

VDMA Guideline

Guide for the design of the interface between industrial trucks and attachments

Disclaimer

This publication is only for guidance and gives an overview regarding data potentially necessary for the layout of the interface between an industrial truck and an attachment. It neither claims to cover all technical options, nor does it reflect any legal aspect. It is not meant to, and cannot, replace knowledge of the pertaining directives, laws and regulations. Furthermore the specific characteristics of the individual products and the various possible applications have to be taken into account. This is why, apart from the assessments and procedures addressed in this guide, many other scenarios may apply.

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1 Foreword

More than 80% of all counterbalanced industrial trucks and a multitude of other industrial trucks are nowadays used with attachments. The mechanical connection of removable attachments is standardized in ISO 2328, a standardization of the hydraulic interface between the truck and attachment has so far not been established.

2 Introduction

This guide has been developed by representatives of various materials handling equipment and attachments manufacturers to facilitate a smooth hydraulic connection of attachments on industrial trucks of different manufacturers.

3 Scope

This guide is applicable to industrial trucks with fork carriers according to ISO 2328, supporting class 1-5, also in conjunction with attachments, which are incorporated directly into the mast (integrated attachments).

Specifications of the truck manufacturers always take priority over this guide.

4 Standards and Directives

The following references are useful for the application of this guide. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

ISO 2328	Fork-lift trucks - Hook-on type fork arms and fork arm carriages - Mounting dimensions
ISO 3287	Powered industrial trucks – Symbols for operator controls and other displays
ISO 3691-1	Industrial trucks - Safety requirements and verification - Part 1: Self-propelled industrial trucks, other than driverless trucks, variable-reach trucks and burden-carrier trucks
ISO 5053	Powered industrial trucks - Terminology
ISO 8434-1	Metallic tube connections for fluid power and general use - Part 1: 24 degree cone connectors
2006/42/EC	Machinery Directive

5 Terms and definitions

For the purposes of this document, the terms and definitions given in the standards listed above apply.

Integrated Attachments are being incorporated directly into the mast and built a unit with the lift truck.

Hook-on Attachments are being mounted with hooks on the carriage of the lift truck. Hook-on attachments are interchangeable.

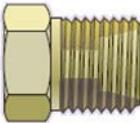
6 Design of hydraulic couplings

For the hydraulic coupling of the attachment to the lift truck screw couplings according to ISO 8434-1 are to be provided. Connecting dimensions are specified by the manufacturer of industrial trucks.

The model by coupling side should be as following:

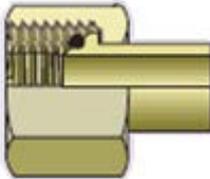
Attachment

Thread Coupling - Male



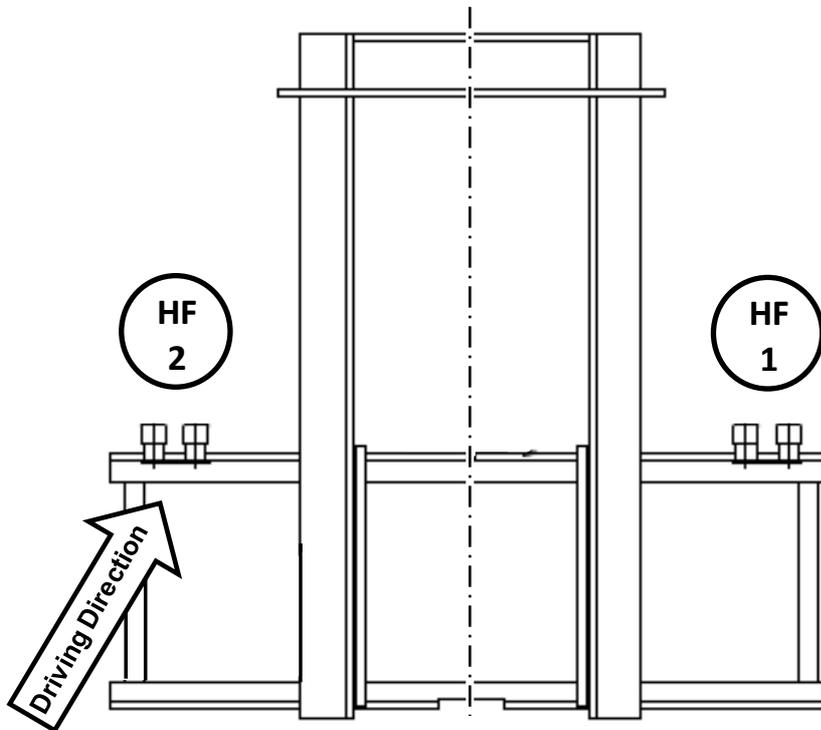
Lift truck

Thread Coupling - Female



7 Layout and allocation of hydraulic couplings on the industrial truck

Attachments which form a permanent unit with the industrial truck (integrated attachments) can be connected directly without couplings. The original connection points for hoses guided over the mast are to be provided at the integrated attachment.



