			
Linde Plant ID	Air Separation Plant		
Linde Project No. tbd		Client Project No.	
Linde Project Code tbd		Client Project Code	
Linde Doc. No. &AA W-SK 2401 (EN)		Client Doc. No.	Client Rev.

Piping

-

Explanation to the Factor List

LE Organizational Unit	Sub-Project No.	Project Code

	inquiry	1.0	14.04.2022	E. Pitsiou, GCP	D. Bumann, GCP	E. Pitsiou, GCP	
Status	Purpose	Issue	Date	Prepared	Reviewed	Approved	Remark

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1 Scope

This specification is applicable for fabrication, installation and modifications of metallic piping systems (including fastening and supports) at prefabrication locations and construction sites.

2 Purpose

This specification explains the manual determination of Factors (piping) from corresponding Factor lists.

3 Definitions

FI	Factor Item
Rm	Running meter
MM	Material Multiplier
MG	Material Group
BOM	Bill of Material

4 Applicable documents

&AZ-W-LX 2401(EN)	Factor List Piping DIN
&AZ-W-LX 2402 (EN)	Factor List Piping ANSI

5 Linde Measurement Factor System

The Linde Factor-Measurement-System is used for progress control and payment of piping construction.

In order to get all valuable construction activities assessed, they are listed in form of single measurement positions (Factor Item - FI). These Factor items are allocated according to material items. The assessment unit of the Factor item is the measurement Factor.

By these measurement Factors all measurement positions are brought into a dimensionless value relation, capable to being totalled.

Basis of assessment for all measurement positions are theoretical aspects and practical experiences.

The evaluation of each Factor item is determined in Factor lists.

Following Factor lists for piping are available:

- &AZ-W-LX 2401 (DIN)
- &AZ-W-LX 2402 (ANSI)

A certain number of Factors is assigned to each activity-position for all diameters and all wall thicknesses. The number of Factors is always related to 'quantity '1', for example 1 m, 1 piece, 1 kg etc.

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6 Handling of Linde Factor System

6.1 Determination of Factors

6.1.1 Factor lists

Factor lists record the Factor item of each activity according to the Linde Factor system.

The items listed in the Factor list only represent the most important ones. All intermediate items will be calculated exactly for compensation or derived by interpolation.

Factors depending only on nominal diameter but not on wall thickness are shown only once per nominal diameter and page in the Factor list.

If other parameters than 'wall thickness' or 'diameter' determine the number of Factors, the Factor values are given in increments. Intermediate values will be calculated for compensation or interpolated for estimation.

Basis for the assessment of the number of Factors is the standard nominal dimensions (tolerances according to code respectively order specification). Exceptions may be granted only by the **COMPANY** if tolerances in diameter and wall thickness are exceeded. Additional compensation will be accepted only above the maximum tolerances and not from the nominal dimensions.

All positions of the Factor lists are explained in Chapter 7.

6.1.2 Derived Factor items

Derived Factor items are not listed in the Factor list but they are as important as the Factor items themselves for accounting purposes.

Chapter 8 shows the derived Factor items. It is described how to calculate the corresponding Factors from the Factor list.

6.1.3 Project specific Factor items

If applicable, Chapter 9 shows the project specific Factor items.

6.1.4 Influence by material

The influence of different materials on the construction work is accounted for in Material Multipliers (refer to Chapter 10 "Material multipliers" (MM)). These are solely applicable for Factor item 3.1 to 3.8 of the Factor lists of piping.

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6.2 Factor design in Linde System

6.2.1 Bill of Material (BoM)

Linde bill of materials show the calculated Factors to corresponding component (compare Appendix 1). The bill of materials is separated into the following:

- Prefabrication
- Erection
- Welding
- Assemblies

The underlying Factor items are shown under 'Surplus' on the bill of material for each material item. The declared Factors on the bill of materials can be calculated according to the procedure described in Chapter 6.1.

Assemblies

Assemblies mean piping components which are combined under a specific assembly name. These assemblies are groups such as drains, vents, instrument nozzles, flange unions, etc. are found several times in the piping systems of the plant.

