

**Workshop Manual**

**BF10L 513**

**0297 7577**

In view of continuous design improvements or changes, the technical specifications and the illustrations shown in this Workshop Manual are subject to alteration. Reprinting and reproduction, in part or in whole, are subject to our written approval.



# FOREWORD

Reliable engine operation is dependent on properly executed repairs as well as adjustment work.

This Workshop Manual describes the appropriate operations for any repair and adjustment work on the engine and engine components. It is presumed that this work will be carried out by qualified personnel.

The Manual has been laid out to ensure quick comprehension of the contents, i. e. illustrations have been placed adjacent to the brief text passages to clearly show the working operations.

Aspects of operation and maintenance are dealt with in the respective Operation Manual.

For spare parts orders the respective spare parts catalogue should be referred to.

This Workshop Manual is not subject to engineering change service and is valid until next issue.

Therefore please refer to the information in our Technical Circulars when carrying out repairs.

General information:

- Please read carefully and observe the instructions given in this Workshop Manual to avoid accidents and ensure that your engine always functions properly and reliably.
- Make sure that this Workshop Manual is readily available for all those carrying out repairs or adjustments and that the contents are well understood.
- Non-compliance with these repair instructions may result in malfunction and engine damage as well as personal injuries for which the manufacturer shall not accept any liability.
- The accident prevention regulations and all other generally recognized regulations on safety and occupational medicine are to be observed.
- A prerequisite for successful repair is that all required equipment, hand and special tools are available and in perfect working order.
- Optimal operation economy, reliability and durability of the engine can only be ensured when genuine parts of DEUTZ AG are used.
- Engine components such as springs, clamps, snap rings, etc. may cause injury if not handled with care.
- Engine repairs must be carried out in accordance with intended use as defined by the equipment manufacturer. For conversions, only parts approved by DEUTZ AG for a specific purpose should be used.

	Disassembly of assembly groups			
	Reassembly to form assembly group			
	Remove obstructing parts			
	Reinstall - Remount parts which had obstructed disassembly			
	Attention! Important notice!			
	Check - Adjust e. g. torque dimensions, pressures, etc.			
	Special tool			
	Note direction of installation			
	Visual inspection			
	Possibly still serviceable Renew if necessary			
	Renew at each reassembly			
	Unlock - Lock e. g. split pin, locking plate, etc.			
	Lock - Adhere e. g. with liquid sealant			
	Guard against personal injury Indication of hazard			
	Guard against material damage Damage to parts			
	Prop up - Support - Hold			
	Oil			
	Grease			
	Mark before disassembly, observe marks when reassembling			
	Balance Eliminate any imbalance			
	Filling - Topping up - Refilling e. g. oil, cooling water, etc.			
	Drain off e. g. oil, cooling water, etc.			
	Loosen - Release e. g. loosening a clamping device			
	Tighten - Clamp e. g. tightening a clamping device			
	Vent			
	Machining process			
	See Technical Data (For inst. 67 as indication of the line)			

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**Specification data / Key to symbols**

**1**

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**Checking and adjusting**

**2**

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**Repair of components**

**3**

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**Disassembly and reassembly of complete engine**

**4**

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**Turbocharger**

**5**

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**Tools**

**6**

## Specification data

# BF10L 513

### **Notes for the user of this Workshop Manual**

In this Workshop Manual all specification data, adjustment values and tightening specifications are allocated to those parts where they are needed for service work, disassembly and reassembly on the engine.