Arrangement of the first auxiliary hydraulic - coupling (HF 1)

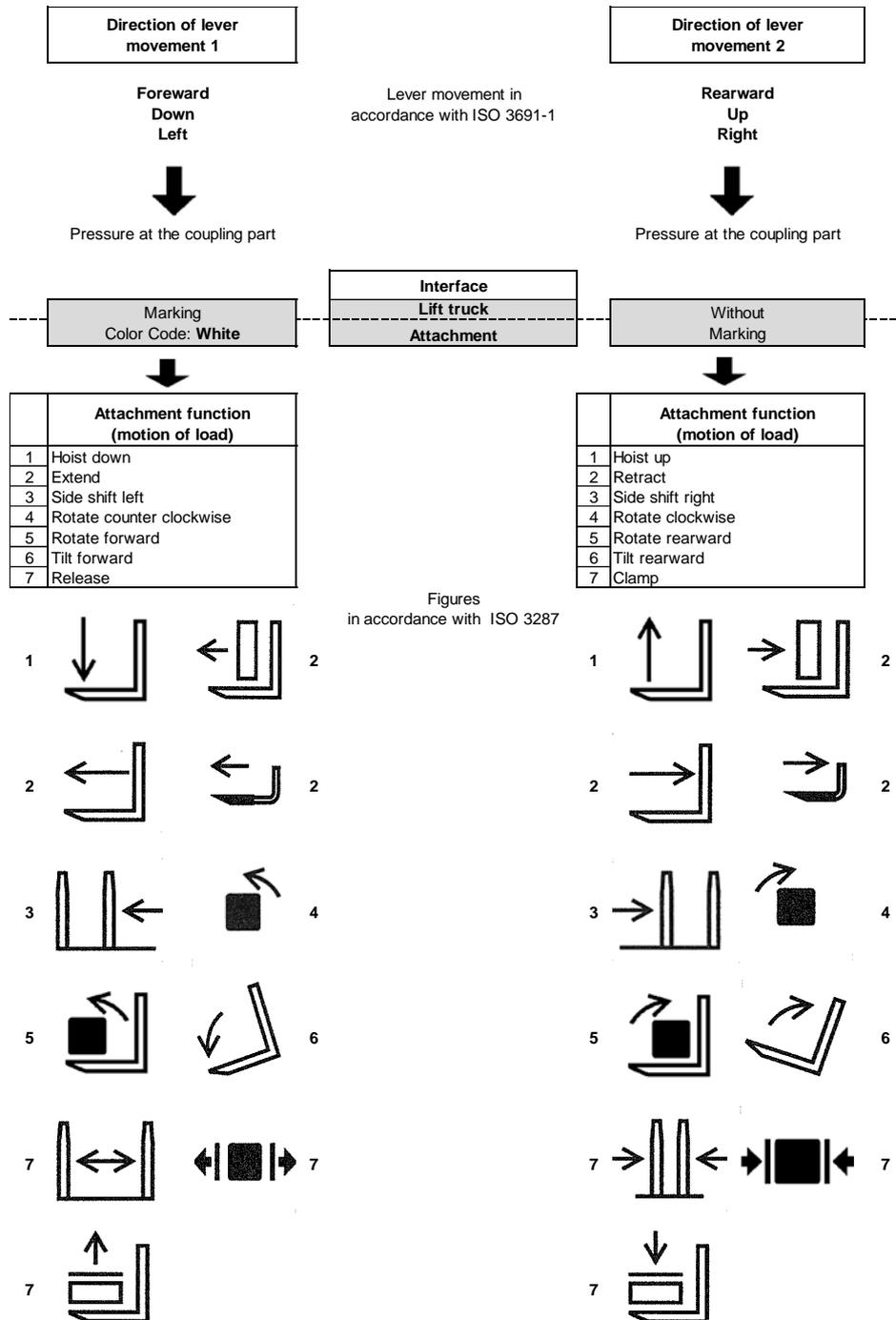
The connection for the first hydraulic function (HF 1) should be located at the right hand side of the lift truck centre line, from the driver's view, looking in the direction of the attachment.

