mm  |   |            |                         |  |                    |                               |                    |   |  |                |                     |                         |                  |                |                |            |   |              |  |                |                |                  |                 |                 |              |        |              |
| Material   | Steel   |   |            |                         |  |                    |                               |                    |   |  |                |                     |                         |                  |                |                |            |   |              |  |                |                |                  |                 |                 |              |        |              |
| Thickness  | 1 mm± .05mm   |   |            |                         |  |                    |                               |                    |   |  |                |                     |                         |                  |                |                |            |   |              |  |                |                |                  |                 |                 |              |        |              |
| Material   | Steel   |   |            |                         |  |                    |                               |                    |   |  |                |                     |                         |                  |                |                |            |   |              |  |                |                |                  |                 |                 |              |        |              |
| Thickness  | .40mm±.05mm   |   |            |                         |  |                    |                               |                    |   |  |                |                     |                         |                  |                |                |            |   |              |  |                |                |                  |                 |                 |              |        |              |
|   |   |   |            |                         |  |                    |                               |                    |   |  |                |                     |                         |                  |                |                |            |   |              |  |                |                |                  |                 |                 |              |        |              |
| <b>Piston PN: 138220005</b>  |   | <b>Piston Oil Compression Ring PN:13822005</b>  |            |                         |  |                    |                               |                    |   |  |                |                     |                         |                  |                |                |            |   |              |  |                |                |                  |                 |                 |              |        |              |
| <table><tr><td>Material</td><td>Aluminun</td></tr><tr><td>Diameter</td><td>72 mm ± .15 mm</td></tr><tr><td>Compression Height</td><td>19.55 mm± .2 mm</td></tr><tr><td>Wrist Pin Diameter</td><td>13 mm± .1 mm</td></tr><tr><td>Top Ring Landing</td><td>2.5 mm ± .1 mm</td></tr><tr><td>Second Ring Landing</td><td>2 mm ± .1 mm</td></tr><tr><td>Oil Ring Landing</td><td>1.5 mm ± .1 mm</td></tr><tr><td>Piston Top</td><td>Flat</td></tr><tr><td>Weight w/o Rings</td><td>132 g ± .1 g</td></tr></table> |   | Material  | Aluminun   | Diameter                | 72 mm ± .15 mm   | Compression Height | 19.55 mm± .2 mm               | Wrist Pin Diameter | 13 mm± .1 mm  | Top Ring Landing   | 2.5 mm ± .1 mm | Second Ring Landing | 2 mm ± .1 mm            | Oil Ring Landing | 1.5 mm ± .1 mm | Piston Top     | Flat       | Weight w/o Rings  | 132 g ± .1 g | <table><tr><td>Material</td><td>Steel</td></tr><tr><td>Thickness</td><td>1.72 mm± .05 mm</td></tr></table> | Material       | Steel          | Thickness        | 1.72 mm± .05 mm |                 |              |        |              |
| Material   | Aluminun  |   |            |                         |  |                    |                               |                    |   |  |                |                     |                         |                  |                |                |            |   |              |  |                |                |                  |                 |                 |              |        |              |
| Diameter   | 72 mm ± .15 mm  |   |            |                         |  |                    |                               |                    |   |  |                |                     |                         |                  |                |                |            |   |              |  |                |                |                  |                 |                 |              |        |              |
| Compression Height   | 19.55 mm± .2 mm   |   |            |                         |  |                    |                               |                    |   |  |                |                     |                         |                  |                |                |            |   |              |  |                |                |                  |                 |                 |              |        |              |
| Wrist Pin Diameter   | 13 mm± .1 mm  |   |            |                         |  |                    |                               |                    |   |  |                |                     |                         |                  |                |                |            |   |              |  |                |                |                  |                 |                 |              |        |              |
| Top Ring Landing   | 2.5 mm ± .1 mm  |   |            |                         |  |                    |                               |                    |   |  |                |                     |                         |                  |                |                |            |   |              |  |                |                |                  |                 |                 |              |        |              |
| Second Ring Landing  | 2 mm ± .1 mm  |   |            |                         |  |                    |                               |                    |   |  |                |                     |                         |                  |                |                |            |   |              |  |                |                |                  |                 |                 |              |        |              |
| Oil Ring Landing   | 1.5 mm ± .1 mm  |   |            |                         |  |                    |                               |                    |   |  |                |                     |                         |                  |                |                |            |   |              |  |                |                |                  |                 |                 |              |        |              |
| Piston Top   | Flat  |   |            |                         |  |                    |                               |                    |   |  |                |                     |                         |                  |                |                |            |   |              |  |                |                |                  |                 |                 |              |        |              |
| Weight w/o Rings   | 132 g ± .1 g  |   |            |                         |  |                    |                               |                    |   |  |                |                     |                         |                  |                |                |            |   |              |  |                |                |                  |                 |                 |              |        |              |
| Material   | Steel   |   |            |                         |  |                    |                               |                    |   |  |                |                     |                         |                  |                |                |            |   |              |  |                |                |                  |                 |                 |              |        |              |