## Workshop Manual BF10L 513

<b>1. Specification data</b>		<b>Page</b>
000	General engine data _____	1.00.01 - 1.00.02
001	Engine weights _____	1.00.01
010	Compression ration _____	1.00.02
020	Dimemions of engine _____	1.00.02
100	Fuel injection system _____	1.00.03 - 1.00.05
110	Fuel injection pump _____	1.00.03
120	Governor _____	1.00.03
130	Injection nozzle _____	1.00.04
140	Commencement of fuel delivery _____	1.00.04
150	Advance/retard unit _____	1.00.05
200 - 400	Cylinder unit _____	1.00.06 - 1.00.16
200	Cylinder head _____	1.00.06
210	Valve guide _____	1.00.06
220	Valve seat insert _____	1.00.06
230	Valve _____	1.00.07 - 1.00.09
250	Valve spring _____	1.00.09
260	Valve clearance _____	1.00.10
270	Distances to be checked _____	1.00.11
280	Cylinder head studs _____	1.00.11
300	Cylinder _____	1.00.12
400	Piston _____	1.00.13 - 1.00.14
420	Piston rings _____	1.00.15 - 1.00.16
500 - 700	Motion parts _____	1.00.17 - 1.00.25
500	Crankshaft _____	1.00.17
510	Crankpin _____	1.00.17 - 1.00.18
520	Main bearing journal _____	1.00.18 - 1.00.19
540	Thrust bearing journal _____	1.00.19 - 1.00.20
550	Main bearing _____	1.00.20
560	Main bearing bore _____	1.00.21
570	Thrust bearing _____	1.00.21 - 1.00.22
600	Connecting rod _____	1.00.22 - 1.00.24
700	Camshaft _____	1.00.24 - 1.00.25
720	Valve timing without valve clearing _____	1.00.25
800	Lubrication system _____	1.00.26 - 1.00.27
800	Lube oil pump _____	1.00.26
820	Lube oil pressure _____	1.00.27
900	Tightening specifications _____	1.00.28 - 1.00.31



## Workshop Manual BF10L 513

 <b>001</b>	Engine weight approx. kg nach DIN 70020-A	1250
<b>002</b>	Engine swept volume cm <sup>3</sup>	15953
<b>003</b>	Bore mm	125
<b>004</b>	Stroke mm	130
<b>005</b>	Direction of rotation	When facing flywheel counter-clockwise
<b>006</b>	Ratedspeed max. rpm	2300
<b>007</b>	Minimum idle speed rpm	600
<b>008</b>	Working cycle	Four-stroke diesel



## Workshop Manual BF10L 513



009

Combustion system

Turbocharged engine with  
direct injection

010

Compression ration

15,8

011

Compression pressure  
bar

22 - 30

012

Firing order

1-10-5-7-2  
8-3-9-4-6

020

Dimensions of engine

021

Max. length  
mm

1526

022

Max. width  
mm


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023

Max. height  
mm


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## Workshop Manual BF10L 513


 <b>110</b>	Fuel injection pump	Bosch
<b>111</b>	Make, model	P
<b>112</b>	Min. pres. that must be attained with abt. 5 rot. of crankshaft bar	300
<b>113</b>	Pressure for testing tightness of relief valve bar	150, drop to 140 in a minute permiss.
<b>120</b>	Governor	Bosch
<b>121</b>	Make, model	RQ

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Workshop Manual BF10L 513

 <b>130</b>	Injection nozzle	
<b>131</b>	Make, model	Bosch DLLA 148 S 885
<b>132</b>	Opening pres. (checking injector for re-use)  bar	$270^{+8}$
<b>133</b>	Opening pressure (new condition)  bar	$275^{+8}$
<b>140</b>	Commencement of fuel delivery	
<b>142</b>	Static <b>with</b> advance / retard unit	see engine rating plate


Workshop Manual BF10L 513

 <b>150</b>	Advance / retard unit	
<b>151</b>	Adjustg. range degrs. crank angle	7
<b>152</b>	Commencing at rpm	1200
<b>153</b>	Ending at rpm	2500


## Workshop Manual BF10L 513

 <b>200</b>	Cylinder head	
<b>210</b>	Valve guide	
<b>211</b>	Valve guide Outer dia. mm	16,0 <sup>+ 0,056</sup> <sub>+ 0,045</sub>
<b>212</b>	Valve guide bore in cyl. head mm	16,0 <sup>+ 0,006</sup> <sub>+ 0,012</sub>
<b>213</b>	Valve guide (pressed in) Inner dia. mm	10,0 <sup>+ 0,015</sup>
<b>220</b>	Valve seat insert	
<b>221</b>	Valve seat insert Outer dia. Inlet mm	56,18 <sub>- 0,020</sub>
<b>222</b>	Valve seat insert Outer dia. Exhaust mm	49,18 <sub>- 0,020</sub>