Assemblies are identified with their Ident-No, as shown in the BOM (prefabrication / construction). The number of Factors shown on the BOM is the sum of Factors including all activities related to the installation of all items, and subassemblies within the particular assembly.

In addition to that all assembly groups are shown in the BOM broken down in single items with their individual number of Factors per item.

The assembly itself (head of assembly group) may contain Factor items, the ones resulting from the alignment of single items, e. g. pipe bending, welds, etc.

Subassemblies within an assembly are broken down too.

Therefore, the user of the BOM system is able to identify and control every single item of a pipeline.

Measurement position '900'

This position is a pseudo-measurement position. In the BOM, it means for the related component the 'Compensation via As-Built measurement'. It shall be used for those parts only

- which, due to their type of design and execution, no Factor values are determined on the basis of the Factor-list (such as sample cooler, square-type ducts, locking devices, spray shields at flange unions etc.) and
- for which essential data for the determination of the number of Factors are missing during Detail Design (e.g. weight for special supports, etc.).

In all these cases it is the responsibility of the **CONTRACTOR** to agree with the site management (**COMPANY**) upon an adequate compensation with respect to actual work performed, e.g. on the basis of fixed prices or on the basis of similar measurement positions of the Factor-list and by completing missing data by weighing, etc and to clear via 'Feedback in As-Built measurement'.

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6.3 Factor pricing

The price for a particular measurement position (respectively a unit price) will be found by multiplying the corresponding number of Factors from Factor-list with a price per Factor.

The price for the assembly and installation of a complete pipeline or a piping system results from the equivalent sum of Factors of all activities multiplied by the price per Factor.

The Linde Factor Measurement System only uses the positions listed in the Factor list. A further breakdown (separation into prefabrication and field erection) or the allowances of special difficulties (heights or narrow work situations) are not considered in the Factor values.

These influences have to be considered with the price per Factor (consideration of complexity of work).

The Factor price is understood to be the price until free installation point for performances accepted by **COMPANY**.

7 Explanation to the Factor items

FI	Name	Explanation	Assessment
1	Piping		
1.1	Pipe installation in field	All necessary activities such as laying out, fitting, alignment, supporting, fixing of straight pipe position. Provision of auxiliary material not provided by COMPANY . Compensation for straight length given in BOM. Excluding material positions such as fittings, flanges, valves etc. (compensated in designated Factor item).	Factor per running meter pipe
1.2	Pipe installation on pipe racks	Explanation: see 1.1	Factor per running meter pipe
1.3	Dismantling of pipes	All activities necessary for dismantling including reconditioning of reusable pipes / parts and their transporting / unloading to the advised storage place. Provision of auxiliary material not provided by COMPANY . The components shall be re-usable after dismantling. Scrapping must be approved by COMPANY . Compensation for dismantled straight pipe length only.	Factor per running meter pipe (straight)
2	Fittings		
	Valid for parts with circumferential welds at each end, not valid for parts as Weldolet, Nipolet, reinforced nozzle, half coupling etc. and parts ending with socket weld or thread.		
2.1	Adjustment of fitting (1N = 1 connection end)	All necessary activities such as measurement, roundness and angularity check of ends, correction works if necessary, cleaning and adjusting. Provision of auxiliary material not provided by COMPANY . Fittings for caps, dished heads.	Factors per piece