Arrangement of the second auxiliary hydraulic - coupling (HF 2)

The connection for the second hydraulic function (HF 2) should be located at the left hand side of the lift truck centre line, from the driver's view, looking in the direction of the attachment.

8 Assignment of attachment motions to lever movement directions of the Industrial Truck

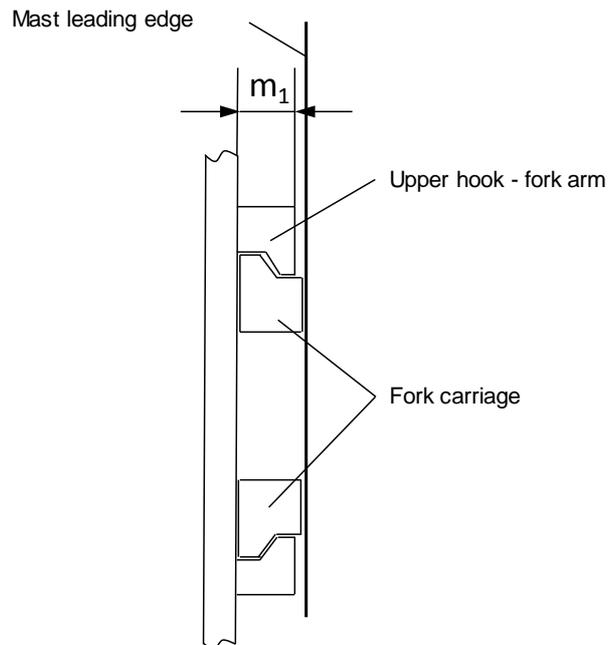
The assignment of the motion of attachments to the direction of movement of levers of the lift truck is in accordance with ISO 3691-1, paragraph 4.4.4.1. Described lever movement directions are given from the driver's view, looking in the direction of the attachment.



As described in the figure, the coupling parts of the lift truck and the attachment for the above described lever movement 1 should be labelled durably in colour "white". Consequently, a marking of the coupling parts for the lever movement 2 is not required.

9 Definition of constructive clearance between attachment and lift truck mast

The dimension "m1" according to ISO 2328 is defined as a construction space for attachments. Mast components such as reinforcing ribs on the fork carriage or chains should not protrude along the leading edge of the mast into the design space of the attachment. In case of a reduced design space the respective manufacturer of the attachment should be informed.



10 Hydraulic pressure information on attachment name plates

Nameplate specifications for attachments need to be in accordance with the requirements of ISO 3691-1 and the Machinery Directive 2006/42/EC.

The specification of the hydraulic pressure on the name plate of the attachment must refer to the required operating pressure, in order to ensure safe functionality of the attachment.

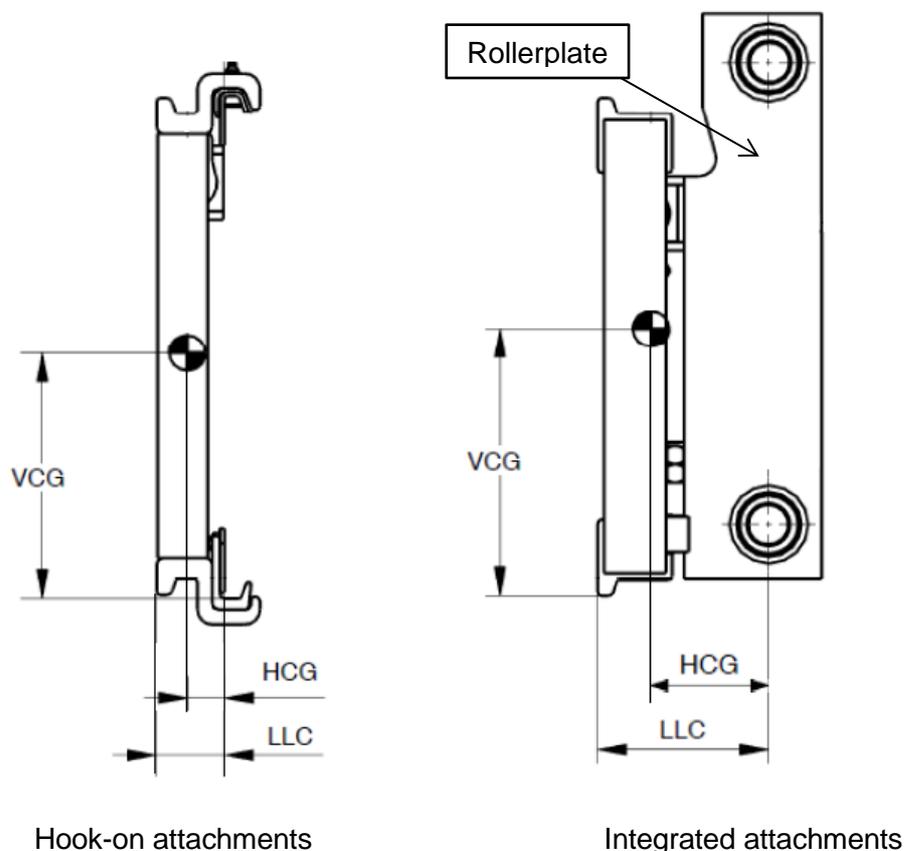
Information about a maximum permissible pressure should be given in addition to the nameplate or, alternatively, separately near to the hydraulic interface, on the attachment.