## Workshop Manual BF10L 513

 <b>225</b>	Valve seat insert bore Inlet  mm	56,0 + 0,03
<b>226</b>	Valve seat insert bore Exhaust  mm	49,0 + 0,025
<b>227</b>	Valve seat width Inlet  mm	2,0 - 2,6
<b>228</b>	Valve seat width Exhaust  mm	2,7 - 3,3
<b>230</b>	Valve	
<b>231</b>	Valve stem dia. Inlet  mm	9,94 - 0,015
<b>232</b>	Valve stem dia. Exhaust  mm	9,93 - 0,015

## Workshop Manual BF10L 513

 <b>233</b>	Valve stem clearance Inlet standard mm	0,060 - 0,090
<b>234</b>	Valve stem clearance Inlet Wear limit mm	0,15
<b>235</b>	Valve stem clearance Exhaust standard mm	0,070 - 0,100
<b>236</b>	Valve stem clearance Exhaust Wear limit mm	0,20
<b>237</b>	Valve head Ø Inlet mm	53,6 ±0,10
<b>238</b>	Valve head Ø Exhaust mm	46,6 ±0,10
<b>239</b>	Seat angle Inlet deg.	30°
<b>240</b>	Seat angle Exhaust deg.	45°

## Workshop Manual BF10L 513

		
<b>241</b>	Marg. thickness Inlet standard  mm	2,9
<b>242</b>	Marg. thickness Exhaust standard  mm	1,5
<b>243</b>	Marg. thickness Inlet Wear limit  mm	2,4
<b>244</b>	Marg. thickness Exhaust Wear limit  mm	1,0
<b>250</b>	Valve spring	
<b>251</b>	Number per valve	1
<b>252</b>	Windings total	7
<b>253</b>	Length unloaded standard  mm	Inlet 65,3 Exhaust 71,3
<b>254</b>	Length unloaded Fatigue limit  mm	Inlet 63,3 Exhaust 69,3



Workshop Manual BF10L 513



260

Valve clearance

261

Standard valve clearance  
Inlet (engine cold)  
mm

0,2

262

Standard valve clearance  
Exhaust (engine cold)  
mm

0,3

263

After repairs on cylinder unit  
Inlet  
mm

0,3

(Following a repair standard valve clearance to be readjusted after 50 running hours)

264


Exhaust  
mm

0,4

(Following a repair standard valve clearance to be readjusted after 50 running hours)


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## Workshop Manual BF10L 513


 <b>270</b>	Distances to be checked	
<b>271</b>	Valve recess standard  mm	Inlet valve 3,45 <sub>-0,4</sub>  Exhaust valve 3,2 <sub>-0,4</sub>
<b>273</b>	Max. distance betw.cyl. head bottom and cyl. head sealing surface standard	7,35 <sup>+0,2</sup>
<b>280</b>	Cylinder head studs	
<b>281</b>	Length standard  mm	334 <sup>±0,7</sup>
<b>282</b>	Length Limit  mm	336

1

Workshop Manual BF10L 513

 <b>300</b>	Cylinder	
<b>301</b>	Bore standard mm	125,0 <sup>+0,04</sup> <sub>+0,01</sub>
<b>302</b>	Bore Wear limit mm	125,1

## Workshop Manual BF10L 513

		
<b>400</b>	Piston	
<b>401</b>	Diameter standard mm	124,86 $\pm 0,007$
<b>402</b>	Number of oversizes	2
<b>403</b>	Each oversize mm	0,5
<b>404</b>	Distance between piston and cylinder head mm	1,10 - 1,25
<b>405</b>	Bore for piston pin mm	45,0 $+ 0,012$ $+ 0,005$
<b>406</b>	Piston pin diameter mm	45,0 $- 0,002$ $- 0,007$