| Thickness  | 1.72 mm± .05 mm   |   |            |                         |  |                    |                               |                    |   |  |                |                     |                         |                  |                |                |            |   |              |  |                |                |                  |                 |                 |              |        |              |
|   |  |  |            |                         |  |                    |                               |                    |   |  |                |                     |                         |                  |                |                |            |   |              |  |                |                |                  |                 |                 |              |        |              |
| <b>Connecting Rod PN:138220031</b>   | <b>Connecting Rod Bearing Insert<br/>PN 138220017</b>                               | <b>Piston Wrist Pin PN:13822006</b>   |            |                         |  |                    |                               |                    |   |  |                |                     |                         |                  |                |                |            |   |              |  |                |                |                  |                 |                 |              |        |              |
| <table><tr><td>Material</td><td>Billet Aluminum 7075-T6</td></tr><tr><td>Rod Length</td><td>88 mm/3.4646 in ± .2 mm</td></tr><tr><td>Width</td><td>23.75 mm± .2 mm</td></tr><tr><td>Weight with 122 g ± 2 g bolts</td><td></td></tr></table>   | Material  | Billet Aluminum 7075-T6   | Rod Length | 88 mm/3.4646 in ± .2 mm | Width  | 23.75 mm± .2 mm    | Weight with 122 g ± 2 g bolts |                    | <table><tr><td>Material</td><td>Babbitt</td></tr><tr><td>Thickness</td><td>1.5 mm - .2 mm for wear</td></tr><tr><td>Width</td><td>19.1 mm± .2 mm</td></tr><tr><td>Weight (2 Pcs)</td><td>19 g ± 1 g</td></tr></table> | Material   | Babbitt        | Thickness           | 1.5 mm - .2 mm for wear | Width            | 19.1 mm± .2 mm | Weight (2 Pcs) | 19 g ± 1 g | <table><tr><td>Material</td><td>Steel</td></tr><tr><td>Overall Length</td><td>40.3 mm± .1 mm</td></tr><tr><td>Outside Diameter</td><td>13mm±.1mm</td></tr><tr><td>Inside Diameter</td><td>9 mm ± .1 mm</td></tr><tr><td>Weight</td><td>22.5 g ± 2 g</td></tr></table> | Material     | Steel  | Overall Length | 40.3 mm± .1 mm | Outside Diameter | 13mm±.1mm       | Inside Diameter | 9 mm ± .1 mm | Weight | 22.5 g ± 2 g |
| Material   | Billet Aluminum 7075-T6   |   |            |                         |  |                    |                               |                    |   |  |                |                     |                         |                  |                |                |            |   |              |  |                |                |                  |                 |                 |              |        |              |
| Rod Length   | 88 mm/3.4646 in ± .2 mm   |   |            |                         |  |                    |                               |                    |   |  |                |                     |                         |                  |                |                |            |   |              |  |                |                |                  |                 |                 |              |        |              |
| Width  | 23.75 mm± .2 mm   |   |            |                         |  |                    |                               |                    |   |  |                |                     |                         |                  |                |                |            |   |              |  |                |                |                  |                 |                 |              |        |              |
| Weight with 122 g ± 2 g bolts  |   |   |            |                         |  |                    |                               |                    |   |  |                |                     |                         |                  |                |                |            |   |              |  |                |                |                  |                 |                 |              |        |              |
| Material   | Babbitt   |   |            |                         |  |                    |                               |                    |   |  |                |                     |                         |                  |                |                |            |   |              |  |                |                |                  |                 |                 |              |        |              |
| Thickness  | 1.5 mm - .2 mm for wear   |   |            |                         |  |                    |                               |                    |   |  |                |                     |                         |                  |                |                |            |   |              |  |                |                |                  |                 |                 |              |        |              |
| Width  | 19.1 mm± .2 mm  |   |            |                         |  |                    |                               |                    |   |  |                |                     |                         |                  |                |                |            |   |              |  |                |                |                  |                 |                 |              |        |              |
| Weight (2 Pcs)   | 19 g ± 1 g  |   |            |                         |  |                    |                               |                    |   |  |                |                     |                         |                  |                |                |            |   |              |  |                |                |                  |                 |                 |              |        |              |
| Material   | Steel   |   |            |                         |  |                    |                               |                    |   |  |                |                     |                         |                  |                |                |            |   |              |  |                |                |                  |                 |                 |              |        |              |
| Overall Length   | 40.3 mm± .1 mm  |   |            |                         |  |                    |                               |                    |   |  |                |                     |                         |                  |                |                |            |   |              |  |                |                |                  |                 |                 |              |        |              |
| Outside Diameter   | 13mm±.1mm   |   |            |                         |  |                    |                               |                    |   |  |                |                     |                         |                  |                |                |            |   |              |  |                |                |                  |                 |                 |              |        |              |
| Inside Diameter  | 9 mm ± .1 mm  |   |            |                         |  |                    |                               |                    |   |  |                |                     |                         |                  |                |                |            |   |              |  |                |                |                  |                 |                 |              |        |              |
| Weight   | 22.5 g ± 2 g  |   |            |                         |  |                    |                               |                    |   |  |                |                     |                         |                  |                |                |            |   |              |  |                |                |                  |                 |                 |              |        |              |



