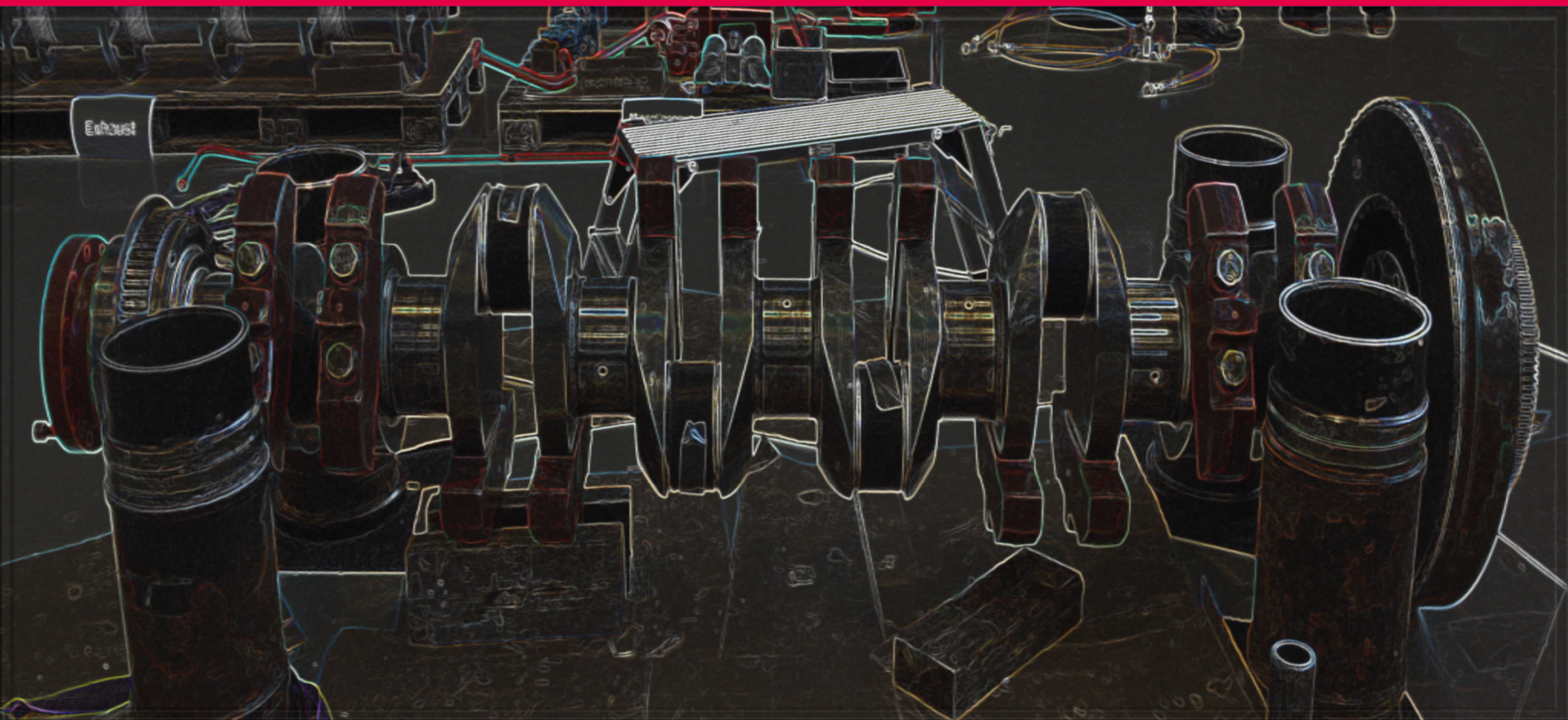


# Crankshaft Deflection



# Checking Main Bearings Alignment



## Safety precautions

- Engine stopped
- Shut-off starting air
- Shut off cooling water
- Shut off fuel oil
- Shut-off cooling oil
- Stop lub. oil circulation
- Press Blocking - Reset

