Kalmar Group Standard	**KGS 50706**
Part **Method Standard**	Group **Manufacturing Methods**
Name **Pair Assembled Fork arms - Form & Dimensional Requirements and Verification Method**	

1 Scope

This Kalmar Group Standard hereinafter referred to as KGS, describes dimensional requirements for pair assembled fork arms and the suited verification method.

2 Purpose

This KGS set the requirements on paired fork arms to ensure proper functioning and performance of the fork arms. To have a dimensional requirement description and a common verification method description for pair assembled fork arms.

Applies only to new installation of pair assembled forks arms

3 Responsibilities

Principal Systems Engineer - Mechanics & Analysis - R&D/FLT set the requirements in this KGS

Product Quality via MAU - Quality must follow the Verification Method according to section 7 of this KGS and stay informed of the requirements of Section 6 of this KGS

Product Support must follow the verification method according to Section 7 of this KGS and stay informed of the requirements of Section 6 of this KGS

4 Definitions

R&D   Research & Development
FLT   ForkLift Truck
MAU   Multi Assembly Unit
Fork arms can also be named Fork Blank in the Forklift truck business
Kissing Fork - Forks that can be in full contact with each other

5 Records / References / Attachments

KGS - 40902   Fork arm - Tolerances
KGS - 40903   Fork arm - Quenching & Tempering Steel - in Quenched & Tempered Condition

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6   Procedure Description / Requirements
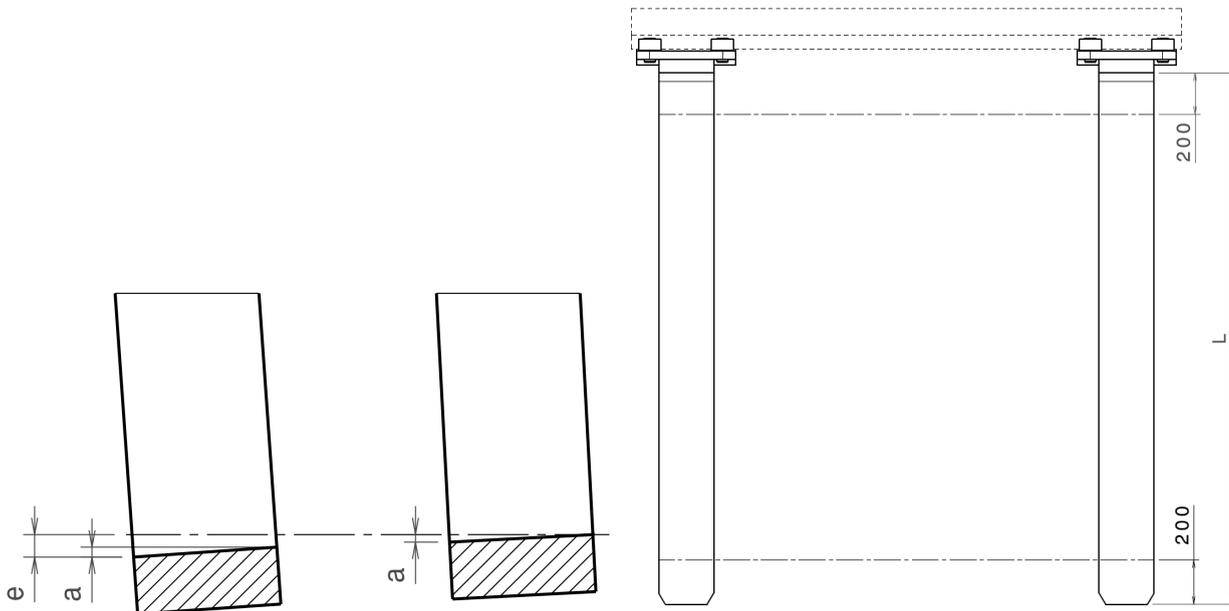
6.1 Twist and tip deviation

Illustration of twist requirement of each individual fork (a) in relation to a horizontal line, and the total deviation (e).