**Crankcase Side Cover PN:138190018****Crankcase Side Cover Gasket  
PN:138190017****Crankcase Bearing PN:13819002**

|                |               |           |                 |                   |             |
|----------------|---------------|-----------|-----------------|-------------------|-------------|
| Material       | Cast Aluminum | Material  | Paper           | Material          | Steel       |
| Bearing OD     | 52mm ± .2 mm  | Thickness | 0.5 mm ± .15 mm | Ball Material     | Steel       |
| Bearing ID     | 25mm± .2 mm   | Color     | Black           | Retainer Material | Steel       |
| Dowel Material | steel         |           |                 | Bearing OD        | 52mm± .2mm  |
|                |               |           |                 | Bearing ID        | 25mm± .2 mm |

**Crankshaft PN:138210107**

|                    |                 |  |  |
|--------------------|-----------------|--|--|
| Material           | Forged Steel    |  |  |
| Crank Pin Diameter | 88mm- .3mm      |  |  |
| PTO Shaft Diameter | 19.05 mm± .2 mm |  |  |
| Weight             | 1870g±10g       |  |  |

**Crankcase Seal PN:13819003**

|                  |                     |
|------------------|---------------------|
| Material         | Fluoropolymer - Red |
| Outside Diameter | 41.25 mm± .2 mm     |
| Inside Diameter  | 23.6 mm ± .25 mm    |