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FI	Name	Explanation	Assessment
2.2	Adjustment of fitting (2 N = 2 connection end)	<p>All necessary activities such as measurement, roundness and angularity check of ends, correction works if necessary, cleaning and adjusting. Provision of auxiliary material not provided by COMPANY.</p> <p>Fittings for elbows, reducers, miter bend.</p> <p>Reducers Reducers fabricated by the CONTRACTOR on site from pipe material by swaging are compensated equal to jobsite-supplied reducers (adjusting fittings). For compensation the larger diameter is considered.</p> <p>Miter bends Only for complete miter bends supplied as prefabricated member that is shown as complete component on BOM. Mitre bends fabricated by the CONTRACTOR on site are considered as pipeline and are shown in the BOM as assembly group (miter bends fabricated from pipes). Here compensation is granted according to the Factor-list (pipe installation, mitre welds, pressure test).</p>	Factors per piece
2.3	Adjustment of fitting (3 N = 3 connection end)	<p>All necessary activities such as measurement, roundness and angularity check of ends, correction works if necessary, cleaning and adjusting. Provision of auxiliary material not provided by COMPANY.</p> <p>Fittings for T piece, Y piece</p>	Factors per piece
2.4	Adjustment of flanges	<p>All necessary activities such as measurement, roundness and angularity check of ends, correction works if necessary, cleaning and adjusting. Check flange face for damages and contamination. Provision of auxiliary material not provided by COMPANY.</p> <p>Flanges are classified according to the pressure rating groups.</p>	Factors per piece
2.5	Installation of blind flanges	<p>All necessary activities such as check flange face for damages and contamination, cleaning.</p> <p>Blind flanges are classified according to the pressure rating groups.</p>	Factors per piece
3	Welding		
	<p>Factors shown in the Factor list for welding activities apply for unalloyed carbon steel only. Depending on the actual material quality, the Factors for welding activities Pos. 3.1 to 3.8 given in the Factor list will be adjusted by the Material Multipliers as shown in Chapter 7. Included are all kinds of heat treatment necessary for welding, if applicable pre-heating caused by weather conditions.</p> <p>Post weld treatment will be compensated per unit price.</p>		
3.1	Circumferential Weld	<p>All necessary activities such as measuring, laying of pipes and fittings, marking of cutting line, cutting, preparation of bevels, if applicable removal of paint, cleaning, adjusting, aligning, supporting, tacking, checking, levelling, welding. Provision of auxiliary material not provided by COMPANY.</p> <p>If necessary counter-fastening of flanges is included.</p>	Factors per piece

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FI	Name	Explanation	Assessment
3.2	Fillet weld	<p>All necessary activities such as measuring, laying of pipes and fittings, marking of cutting line, cutting, grating, if applicable removal of paint, cleaning, jointing, adjusting, aligning, if applicable supporting, tacking, welding. Provision of auxiliary material not provided by COMPANY.</p> <p>Applicable to items with socket weld end connections (socket weld flanges, socket weld fittings etc.).</p> <p>Following fixed wall thicknesses and nominal diameters are implemented in the Factor assessment:</p> <p>DN \leq 80 or \leq 3" s = 3.9 mm</p> <p>DN > 80 or > 3" s = 6.4 mm</p> <p>For slip-on-flanges according to ANSI B 16.5 and plain collars according to DIN 2655 and 2656, fillet welds will be compensated twice.</p>	Factors per piece
3.3	Miter weld	Performance: see 3.1	Factors per piece
3.4	Branch connection	<p>All necessary activities such as measuring branch outlet on main pipe, marking, cutting, if applicable removal of paint, adjusting of branch, tacking, aligning, welding. Provision of auxiliary material not provided by COMPANY.</p> <p>For unfortified branches the calculation is based on the actual outside diameter and wall thickness of the branch.</p> <p>For branch connections the outside diameter and wall thickness of the branch according to the BOM is considered.</p> <p>This position also includes inclined branches.</p>	Factors per piece
3.5	Weldolet, Nipolet etc.	<p>All necessary activities such as measuring branch outlet on main pipe, marking, cutting of outlet, bevelling, if applicable removal of paint, attaching of Weldolet etc., tacking, aligning, welding. Provision of auxiliary material not provided by COMPANY.</p> <p>The calculation is based on the actual outside diameter and wall thickness of continuing pipe (connecting dimensions).</p> <p>For Nipolets, Sockolets and Thredolets up to DN < 80 or < 3", the following wall thicknesses will be used for compensation instead of the connecting dimensions:</p> <p>DN \leq 80 or \leq 3": s = 3.9 mm</p> <p>DN > 80 or > 3": s = 6.4 mm</p>	Factors per piece
3.6	Reinforcement pad	<p>Fabrication of pad (reinforcing ring) according to drawing: cutting the ring out of pipe (same as run pipe), bevelling, drilling and threading of vent hole, adjusting, tacking, welding, closing of vent hole with putty or plug. Provision of auxiliary material not provided by COMPANY.</p> <p>The Factor for Pos. 3.6 results to outside diameter of reinforcement pad and wall thickness of run pipe.</p>	Factors per piece