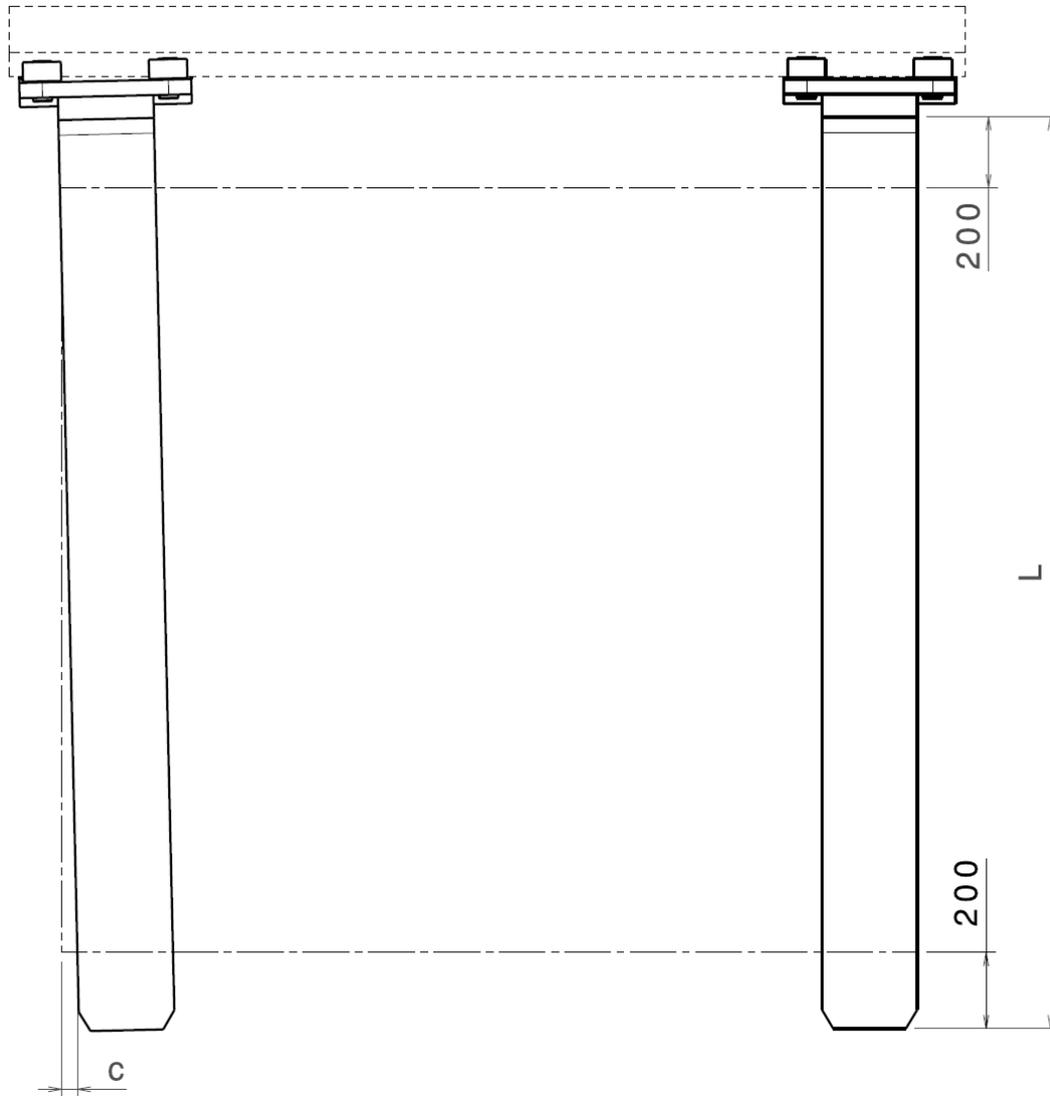## Twist requirement 200 mm from shank and tip

Fork width (b)	b ≤ 200	200 < b ≤ 300	b > 300
Individual Twist a (mm)	3	4	5
Deviation e (mm) 200mm from shank	5	5	5

Twist requirement 200mm from tip

Fork length (L)	L < 1700	1700 ≤ L < 2500	L ≥ 2500
Tip deviation e (mm) 200mm from tip	6	8	10

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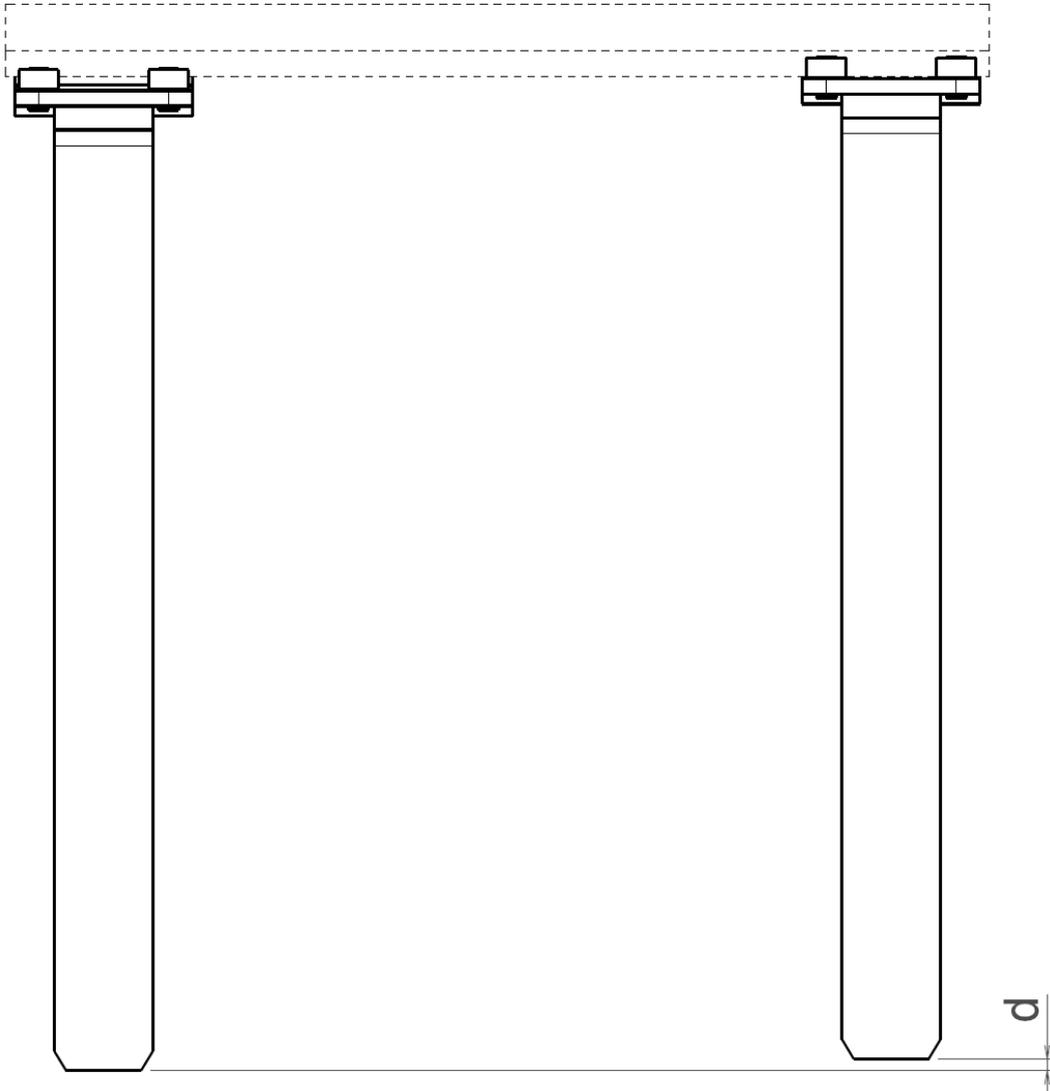Version: 1