# Checking Main Bearings Alignment

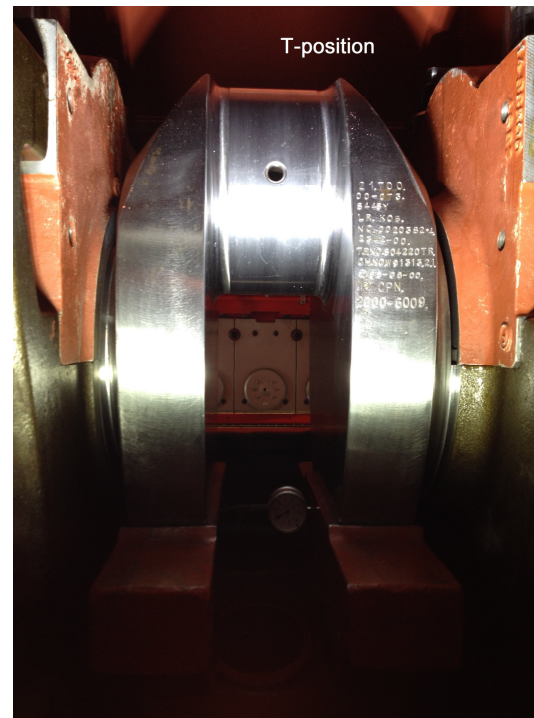


## Starting Position

Turning gear in engagement (if mounted).

Cover for crankshaft has been removed from frame.

All indicator valves open.

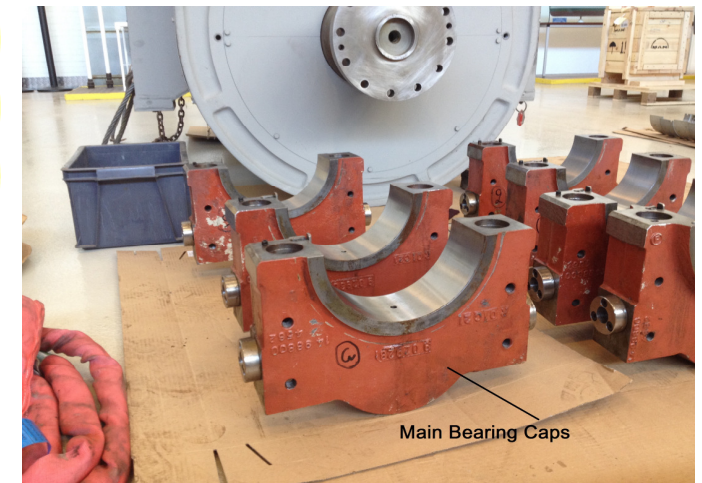


# Checking Main Bearings Alignment



As the crankshafts of medium speed engines are very stiff, any great deviations in the alignment will result in clearance at the bottom shell of the bearings.

The cause of incorrect main bearing position may be wear of the bearings or misalignment of the engine.