**Camshaft Specs PN:138220012****Camshaft lift table**

| <b>Lift</b> | <b>Intake</b> | <b>BBDC</b> | <b>Exhaust</b> |
|-------------|---------------|-------------|----------------|
| 0.006       | 44 +/- 4°     | BBDC        | 83 +/-4°       |
| 0.05        | 13 +/- 4°     | BBDC        | 51 +/-4°       |
| 0.1         | 5.5 +/- 4°    | BBDC        | 32 +/-4°       |
| 0.15        | 24 +/- 4°     | BBDC        | 14 +/-4°       |
| 0.2         | 45 +/- 4°     | ABDC        | 6.5 +/-4°      |
| 0.25        | 77 +/- 5°     | ABDC        | 38 +/-5°       |
| Max Lift    | 0.28          |             | 0.28           |
| Min Lift    | 0.26          |             | 0.26           |
| <b>Lift</b> | <b>Intake</b> | <b>BTDC</b> | <b>Exhaust</b> |
| 0.25        | 47 +/- 5°     | BTDC        | 85.5 +/-5°     |
| 0.2         | 15.5 +/- 4°   | BTDC        | 53 +/-4°       |
| 0.15        | 5.5 +/- 4°    | BTDC        | 33 +/-4°       |
| 0.1         | 27 +/- 4°     | BTDC        | 16 +/-4°       |
| 0.05        | 42 +/- 4°     | ATDC        | 5 +/-4°        |
| 0.006       | 70.5 +/- 4°   | ATDC        | 34 +/-4°       |

**Ignition Coil PN:138220007**

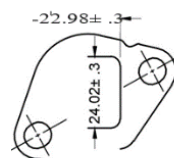
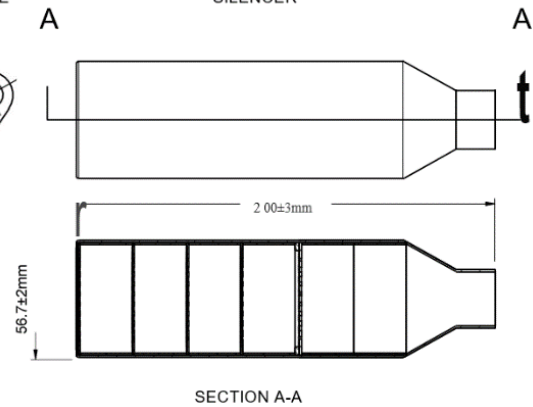
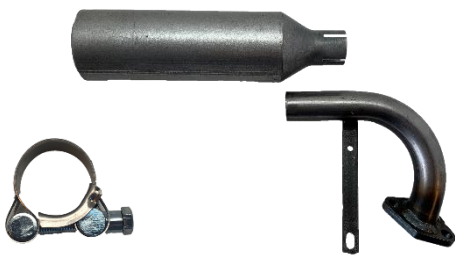
|           |         |
|-----------|---------|
| RPM Limit | 6500    |
| Brand     | PVL     |
| Type      | Digital |

**Ignition Coil Alternative Version****Flywheel PN:138220018**

|          |                      |
|----------|----------------------|
| Material | Billet Aluminum      |
| Diameter | 165mm $\pm$ .2mm     |
| Weight   | 1.43 kg $\pm$ .05 kg |
| Timing   | 29°                  |

**Exhaust Header/Muffler (PN:T-EXH-001)**

|                          |                 |
|--------------------------|-----------------|
| Model                    | TILL 4625       |
| Brand                    | RLV             |
| Qty. of baffles          | 5               |
| Dia. of holes in baffles | 31.7 $\pm$ .5mm |

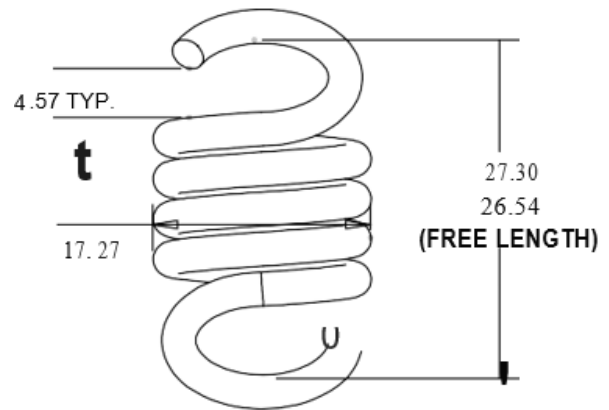
**EXHAUST FLANGE****SILENCER****Exhaust Header/Muffler Type B (P/N: T-EXH-001)****Mounting Kit RLV P/N: MNT5910)****Header Pipe RLV P/N: EXF5200**