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FI	Name	Explanation	Assessment
3.7	Welding gasket	<p>Cleaning of flange and welding gasket faces, positioning of gasket, centre, tacking, welding. After bolting-up: tacking and welding of flanges (partially removal of bolts for welding and re-tightening). Provision of auxiliary material not provided by COMPANY.</p> <p>Note Basis for the number of Factors is a standardized wall thickness of 4 mm. They are stated in the Factor-list only once per outside diameter of pipe.</p> <p>The installation of the flange union is compensated according to Pos. 4.1 to 4.3, depending on pressure classification.</p>	Factors per piece including welding gasket
3.8	Backing ring for Aluminium welds	<p>Fitting and shortening of Al- and stainless steel ring, welding of longitudinal seams, tack-welding of combined backing ring, acc. to LS 419-01 and LS 145-21.</p> <p>Note Basis for wall thickness is a standardized wall thickness of 4 mm. They are stated in the Factor-list only once per outside diameter of pipe.</p> <p>The insertion of stainless steel backing rings \leq DN 100 (LS 419-01) as per LS 145-19, will not be compensated separately.</p>	Factors per piece
3.9	Cutting for modifications (Cutting of welds)	<p>All necessary activities such as measuring, marking, if applicable removal of paint, cutting, grinding of excess weld, prepare cut surface on pipe, flanges, welding gaskets etc., accurate to angle for reuse. Provision of auxiliary material not provided by COMPANY.</p> <p>Note The position is only compensated once per dismantling point.</p> <p>This position is only compensated if the components are appointed for reuse.</p>	Factors per piece
4	Flange unions, Threads, Bending of Pipes		
4.1	Flange unions ($<$ PN 63, or $<$ Class 400)	All necessary activities such as cleaning of flange facing, preparation of gaskets, positioning of gaskets, lubrication of bolts, fitting, tightening (if required with torque wrench for bolt connections with specified torque). Metallic gaskets are treated like normal gaskets. Provision of auxiliary material not provided by COMPANY .	Factors per piece
4.2	Flange unions ($>$ PN 63 $<$ PN 160, or $>$ Class 400 $<$ Class 900)	Explanation: see 4.1	Factors per piece
4.3	Flange unions ($>$ PN 160, or $>$ Class 900)	Explanation: see 4.1	Factors per piece
4.4	Positioning of blinds & plug-ins	Explanation: see 4.1 - 4.3,	Factors per blind piece

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FI	Name	Explanation	Assessment
		<p>Additionally positioning of all kinds of intermediate rings and blinds such as line blinds, orifice plates, drip rings, orifices and similar.</p> <p>The value listed in the Factor list indicates a surcharge to the flange union.</p>	
4.5	Pipe bends	<p>(Pipes up to DN 200 or 8")</p> <p>All necessary activities such as measuring pipe, bending according to specification. The Factor applies to a bending angle of ≤ 135 degrees. Pos. 4.5 is compensated twice for angle of > 135 degrees.</p>	Factors per piece
4.6	Cutting of threads	All necessary activities such as measuring, laying of pipe, marking of cut, cutting, threading, grating. Provision of auxiliary material not provided by COMPANY .	Factors per piece
4.7	Sealing of threads	<p>All necessary activities such as cleaning of thread, preparation according to specification, threading, tightening. Provision of auxiliary material not provided by COMPANY.</p> <p>Note The Factor value is related to the size of the female thread. The amount of Factors is based on the nominal pipe size (not on inside diameter of the thread).</p>	Factors per female thread piece
4.8	Dismantling of flange unions	All necessary activities such as dismantling and their transporting / unloading to the advised storing place. Provision of auxiliary material not provided by COMPANY .	Per piece, (0,7 x Factor of corresponding Pos. 4.1 - 4.4 and 4.7)
5	Valves		
5.1	Valves, without - or with simple hand drive	<p>Valve, safety valve, swing check valve, strainer, level controller, level indicator, float cage etc. checking, blowing out or removal of foreign matter, installing, aligning, supporting, fixing, fastening of hand wheel or lever. Provision of auxiliary material not provided by COMPANY.</p> <p>The location / orientation of spindles / hand wheels shall be as indicated on isometrics. In case of interference (access, operation problems), orientation shall be clarified with COMPANY. There is no compensation if valves have to be removed and re-installed due to faulty handling.</p> <p>For safety valves compensation is based on nominal size of pressure side (entry side). Level controller, level indicator, float cage etc. are compensated 2 x Pos. 5.1 (nominal size nozzle).</p> <p>Valves are classified according to the pressure rating groups.</p>	Factors per piece
5.2	Valve with actuator	<p>Valve with actuator means all pneumatic-, motor-, or manual gear operated valves.</p> <p>Performance: see 5.1</p> <p>This position is compensated only for complete valve, including actuator.</p>	Factors per piece