# Checking Main Bearings Alignment



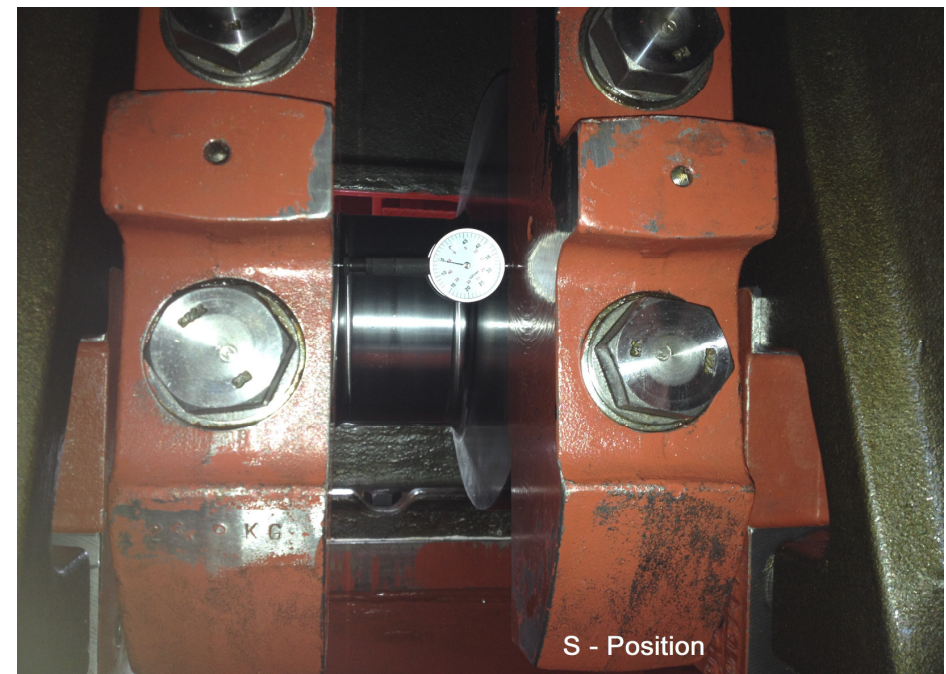
## Effecting the deflection measurement

The deflection measurement is effected by placing a springloaded dial gauge in the centre punch marks provided for this purpose.

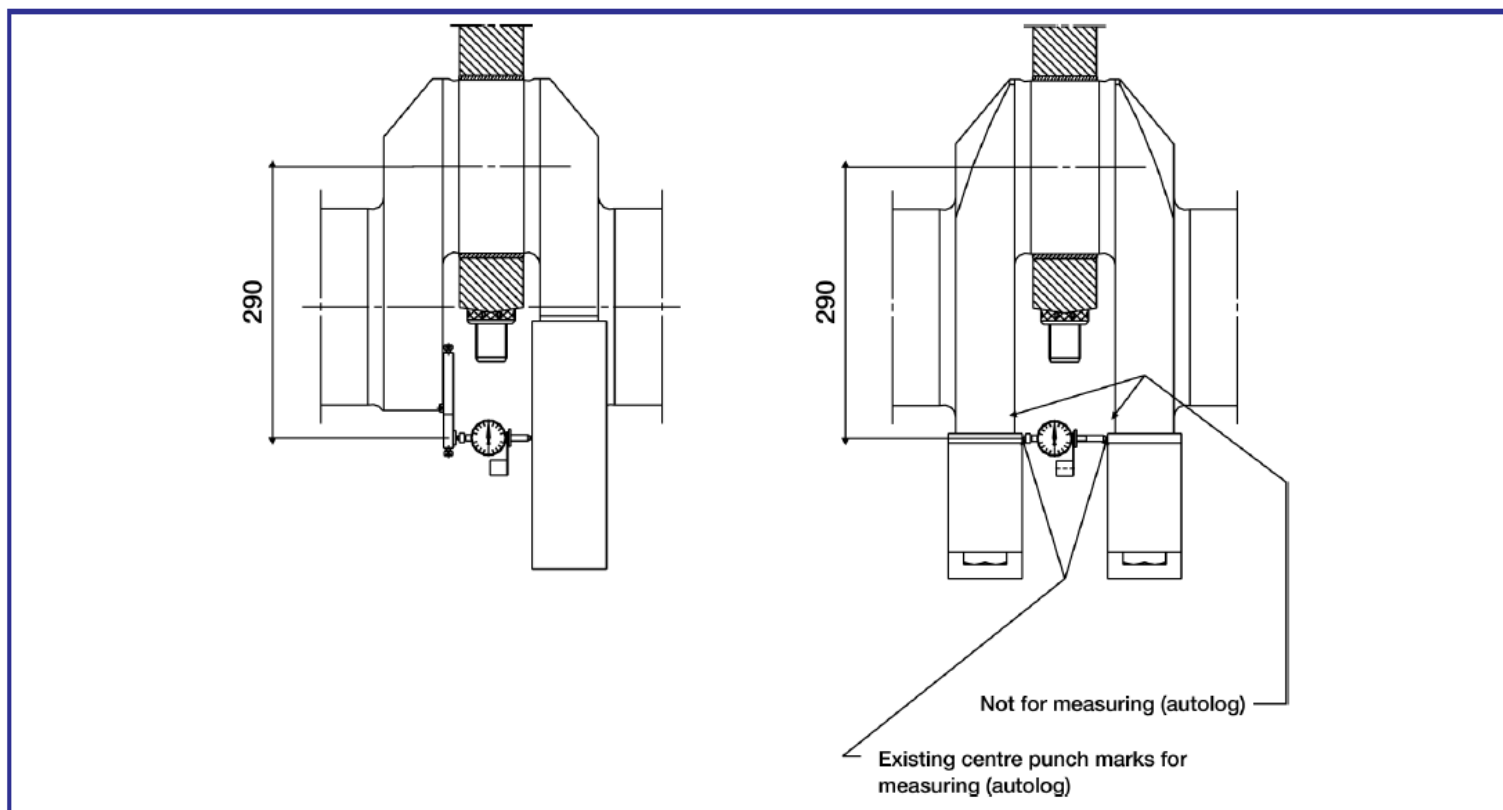
"Closing" of the throw in top dead centre is regarded as negative, (compression of the gauge).