11 Lost load centre and centre of gravity of hook-on and integrated attachments

Measures regarding the lost load centre and the centre of gravity of attachments should be described in accordance with the following figures. Here, dimensions for integrated attachments are referring to the completed design; not on potential price list or catalogue information.

In general, the lower edge of each attachment should be taken as reference dimension for specifying the vertical centre of gravity.

Weight information on nameplates of integrated attachments include the rollerplates.



HCG Horizontal Centre of Gravity
VCG Vertical Centre of Gravity
LLC Lost Load Centre

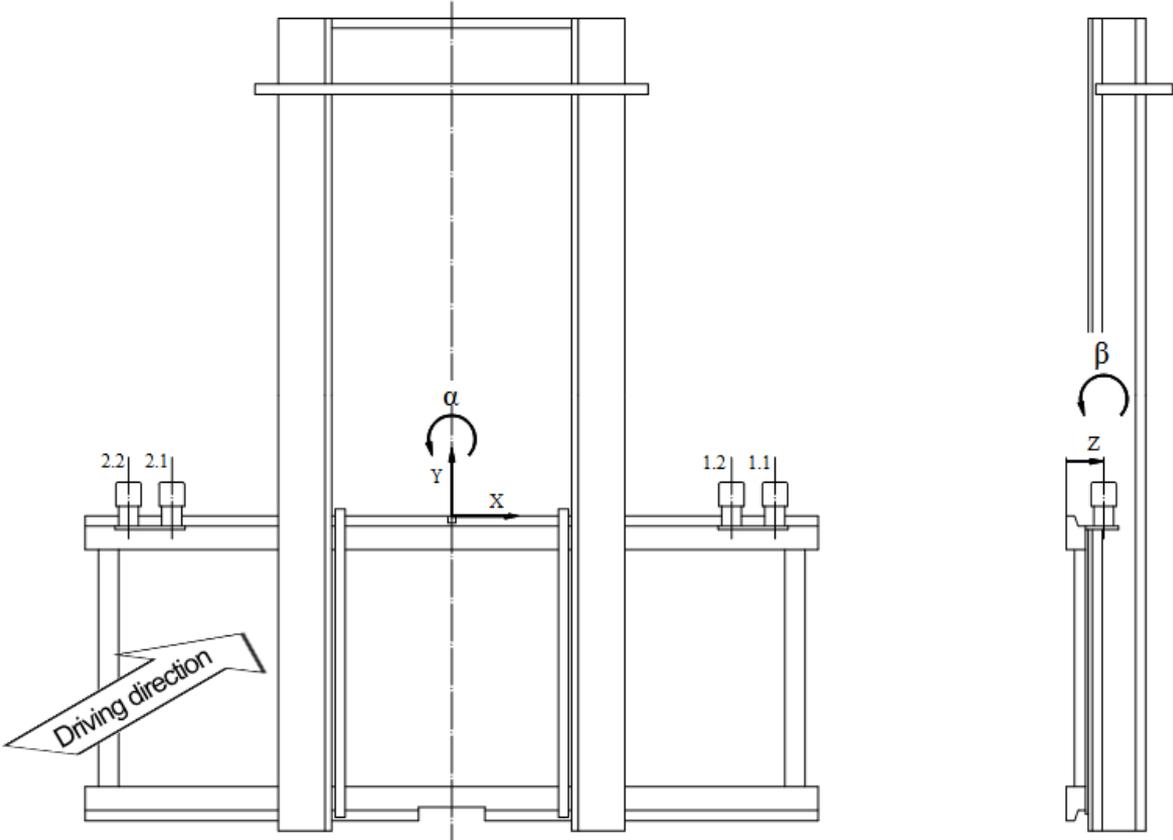
12 Inquiry and order information (Industrial Truck / Attachment)

Essential information for the correct interpretation of material handling equipment and attachments is listed in the following appendices. This information should be identified and provided to prevent possible functional errors after the delivery of the products.