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FI	Name	Explanation	Assessment
5.3	Wafer type valve with actuator	<p>Valve with actuator means all pneumatic-, motor-, or manual gear operated valves.</p> <p>Performance: see 5.1</p> <p>This position is compensated only for complete valve, including actuator.</p> <p>Note For this position only one flange union will be compensated acc. to Pos. 4.1 to 4.3.</p>	Factors per piece
5.4	Wafer type valve without - or with simple hand drive	<p>Performance: see 5.1</p> <p>Note For this position only one flange union will be compensated acc. to Pos. 4.1 to 4.3.</p>	Factors per piece
5.5	Spindle extension	Complete installation of spindle extension (with hand wheel and guiding part) supplied by Linde or fabricated from CONTRACTOR , aligning and fastening by welding or bolting	Factors per piece
5.6	Dismantling of valves etc.	<p>Valid for valves Pos. 5.1 to 5.4, and spindle extensions Pos. 5.5.</p> <p>Dismantling, cleaning from loose dirt by purging and/or blowing for valves, transporting / unloading to the advised storing place.</p>	Factors per piece (0,7 x Factor of corresponding Pos. 5.1 - 5.5)
6	Pressure and Leak test		
6.1	Hydraulic or pneumatic pressure test	<p>Pressure and leak test with water, water mixtures (e. g. Glycol), dry oil free air, and inert gas, if applicable with steam.</p> <p>Provision of temporary connections for filling and draining, supply and installation of line blinds, removing piping items exempted from pressure test, filling and venting of system, pressure testing according to the specification.</p> <p>Leak test to be applied to all welds and brazing joints prepared by CONTRACTOR (incl. longitudinal welds in pipes and fittings), flange unions and threaded connections. In case of pneumatic test all welding and bolting connections are to be leak tested with a foaming agent. Pneumatic tests shall be executed acc. specifications.</p> <p>Carry out inspection and documentation according to the required specifications, drain system, remove line blinds, install parts which were removed prior to the pressure test and install flange unions with specified gaskets, bolts and nuts have to be tightened, unlock spring hangers and spring supports, remove temporary piping test components.</p>	Factor per running meter, pipe acc. Pos. 1.1
6.2	Service Test	Service test is a leak test with dry oil free air or gas at a low pressure setting in addition to the performed pressure test according to the specification.	Factor per running meter pipe acc. Pos. 1.1
7	Others		

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FI	Name	Explanation	Assessment
7.1	Stiffening web	Preparation, adjusting, welding. Use material according to the Linde specification. Alloy stiffening webs may be fabricated from identical scrap material.	Factors per piece
7.2	Fastening, supports, special types	Installation of supports, supplied by Linde or CONTRACTOR , installation of insulation or Teflon spacers, bolting and if required welding (removal of temporary supports). Measuring, drilling of penetration holes for bolt connections (e. g. steel construction), required installation and dismantling of supporting structures. Post galvanisation and lining of supporting constructions are included in Factor. The constant value of 0.3 Factors (Pos. 7.2) will be compensated only once for a complete support. If a support is divided in the BOM in single parts such as pipe clamps, guides, fish plates, spacers etc., these parts will be compensated according to their total weight with 0.032 Factors/kg, without the constant value. Exemplary for such supports and their components are the Linde Support Standards. For compensation weights as indicated in the drawings or BOM will be used. Fabrication will be paid separately (special agreement).	Factors per piece Weight dependent Factors in kg Single weight per support.
7.3	Spring supports and Spring hanger	Explanation: see 7.2, but additional with adjusting of initial stress force.	See Pos. 7.2
7.4	Grinding of excess material on welding roots	Careful grinding of excess material on welding roots on specified welds (e. g. orifice flanges) with adequate tools, removal of grinding dust.	Factors per piece weld
7.5	Measuring line branch on slip-on flanges	Penetrate measuring line branch according to flange boring, grating, removal of drilling chips.	Per piece bore hole, according to nominal size of measuring line branch.