In the example the deflection reading is therefore negative.

As during the turning of the throw, the gauge and the connecting rod will meet near the bottom position of the throw, the measurement for the bottom position is to be replaced by the average of the two near by positions on either side.



# Checking Main Bearings Alignment



# Checking Main Bearings Alignment



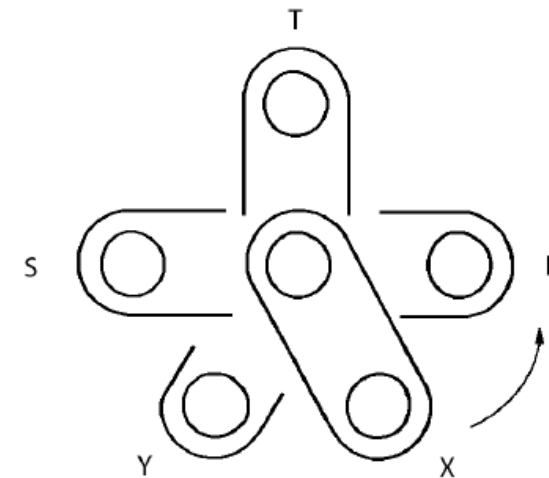
## Checking The Deflection Measurement

As "bottom" reading is used the mean value of the two "near bottom" readings X and Y

The total deflection ("opening-closing") of the throw during the turning from bottom to top position is entered

These figures are due to vertical misalignment of the main bearings. Similarly, horizontal misalignment procedures

Besides misalignment of the bearings, the readings can be influenced by ovality or eccentricity of the journals.



Front end view.  
Start in position X.  
Turn anti clockwise

# Checking Main Bearings Alignment



## **CAUTION** Engines equipped with turning gear

When taking these deflection readings for the three aftmost cylinders, the turning gear should at each stoppage be turned a little backwards to ease off the tangential pressure on the teeth of the turning wheel as this pressure may otherwise falsify the readings.



# Checking Main Bearings Alignment



## Schedules

Measurement of crank throw deflections by means of dial indicator (autolog)				
Crank throw deflection	=	Difference in dial indicator readings in two diametrically opposite crank throw positions, i.e. two positions displaced 180°		
Vertical deflection	=	Difference in top-bottom readings		
Horizontal deflection	=	Difference in side-side readings		
Vertical and horizontal deflections of crank throws				
Unless otherwise stated the values refer to cold engine				
For new or realigned plant	Aim for	+ or – 3/100 mm		
	Acceptable	+ or – 5/100 mm		
For plant in service realignment is recommended if deflections exceed			+ or – 9/100 mm	
Vertical deflection of crank throw at flywheel				
Unless otherwise stated the values refer to cold engine				
Rigid coupling between diesel engine and driven machine		Flexible coupling between diesel engine and driven machine		
For new or realigned plant	0 to + 3/100 mm	For new or realigned plant	Aim for	– 9/100 mm
			Acceptable	– 11/100 mm
For plant in service realignment is recommended if deflection measured on warm engine exceeds	– 9/100 mm	For plant in service realignment recommended if deflection exceeds	– 16/100 mm	



These are 23/30H Limits!  
Each engine has unique limits!