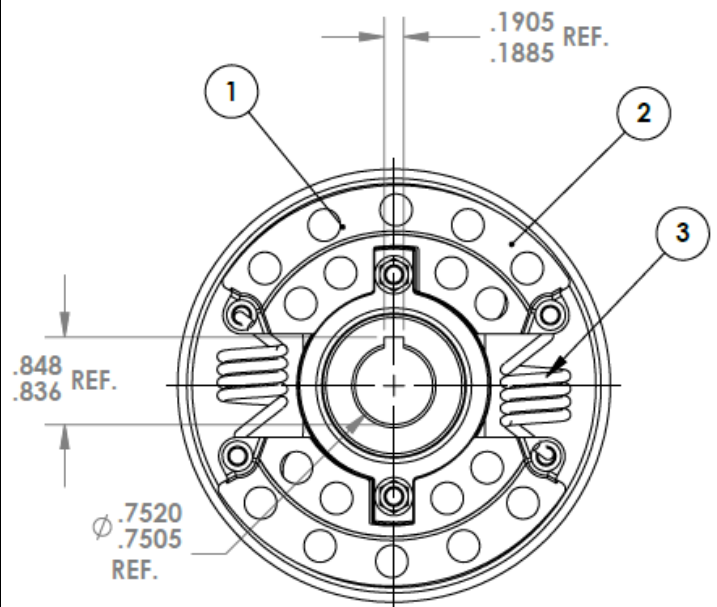
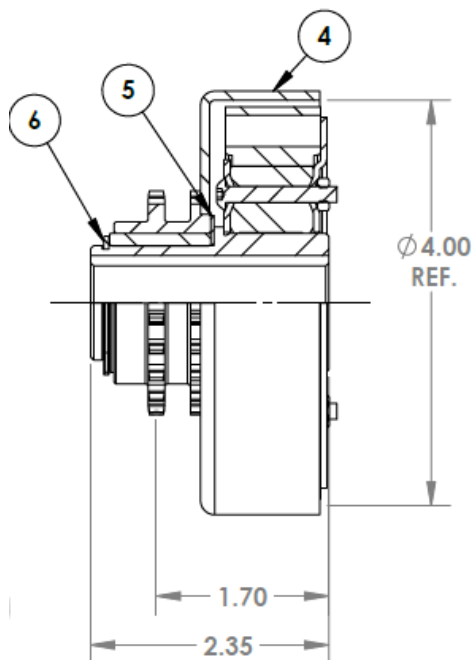
### Clutch

|                    |                 |
|--------------------|-----------------|
| Brand              | Noram           |
| Model              | 4000 S174       |
| Engagement         | 3000 rpm Max    |
| Weight             | 1.35 kg± .2 kg  |
| Clutch Shoe Weight | .22 kg ± .02 kg |



### Clutch Spring (PN:T-CLU-SPR -01)

|               |                       |
|---------------|-----------------------|
| No. of Turns  | 4                     |
| Colour        | Dark Green (non tech) |
| Wire Diameter | 2.89mm ± .5mm         |
| Overall OD    | 1727mm±.15mm          |



VIEW SHOWN THROUGH COVER PLATE

## Recommended Torque Values

| <u>Description</u>        | <u>Socket Size</u> | <u>Torque (Nm)</u> |
|---------------------------|--------------------|--------------------|
| Cylinder Head             | 12mm               | 37Nm               |
| Flywheel                  | 21mm               | 70Nm               |
| Rocker Arm Support        | 12mm               | 24Nm               |
| Valve Locking Nut         | 10mm               | 10Nm               |
| Spark Plug                | 21mm               | 24Nm               |
| Crankcase Side Cover      | 10mm               | 33Nm               |
| Blower Housing            | 8mm                | 10Nm               |
| Carburetor to Manifold    | 10mm               | 10Nm               |
| Connecting Rod            | 10mm               | 19Nm               |
| Exhaust to Engine         | 13mm               | 28Nm               |
| Intake Manifold to Engine | 10mm               | 10Nm               |
| Oil Drain Plug            | 10mm               | 22Nm               |
| Valve Cover               | 8mm                | 7Nm                |