Appendix A: Inquiry- / order information form (Industrial truck / Attachment)

INQUIRY- /ORDER INFORMATION TECHNICAL DATA - INDUSTRIAL TRUCK / ATTACHMENT	Please enter relevant information
Industrial Truck Information	
Manufacturer & Type: <input style="width: 200px;" type="text"/>	Truck Id. Number <input style="width: 150px;" type="text"/>
Mast (Type/Lifting Height): <input style="width: 100px;" type="text"/>	Mast Tilt Back/Foreward [°]: <input style="width: 80px;" type="text"/>
ISO Class (according ISO 2328): <input style="width: 100px;" type="text"/>	Width - Fork Carriage [mm]: <input style="width: 80px;" type="text"/>
	Integral Sideshifter <input type="checkbox"/> Yes <input type="checkbox"/> No
Quantity Hydraulic Functions: <input style="width: 80px;" type="text"/>	Tyres: <input style="width: 150px;" type="text"/>
Max. Hydraulic Pressure [bar]: <input style="width: 80px;" type="text"/>	Adjustable: <input type="checkbox"/> Yes <input type="checkbox"/> No
Max. Hydraulic Flow Volume [l/min]: <input style="width: 100px;" type="text"/>	Adjustable: <input type="checkbox"/> Yes <input type="checkbox"/> No
Rated - Capacity [kg]: <input style="width: 100px;" type="text"/>	Load Centre Distance [mm]: <input style="width: 100px;" type="text"/>
Attachment Information	
Attachment Mounting Type: <input type="checkbox"/> Integral Attachment <input type="checkbox"/> Hook-on Attachment	
Type of Attachment/Function: <input style="width: 300px;" type="text"/>	
Manufacturer: <input style="width: 200px;" type="text"/>	Catalogue Unit: <input type="checkbox"/> Yes <input type="checkbox"/> No <small>(if not, please add the quotation)</small>
Max. Capacity [kg]: <input style="width: 80px;" type="text"/>	Load Centre Distance [mm]: <input style="width: 100px;" type="text"/>
Frame Width [mm]: <input style="width: 80px;" type="text"/>	Sideshift [mm]: <input style="width: 100px;" type="text"/>
Weight* [kg]: <input style="width: 80px;" type="text"/>	Horizontal Centre of Gravity* [mm]: <input style="width: 100px;" type="text"/>
Lost Load Centre LLC* [mm]: <input style="width: 80px;" type="text"/>	Quantity Hydraulic Functions: <input style="width: 100px;" type="text"/>
Hydraulic Pressure [bar] Recommended: <input style="width: 80px;" type="text"/>	Max.: <input style="width: 80px;" type="text"/>
Hydraulic Flow Volume [l/min] Recommended: <input style="width: 100px;" type="text"/>	Max.: <input style="width: 80px;" type="text"/>
Fork Arm Information:	
Fork Arm Width [mm]: <input style="width: 80px;" type="text"/>	Fork Arm Thickness [mm]: <input style="width: 80px;" type="text"/>
Width upper hook [mm]: <input style="width: 80px;" type="text"/>	Fork Arm Length [mm]: <input style="width: 100px;" type="text"/>
* Information for the integrated attachment includes rollerplates? <input type="checkbox"/> Yes <input type="checkbox"/> No	
Load Information	
Load Width [mm]: <input style="width: 80px;" type="text"/>	Max. Load [kg]: <input style="width: 80px;" type="text"/>
Load Depth [mm]: <input style="width: 80px;" type="text"/>	Load Centre [mm]: <input style="width: 80px;" type="text"/>
Load Height [mm]: <input style="width: 80px;" type="text"/>	Prorated [%]: <input style="width: 80px;" type="text"/>
Load Diameter [mm]: <input style="width: 80px;" type="text"/>	Driving Distance [m]: <input style="width: 80px;" type="text"/>
Lateral Offset [mm]: <input style="width: 80px;" type="text"/>	To Lifting Height [mm]: <input style="width: 80px;" type="text"/>
	Load on Pallet <input type="checkbox"/>
	Load fixed/clamped <input type="checkbox"/>
	Centrally loaded <input type="checkbox"/>
Application Information	
Type of Industry: <input style="width: 250px;" type="text"/>	Multi-Shift Operation: Yes <input type="checkbox"/> No <input type="checkbox"/>
Indoor/Outdoor use	Soil Surface
Only inside: <input type="checkbox"/>	Plane: <input type="checkbox"/>
In- and outside: <input type="checkbox"/>	Uneven: <input type="checkbox"/>
Predominantly outside: <input type="checkbox"/>	Gradients: <input type="checkbox"/>
	Sleeper: <input type="checkbox"/>
	Type of Flooring
	Asphalt: <input type="checkbox"/>
	Pavement: <input type="checkbox"/>
	Concrete: <input type="checkbox"/>
	Others: <input type="checkbox"/>
Note: Please use an additional page for additional information.	
Date: <input style="width: 150px;" type="text"/>	Signature: <input style="width: 150px;" type="text"/>
	Pages: <input style="width: 50px;" type="text"/>