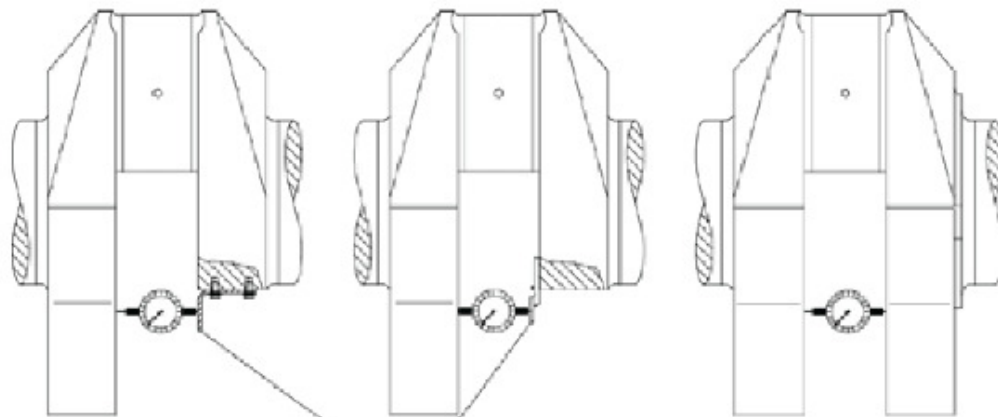
All Cylinders

AFT most Cylinder

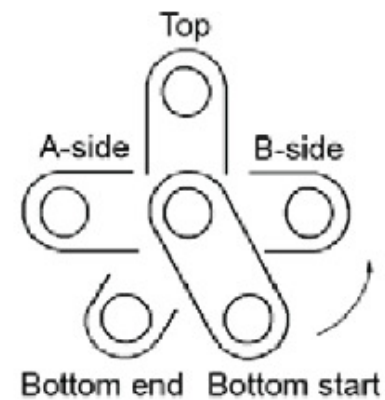
# Checking Main Bearings Alignment



On engines **without** double counterweights the use of a special tool is necessary for dial gauge support.



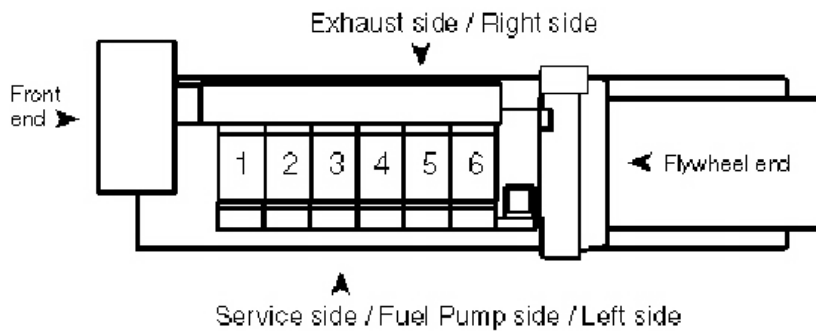
On every crank web  
without counterweight