## Contact Information and Resources

Email: [sales@tillotson.ie](mailto:sales@tillotson.ie)

Website: [www.tillotson.ie](http://www.tillotson.ie)

YouTube Page: <https://youtube.com/channel/UCZgldHZl8EBj93WnvcKFRHA>



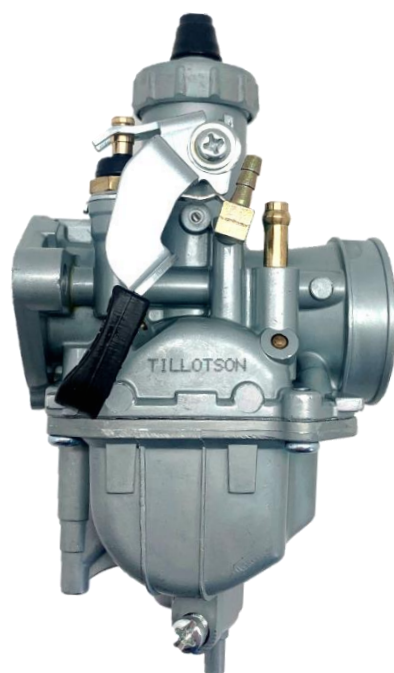
## APPENDIX 3

## Carburetor Fiche



## CARBURETOR

### Tillotson FM22-1A



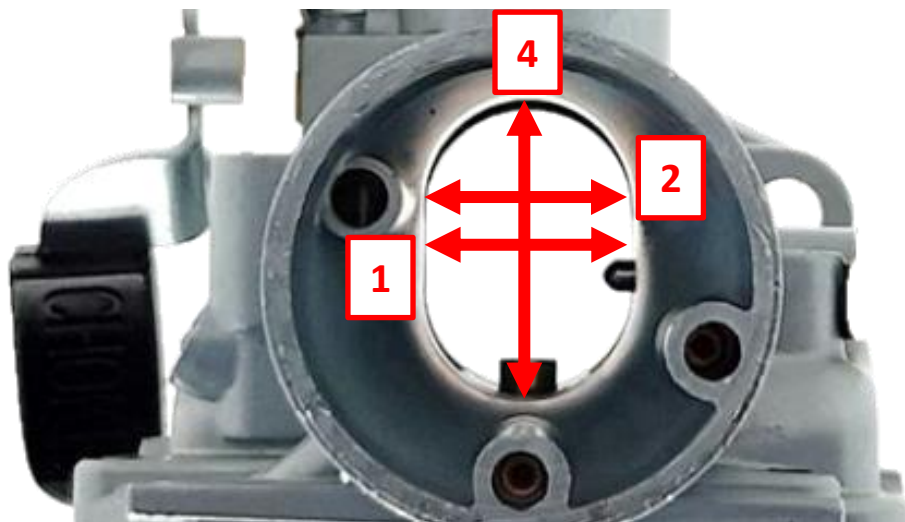
|              |                       |
|--------------|-----------------------|
| Manufacturer | <b>TILLOTSON LTD.</b> |
| Make         | <b>TILLOTSON</b>      |
| Model        | <b>FM22-1A</b>        |