6.2 Fork alignment

Measurement on the fork blades, approximately 200 mm from bend and approximately 200 mm from fork tip

Fork alignment requirements

Deviation c (mm)Standard forks	L / 150*
Deviation c (mm) Kissing forks	5
*Fork length divided by 150	

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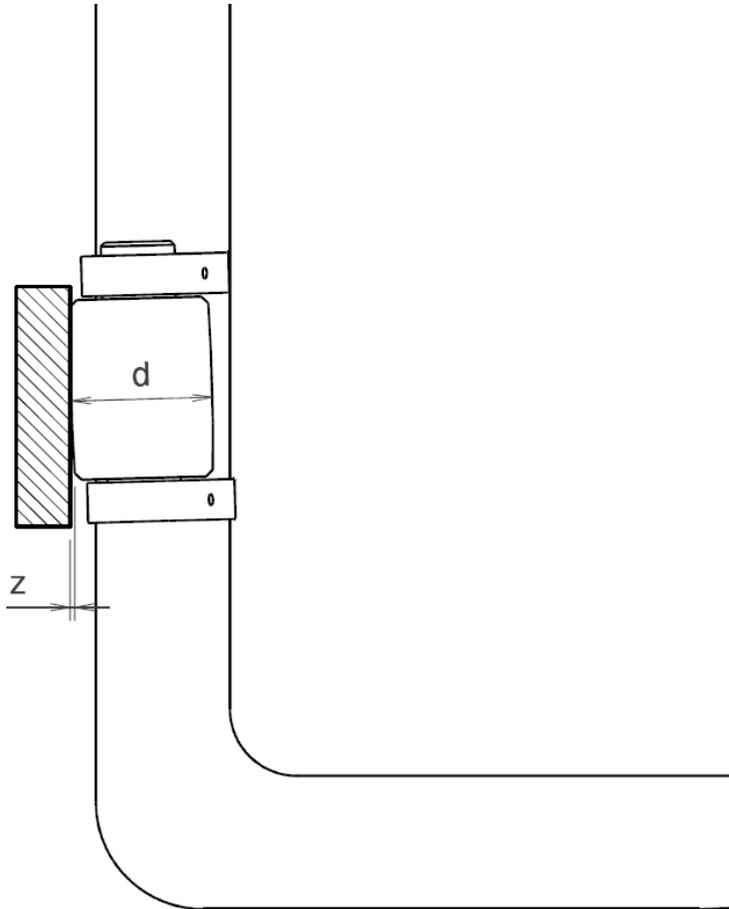Approver: jonas.disman@kalmarglobal.com
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6.3 Length

d

Length requirement

d (mm)	Max 10

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6.4 Rollers

For roller forks the lower rollers must be placed according to the requirements below.

In relation to the carriage beam the lower roller is only allowed to lean in the direction like the picture above but with the maximum deviation z.