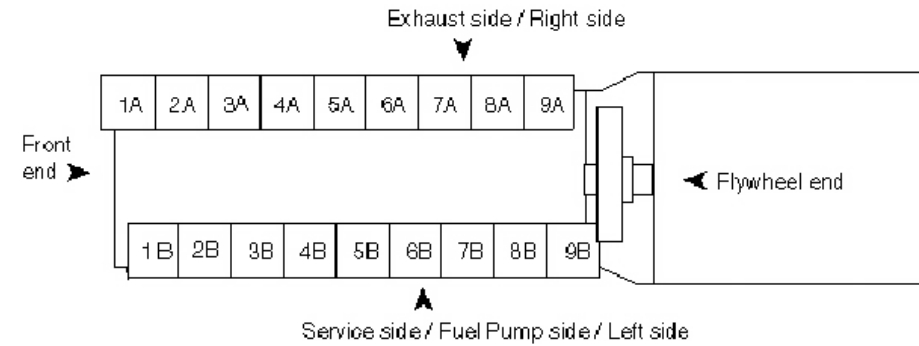
# Basic Orientation Reference



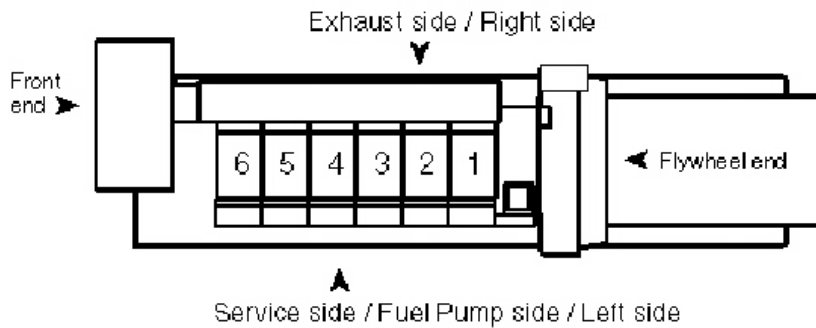
L16/24, L21/31, L23/30H, L27/38, L28/32H



V28/32H, V28/32S



L32/40



# Template



## MAN Diesel & Turbo



Plant/Ship:	No. of page: 2 (2)
-------------	--------------------

Test place/Teststed Condition/Tilstand	<input type="checkbox"/> Testbed/Prøvehal	Temperature:
	<input type="checkbox"/> Onboard/ombord	Water/vand °C
	<input type="checkbox"/> Plant/Maskinhal	Lub. oil/smøreolie °C

Engine No/Motornr.:									
Cyl. No	1	2	3	4	5	6	7	8	9
Bottom									
B-side									
Top									
A-side									
Bottom									

# Example



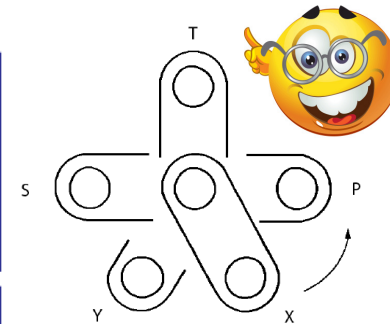
Deflection of crankshaft in 1/100 mm. (0.01 mm).

Crank position		Cyl. No.					
		1	2	3	4	5	6
Bottom start	X	0	0	0	0	0	0
Left side	P	2	0	2	0	-1	2
Top	T	3	-2	4	5	-2	3
Right side	S	3	-2	2	0	0	1
Bottom stop	Y	2	-1	0	1	0	2
Bottom $0,5 \times (X + Y) = B$		1	-0.5	0	0.5	0	1

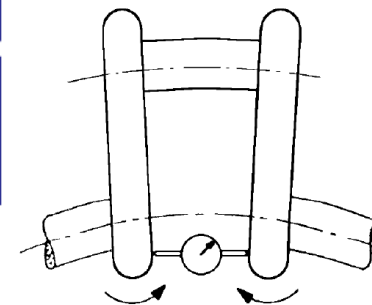
Deflection from vertical misalignment		Compare limits					
top - bottom or T - B =	V	2	-1.5	4	4.5	-2	2

Deflection from horizontal misalignment		Compare limits					
Right side - left side or P - S =	H	-1	2	0	0	-1	1

Check on gauge readings	T + B = C	4	-2.5	4	5.5	-2	4
	P + S = D	5	-2	4	0	-1	3



Front end view.  
Start in position X.  
Turn anti clockwise



"Closing" of the crankthrow is considered negative.