## Measurements & Tolerance Index

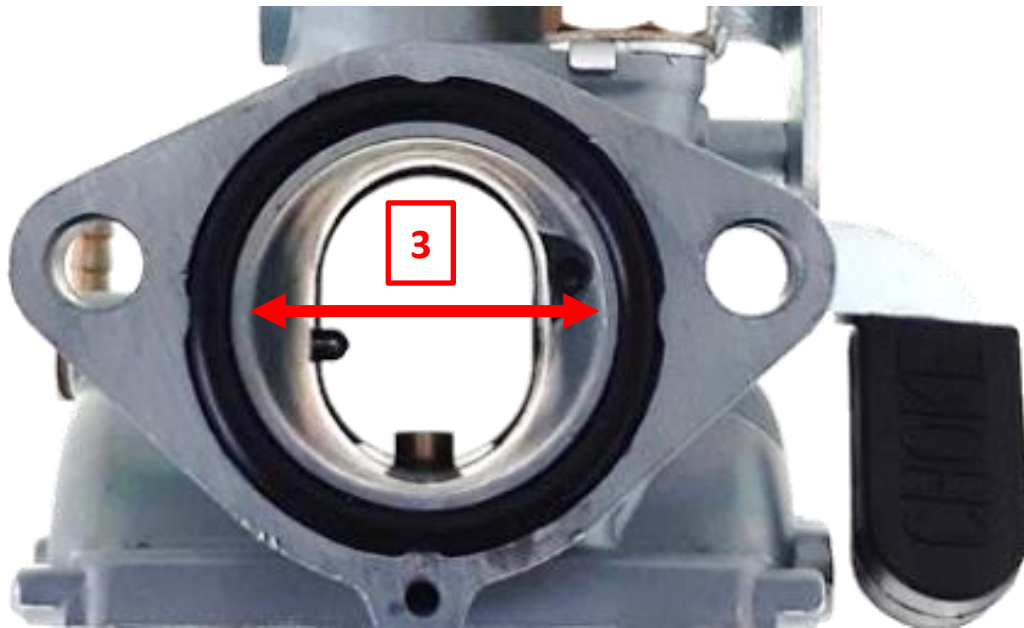
| ITEM | DESCRIPTION                           | TOLERANCE                              |
|------|---------------------------------------|--|
| 1    | Venturi Horizontal Measurement Centre | 18.22mm Max (0.717")                   |
| 2    | Venturi Horizontal Measurement Max    | 18.72mm Max (0.737")                   |
| 3    | Throttle Bore Diameter                | 26.25mm Max (1.034")                   |
| 4    | Venturi Vertical Measurement          | 25.05mm Max (0.986")                   |
| 5    | Air Pick Off Hole                     | 1.9mm +/- 0.1mm (0.075" +/- 0.004")    |
| 6    | Venturi Idle Air Hole                 | 1.9mm +/- 0.1mm (0.075" +/- 0.004")    |
| 7    | Fuel In                               | 1.65mm Max (0.065")                    |
| 8    | Main Feed Hole                        | 2.65mm Max (0.104")                    |
| 9    | Pilot Feed Hole                       | 0.97mm +/- 0.06mm (0.038" +/- 0.002")  |
| 10   | Idle Feed Hole                        | 0.80mm +/- 0.05mm (0.32" +/- 0.002")   |
| 11   | Choke Feed Hole                       | 0.65mm Max (0.26")                     |
| 12   | Emulsion Tube & Main Jet Length       | 39.0mm +/- 0.15mm (1.536" +/- 0.007")  |
| 13   | Main Jet Orifice                      | 1.20mm +/- 0.04mm (0.046" +/- 0.0015") |
| 14   | Main Jet Emulsion Orifice x12         | 0.86mm Max (0.034")                    |
| 15   | Pilot Jet Length                      | 29.05 +/- 0.15mm (1.144" +/- 0.007")   |
| 16   | Pilot Jet Orifice                     | 0.36mm +/- 0.04mm (0.014" +/- 0.0015") |
| 17   | Pilot Jet Emulsion x6                 | 0.73mm Max (0.029")                    |
| 18   | Slide Length Max                      | 37.00mm +/- 0.15mm (1.457" +/- 0.007") |
| 19   | Slide Diameter                        | 20.4mm +/- 0.15mm (0.804" +/- 0.007")  |
| 20   | Needle Length                         | 50.0mm +/- 0.2mm (1.970 +/- 0.01")     |