8 Derived Measurement Positions

IF	Name	Explanation	Assessment
-	General Measurement Positions		
	Half Coupling	The connection weld between half coupling and header pipe is a fillet weld. To allow for the additional work as drilling the hole a circumferential weld according to Pos. 3.1 will be compensated. For compensation the outside diameter of the connection pipe (not header pipe) and 10.6 mm wall thickness for pressure class 6000 lbs 13.8 mm wall thickness for pressure class 9000 lbs will be used.	Factors per piece

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IF	Name	Explanation	Assessment
		Note The wall thicknesses considered for compensation are fictitious. They consider the amount of work for the actual outside diameter of the half coupling. For compensation of fillet weld of connected pipe Pos. 3.2 does apply.	
	Drilling of a hole in connection with a fillet weld	When parts are to be connected by fillet weld and have to be provided with a hole, e. g. drilling of a blind flange, the Factor for this weld will be compensated as shown in Pos. 3.1 for a circumferential weld, to compensate the drilling work.	Factors per piece
	Thermo-coupling, High pressure nozzle	For thermo-couplings (insert part) refer to LS 491-08 or similar 0.75 x Pos. 3.4 will be paid (reduced scope of work). For high pressure nozzles 0.63 x Pos. 3.4 will be paid (reduced scope of work).	Factors per piece
	Orifice Flange union	Orifice flange union means the assembly of orifice flanges, flange union, orifice and instrument tubing, but not types of restriction plate or completely supplied orifice run. According to the instrument specification welding of both orifice flanges, grinding of inner root path, in case of slip-on flanges, drilling and grating of measuring line branches, seal welding of surplus holes, seal welding of measuring line branches, preparation of flange connection and installation of orifice. (Limit of supply piping = limit of supply piping construction). Beside the Factors allocated to each item the following will be paid in addition: -grinding of inner root path for each flange welding seam Factor per piece according to nominal size of flange: 1 x Pos. 7.4 -drilling and grating of hole for each measuring line branch acc. to nominal branch size: 1 x Pos. 7.5	Factors per piece
	Installation of metal expansion joints and meter runs	Installation of metal expansion joints and completely delivered meter runs will be compensated per piece for: welding connection (circumferential weld) type: 1 x Pos. 2.2 flange connection type: 1 x Pos. 5.1 Welding seams or flange unions are compensated separately. Installation of non-metal expansion joints (textile-, Perbunan-, rubber expansions, bellows etc.) and if specified fastening with strips and hose clamps will be compensated: 1 x Pos. 4.4. For non-metal expansion joints the smaller diameter will be used for compensation.	Factors per piece
	Cold box shell penetration for pipes	(refer to LS 493-04, Pos. 1.1 – Penetration for AL-pipes) Cleaning of flange faces, setting gasket and penetration plate in position, welding of the fillet weld between the penetration plate and the pipe and tightening of the nuts after welding. Compensation will be paid for: Fastening of the penetration plate to the cold box: 0.4 x Pos. 4.1 Fillet weld between penetration plate and pipe: 1.0 x Pos. 3.2	Factors per piece
	Blow off lines and diagonal	For the diagonal cut at the end of a blow off line the Pos. 3.9, Cutting for modification, shall be used for compensation.	Factors per piece