Roller requirement

Roller size (d) (mm)	d ≤ 50	75 ≥ d ≤ 90	d ≥ 105
z (mm)	0 - 1.0	0 - 1.7	0 - 3.5

7   Verification Method

7.1 Preparations and Equipment

7.1.1 Machine Preparation

- Place the truck on level ground
- Spread the forks to approx. 2000mm, outer-outer
- Check that the upper fork rollers are in contact against the top and backside of the top carriage beam
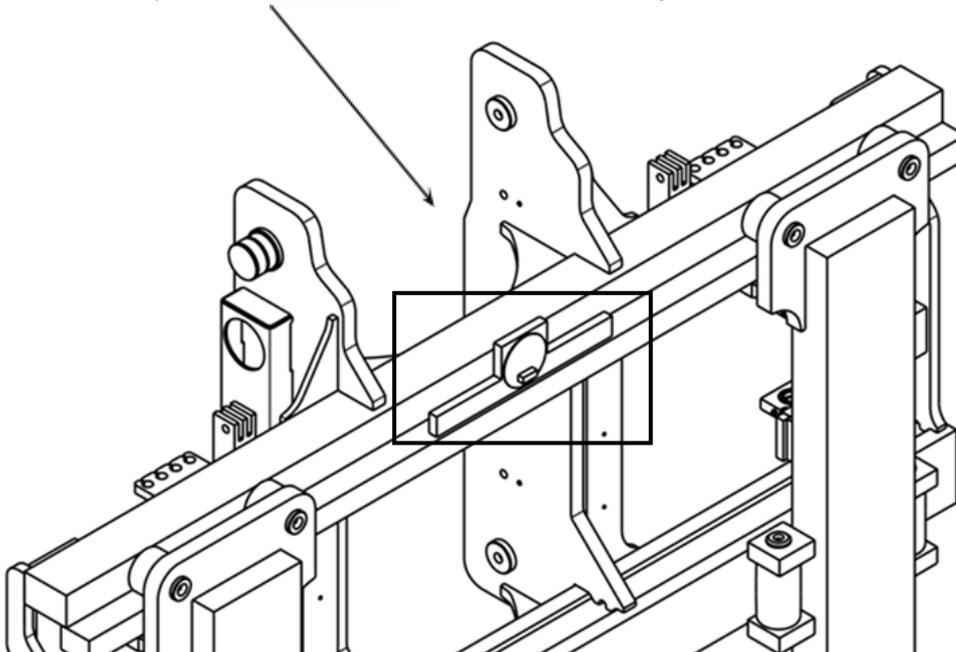- Check that lower fork rollers are in contact against the lower carriage beam

7.1.2 Equipment

- Spirit level with digital reference level setting
- Long spirit level/straight edge
- Digital vernier caliper
- Spacers / Shims

7.2 Verification Procedure

7.2.1
Place an adjustable spirit-level on the upper carriage beam and set zero.

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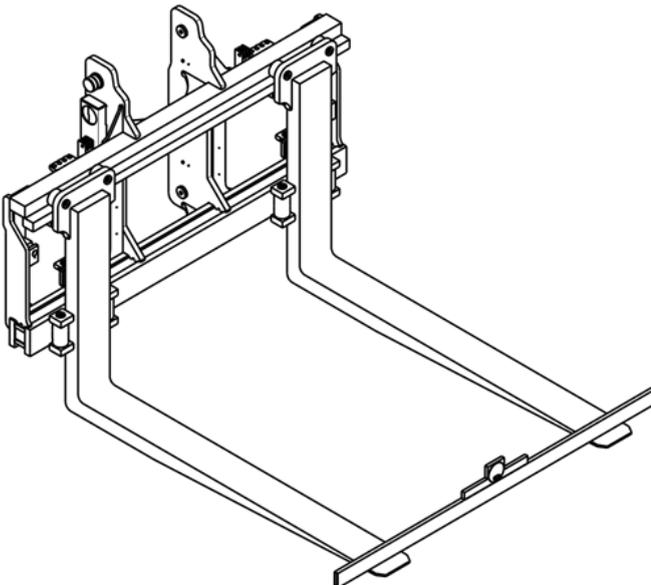Approver: jonas.disman@kalmarglobal.com
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7.2.2

Place a straight-edge (length 2-2.5 m) on the fork blades, approximately 200 mm from the bend and adjust the straight-edge with shims to plane level using a spirit-level.
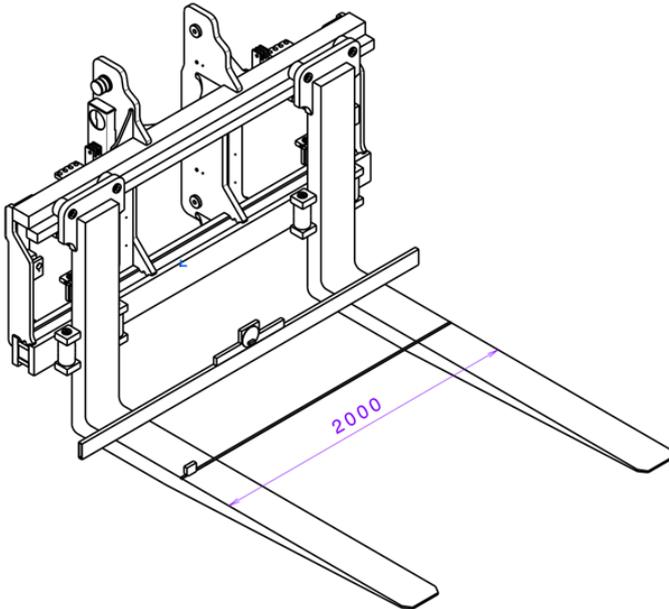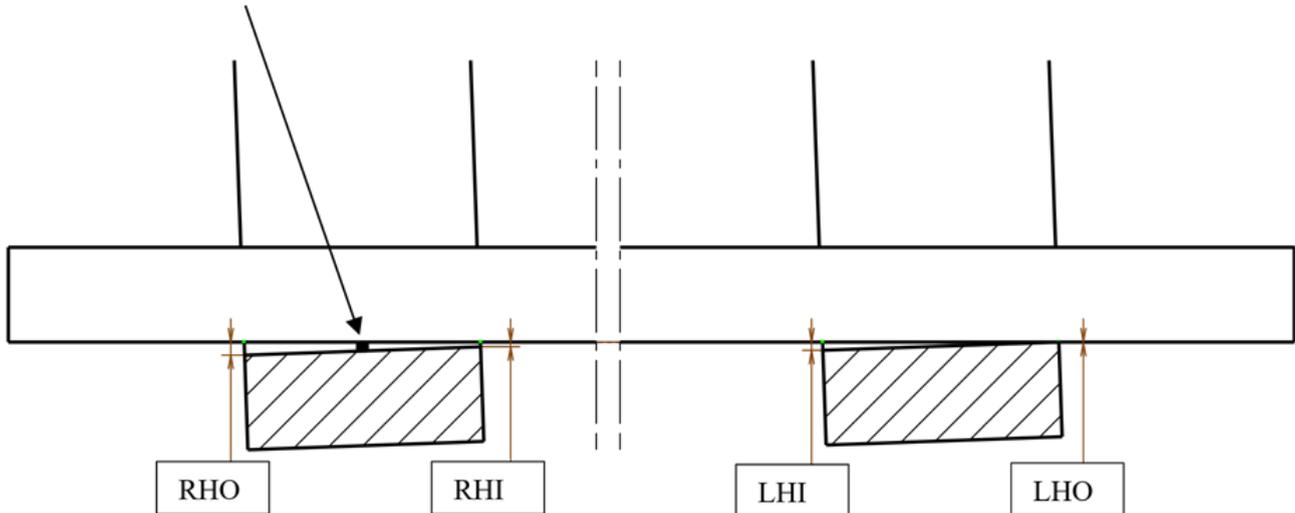
7.2.3