## Measurement Diagrams

1. Venturi Horizontal Measurement Centre
2. Venturi Horizontal Measurement Max
4. Venturi Vertical Measurement

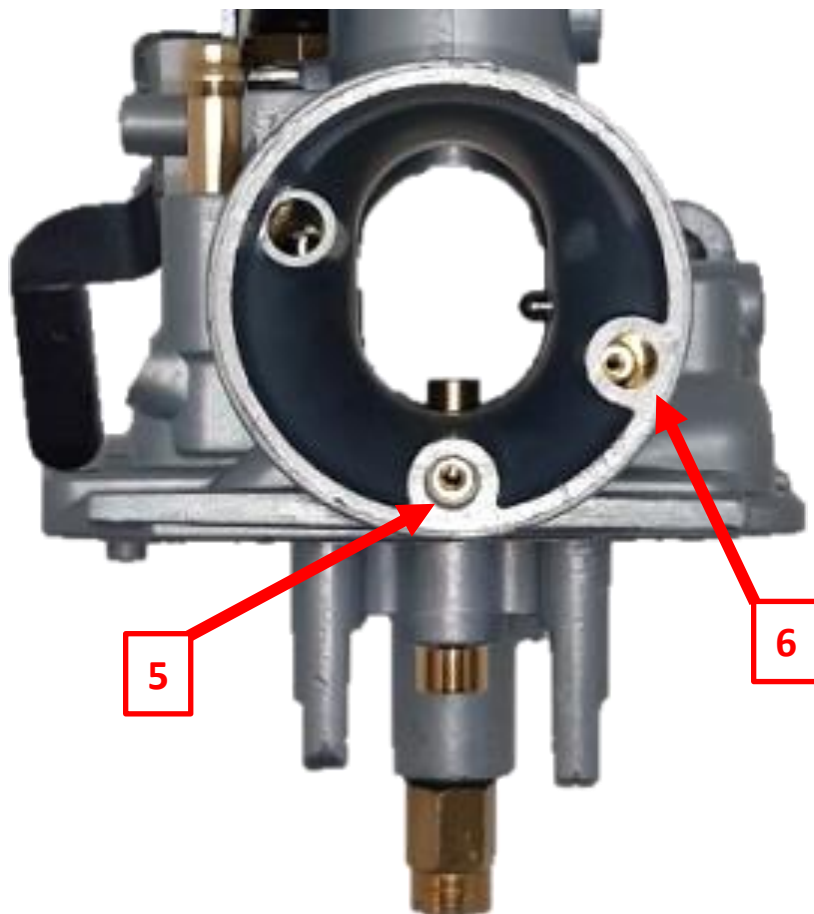


### 3. Throttle Bore Diameter



### 5. Air Pick Off Hole

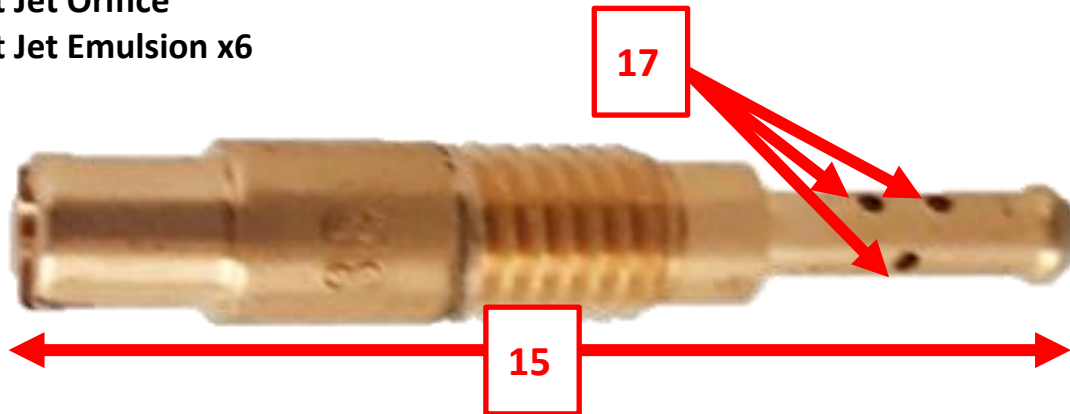
### 6. Venturi Idle Air Hole







- 15. Pilot Jet Length
- 16. Pilot Jet Orifice
- 17. Pilot Jet Emulsion x6



- 18. Slide Length Max
- 19. Slide Diameter
- 20. Needle Length



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