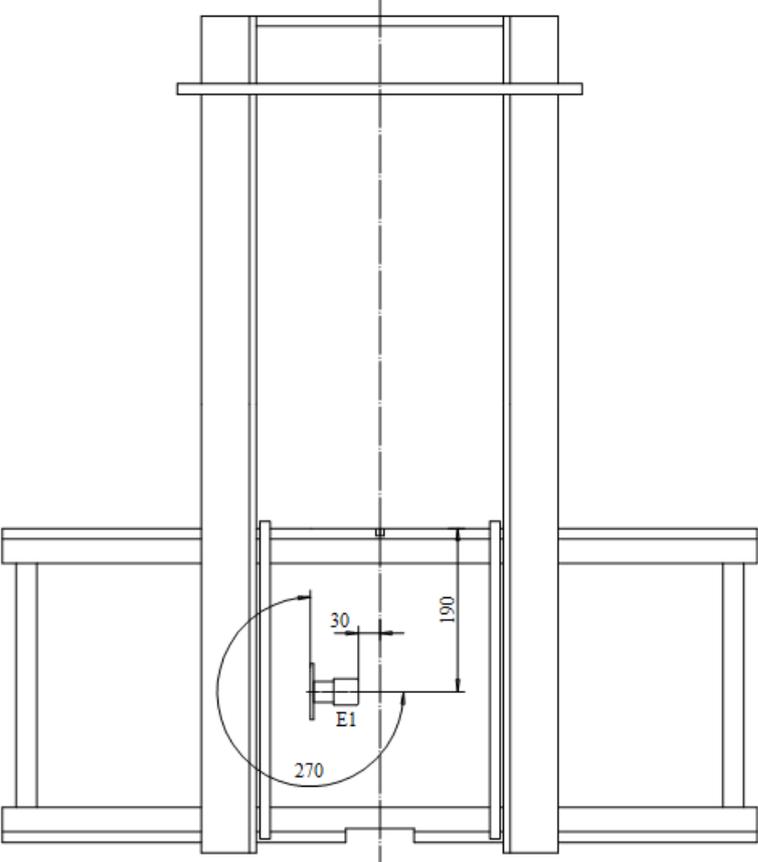
Appendix B: Description for the position of hydraulic connections



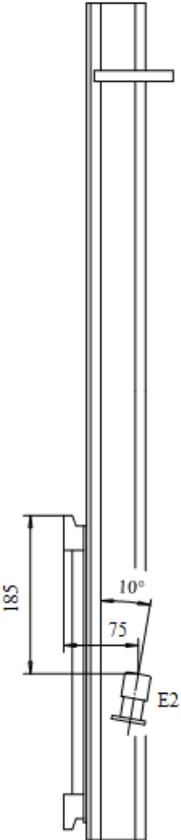
Connector	X [mm]	Y [mm]	Z [mm]	α [°]	β [°]	Size	Connector Type	White marking according to chapter 6
1.1								
1.2								
2.1								
2.2								

Appendix C: Example for the description of the position of hydraulic connections

Example E1



Example E2



Connector	X [mm]	Y [mm]	Z [mm]	α [°]	β [°]	Size	Connector Type	White marking according to chapter 6
E1	-30	-190		+270°		12S; M20x1,5	screw connection; female	X
E2		-185	+75		-10°	12S; M20x1,5	screw connection; female	

Contact

Heiko Boekhoff
VDMA Materials Handling and Intralogistics
Tel.: +49 69 6603-1505
Email: heiko.boekhoff@vdma.org