Place the straight-edge approximately 200 mm from the fork tip and adjust the straight-edge with shims to plane level using a spirit-level.

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7.2.4

Measure the gap between the straight-edge and top of the fork blade.

In the picture the straight-edge has been adjusted by using shims (see arrow) to plane level.

RHO = Right hand outer
RHI = Right hand inner
LHI = Left hand inner
LHO = Left hand outer

Deviation RH-LH (e in 6.1) is calculated by subtracting the biggest value from the fork with the biggest deviation with the smallest value from the fork with the smallest deviation.
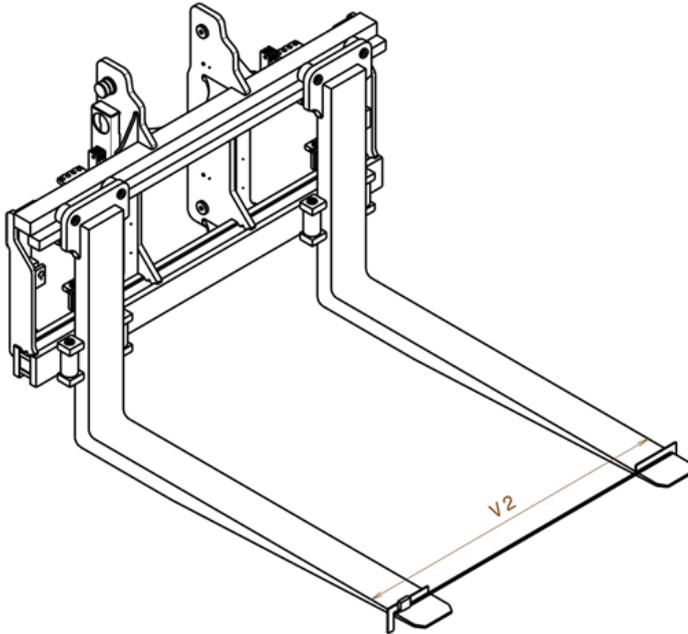
7.2.5