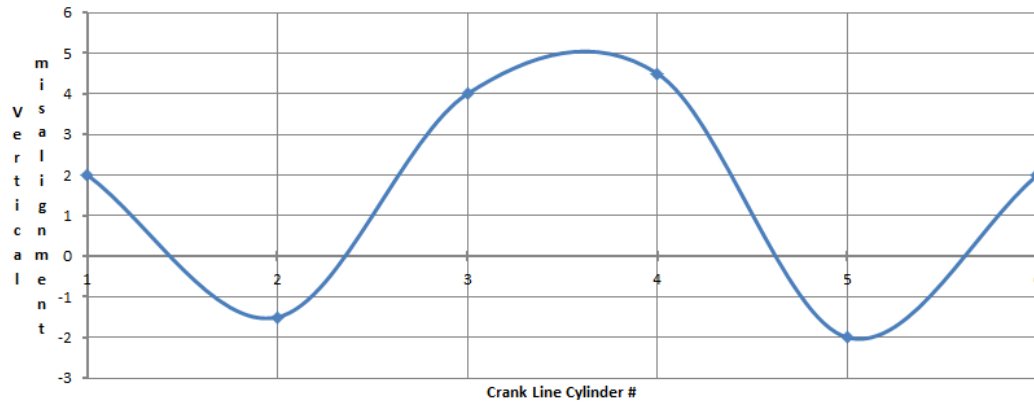
- Left = Maneuvering Side
- Right = Exhaust Side



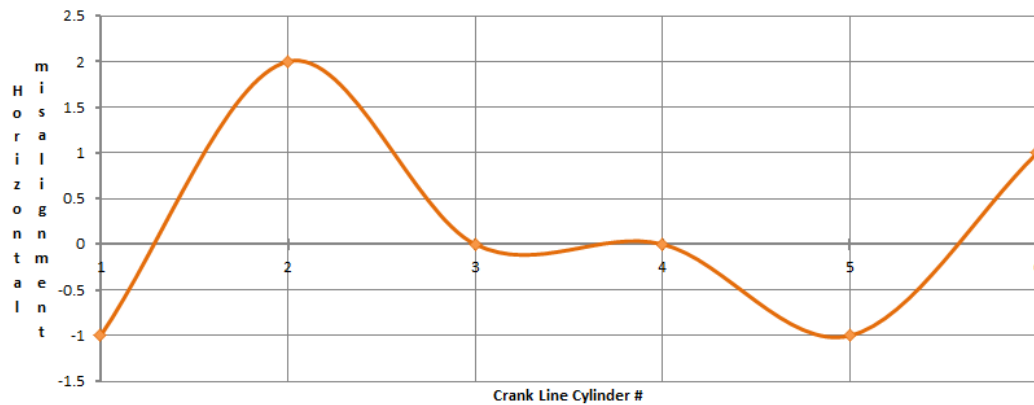
# Alignment Corrections



Vertical Misalignment in 1/100mm



Horizontal Misalignment in 1/100mm



Crankshaft Deflection

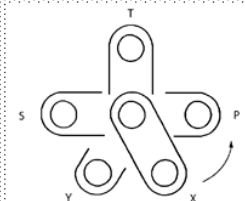
	Cylinder #					
Crank Position	1	2	3	4	5	6
Bottom Start "X"	0	0	0	0	0	0
Port Side "P"	2	0	2	0	-1	2
Top "T"	3	-2	4	5	-2	3
Starboard Side "S"	3	-2	2	0	0	1
Bottom Stop "Y"	2	-1	0	1	0	2
Bottom Total "B" = 0.5*(X+Y)	1	-0.5	0	0.5	0	1

Deflection from Vertical Misalignment "V" = (T-B)	2	-1.5	4	4.5	-2	2
---	---	------	---	-----	----	---

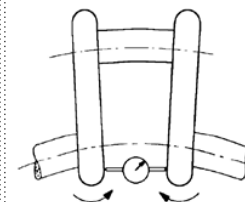
Deflection From Vertical Misalignment "H" = (P-S)	-1	2	0	0	-1	1
---	----	---	---	---	----	---

Gauge Readings "C" = (T+B)	4	-2.5	4	5.5	-2	4
Gauge Readings "D" = (P+S)	5	-2	4	0	-1	3

Inputs in 1/100mm (0.01mm)  
Automatically Calculated



Front end view.  
Start in position X.  
Turn anti clockwise



"Closing" of the crankthrow is considered negative.

Thank you for your attention