Measure from the outer edges of the fork blades, approximately 200 mm from bend (V1).
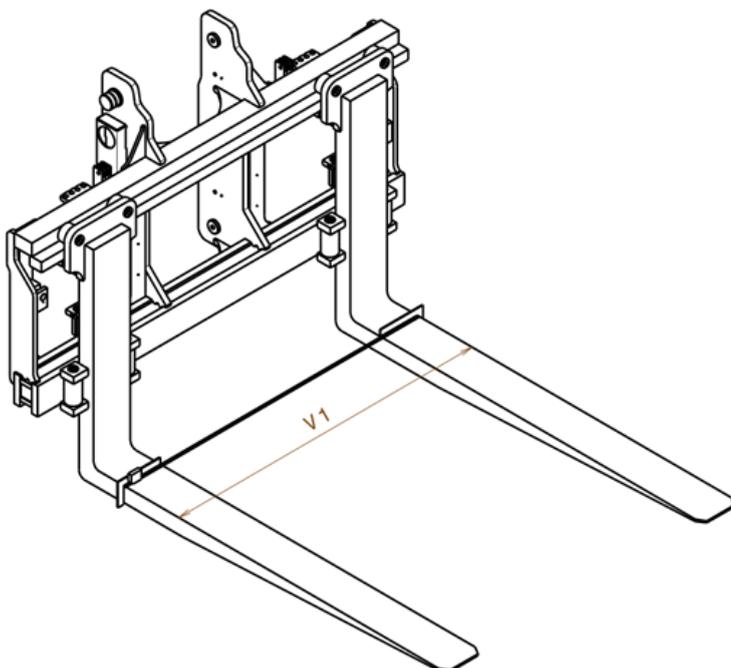
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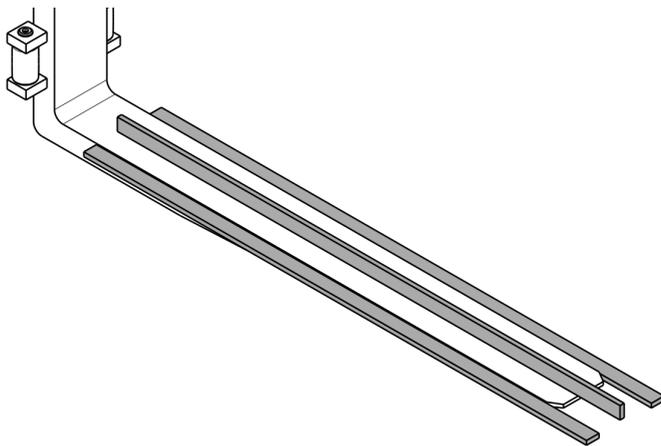Approver: jonas.disman@kalmarglobal.com
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7.2.6
Measure from the outer edges of the fork blades, approximately 200 mm from fork tip (V2).

7.2.7
Check fork blades flatness by using a straight-edge approximately 200 mm from bend. Measure the outer, top and inner on both right and left hand fork.


- "Hill": Put shims underneath the straight-edge, equally at both ends.
- Measure height of the shims.
- "Depression": Measure the gap underneath the straight-edge.

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7.2.8

Check the length of the forks from the front face to the fork tip with a measuring tape. Both right and left hand fork.
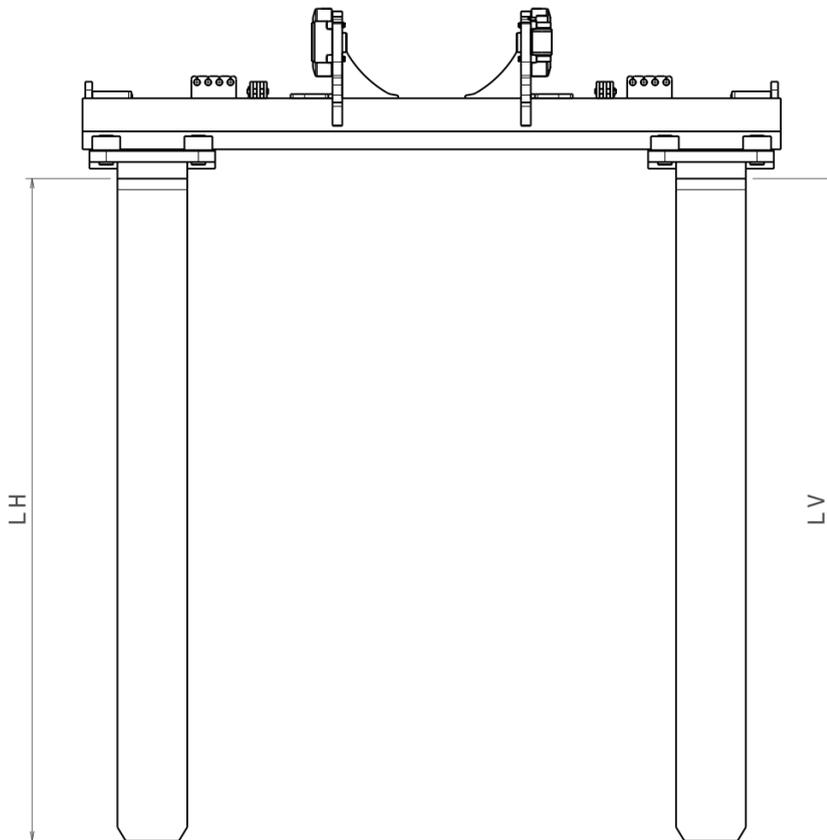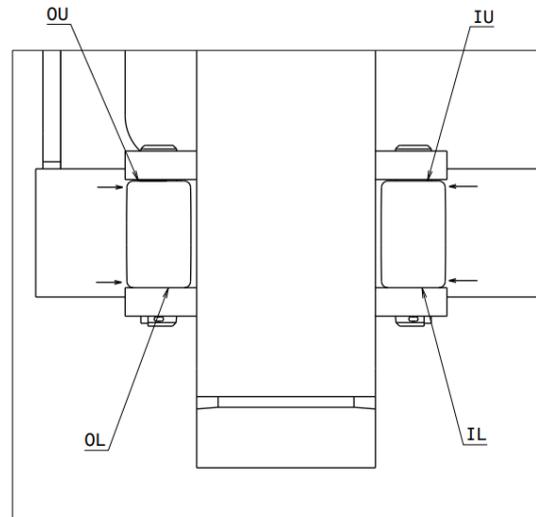

7.1.9

Check Thickness on Forks
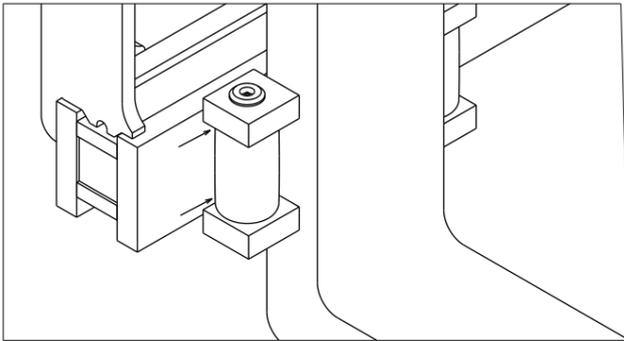

*Fork Thickness (**T**), Fork Tip Thickness (**T1**)*

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7.2.10

Check lower rollers contact with a thickness gauge

*Outer upper (**OU**), Outer lower (**OL**), Inner upper (**IU**), Inner lower (**IL**)*

7.2.11

Check that upper support rollers are greased and run smoothly.
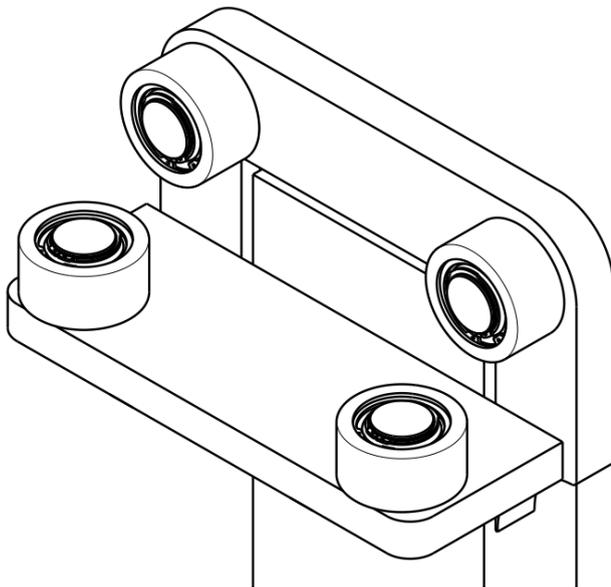
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7.2.12
Check that sideshift cylinder bracket is correctly assembled and has been greased.

7.2.13
Check that lower support rollers are greased and fun smoothly.

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7.2.14

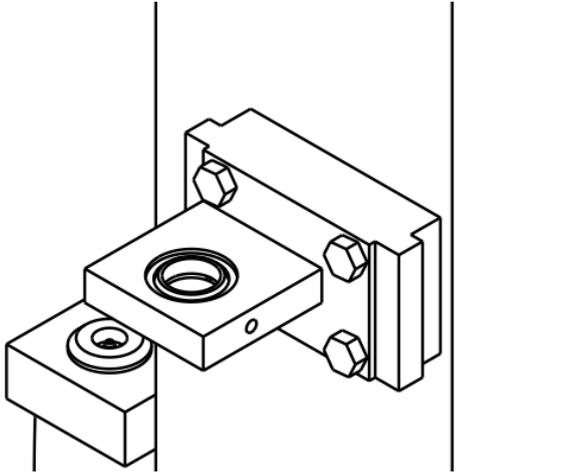Check that marking on fork arm is correct and readable.
Example.

```
          4480  -  600  -  60  -  830
Supplier
          207926.0315-01  -   53594
```

7.2.15

Check paint thickness according to K-20600.0001, section 14.3.

7.2.16

Check forged surfaces,pits,dents etc.
Sharp dents are not allowed.

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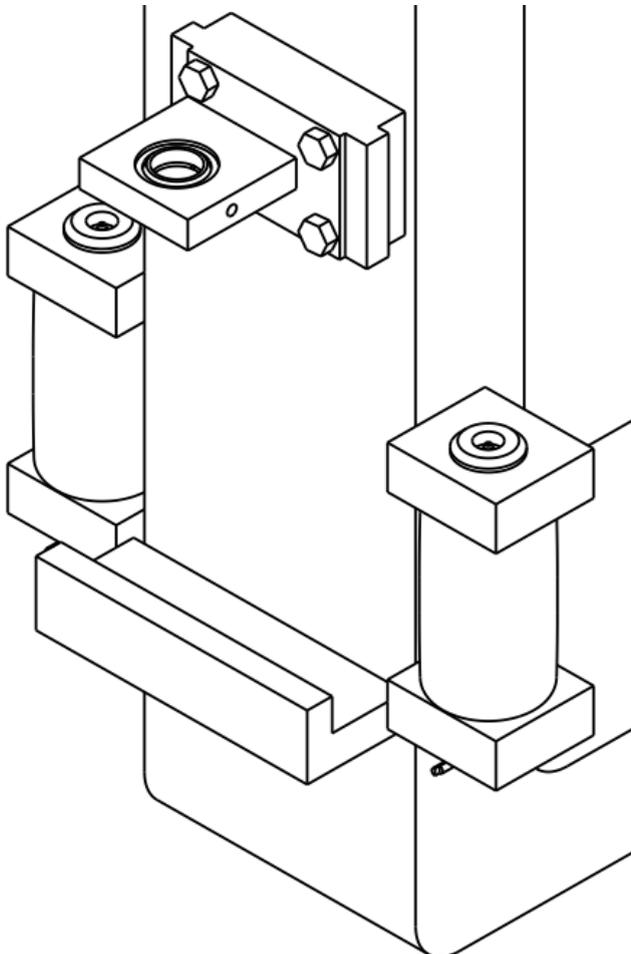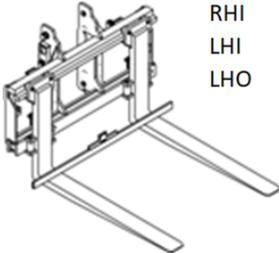Approver: jonas.disman@kalmarglobal.com
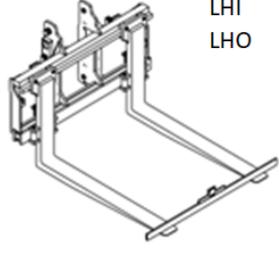Version: 1

7.3 Check Points Forks

7.3.1 How to present results: Forks

Part Number:	.... Serial number ....
W x T x L:	..................x..................x..............
Date:	....
Resp. Signature	....

According to: 7.2.2 and 7.2.3

				Fork width		
				b ≤ 200	200 < b ≤ 300	b > 300
RHO	....	Deviation RH	....	3	4	5
RHI	....	Deviation LH	....	3	4	5
LHI	....	Deviation RH - LH	....	5*	5*	5*
LHO	....			* Assembled on machine tolerance increases by +1		

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According to: 7.2.3 and 7.2.4

				Fork width		
				b ≤ 200	200 < b ≤ 300	b > 300
RHO	....	Deviation RH	....	3	4	5
RHI	....	Deviation LH	....	3	4	5
LHI	....					
LHO	....			Fork length		
				L < 1700	1700 ≤ L < 2500	L ≥ 2500
		Deviation RH - LH	....	6*	8*	10*
				* Assembled on machine tolerance increases by +3		

Approved
Not Approved

According to: 7.2.5 and 7.2.6

		Allowed Max Deviation
V1	....	
V2	....	
Deviation (c, mm)	....	L / 150*
Kissing Forks (mm	....	5
		* Assembled on machine tolerance is L / 100

Approved
Not Approved

According to: 7.2.7

	Right	Left	Allowed Max Values		
			Light	Medium	Heavy
Outer - Hill / Depression	....	....	4*	4	5
Upper - Hill / Depression	....	....			
Inner - Hill / Depression	....	....			

* Max 3mm if L <1800mm

Approved	
Not Approved	

According to: 7.2.8

LL	....	L +/- 10mm
LR	....	L +/- 10mm
Deviation	....	Max 10mm

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According to: 7.2.9

		Allowed Tolerance			
		Fork (T)		Fork Tip (T_1)	
		Thickness	Tolerance	Thickness	Tolerance
T	....	T ≤50	-1 / +2	T_1 ≤ 15	-1 / +3
T_1	....	50 < T ≤ 90	-1 / +3	T_1 > 15	-3 / +3
		90 < T ≤ 110	-1.5 / +4		
		T > 110	-2 / +5		

Approved	
Not Approved	

7.3.2 How to present results: Rollers

Part Number:	Serial number ....
W x T x L: ....x..............x.............	
Date:	
Resp. Signature	

According to: 7.2.10

Note! Lower values shall always be equal or bigger than Upper values
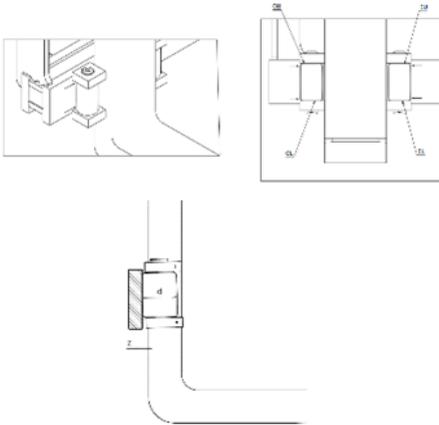
Lower rollers: OL&IL	Light	Medium	Heavy
z = (mm)	d=50	d=90	d=105
	0 - 1	0 - 1.7	0 - 3.5

	Left	Right
Outer upper (OU)	....	....
Outer lower (OL)	....	....
Inner upper (IU)	....	....
Inner lower (IL)	....	....

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According to: 7.2.11
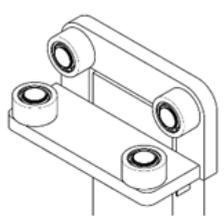
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According to: 7.2.12
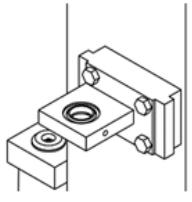
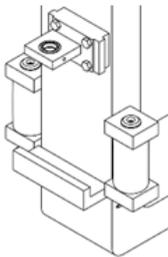| Approved	
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According to: 7.2.13

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According to: 7.2.14

4480 - 600 - 60 - 830
Supplier
207926.0315-01 - 53594

	Approved	
	Not Approved	

According to: 7.2.15

Check Paint	Approved	
	Not Approved	

According to: 7.2.16

Check Surface Finish	Approved	
	Not Approved	

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