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IF	Name	Explanation	Assessment								
	cuts at pipe ends										
	Valves for cryogenic services in cold box shells	<p>Valves for cryogenic service in cold boxes are assembly units, the valve itself with or without actuator and some additional parts. Some of these parts do not have a position in the Factor-list. According to the amount of work similar measurement positions will be allocated. The separated parts in the assembly units will be compensated according to::</p> <table><tr><td>Valve without driver</td><td>2 x Pos. 5.1</td></tr><tr><td>Valve with driver</td><td>2 x Pos. 5.2</td></tr><tr><td>Bulkhead, support</td><td>1 x Pos. 7.2</td></tr><tr><td>Bellows (see Pos. 8.5!)</td><td>1 x Pos. 4.4</td></tr></table>	Valve without driver	2 x Pos. 5.1	Valve with driver	2 x Pos. 5.2	Bulkhead, support	1 x Pos. 7.2	Bellows (see Pos. 8.5!)	1 x Pos. 4.4	Factors per piece
Valve without driver	2 x Pos. 5.1										
Valve with driver	2 x Pos. 5.2										
Bulkhead, support	1 x Pos. 7.2										
Bellows (see Pos. 8.5!)	1 x Pos. 4.4										
	Rain bumper, Seal ring	<p>Rain bumper or seal ring shall be installed and welded according to specification.</p> <p>Compensation is based on measuring 'D1' or 'Da', whereas wall thickness is constantly 3.9 mm for all diameters.</p> <p>Compensation for divided performance also includes hood longitudinal welds.</p> <p>Compensation will be paid for:</p> <table><tr><td>Performance – one-piece</td><td>1.0 x</td><td>Pos. 3.2</td></tr><tr><td>Performance – two-piece</td><td>1.5 x</td><td>Pos. 3.2</td></tr></table>	Performance – one-piece	1.0 x	Pos. 3.2	Performance – two-piece	1.5 x	Pos. 3.2	Factors per piece		
Performance – one-piece	1.0 x	Pos. 3.2									
Performance – two-piece	1.5 x	Pos. 3.2									
	Special components for cold box shell	<p>This positions applies to the following components:</p> <p>Safety valves, Zchg. 2-50192 or similar</p> <p>scavenging gas exit pot, Zchg. 2-51052 Perlite-drainage,</p> <p>LS 490-04, valve nozzle</p> <p>Performance: removal of paint etc. around welding areas, laying of component, aligning, tacking, if required re-positioning, welding onto cold box shell.</p> <p>Compensation for the installation of complete component:</p> <table><tr><td>1.0 x Pos. 3.2</td><td>(Wd-konst. = 3.9 mm)</td></tr><tr><td>0.2 x Pos. 5.1</td><td>(DN-valve)</td></tr></table> <p>Note</p> <p>For oval connection opening the medium diameter will be used for Factor calculation.</p> <p>If the cold box shell cutting has to be performed on site, 0.7 x Pos. 3.2 (dimensions: see above) will be paid in addition. The compensation for this position is handled in the As-Built measurement Factor.</p> <p>If a 90-degree elbow (Zchg. 3-78880) has to be installed between the shell and the valve, 1 x Pos. 3.1 will be allocated in addition to the elbow.</p>	1.0 x Pos. 3.2	(Wd-konst. = 3.9 mm)	0.2 x Pos. 5.1	(DN-valve)	Factors per piece				
1.0 x Pos. 3.2	(Wd-konst. = 3.9 mm)										
0.2 x Pos. 5.1	(DN-valve)										

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9 Project specific Factor Item

NN

10 Material Multiplier (MM) for Factor list

MM	MG	DIN-Material	EN-Material	WS- No.	ASTM - Material
1.0	CS	St 35	S235G2T	1.0308	-
		St 35.8	P235G1TH	1.0305	A106 Grade A+B A234 Grade WPA
		UZSt 37-2	-	1.0161	-
		RSt 37-3U	S235JO	1.0114	A283 Grade C
		St 44-2	S275JR	1.0044	A283 Grade D
		St 45	S255GT	1.0408	-
		St 45.8	P255G1TH	1.0405	A106 Grade A+B A234 Grade WPB
		C 21	-	1.0432	-
		C 22	C22	1.0402	A234 Grade WPB
		C 22.8	P250GH	1.0460	A105
		H II	P265GH	1.0425	A285 Grade B A516 Grade 55+60
		H I	P235GH	1.0345	A414 Grade C A516 Grade 55
		St 37.0	P235TR1	1.0254	A53 Grade A A135 Grade A
		St 37.0	P355NH	1.0565	A106 Grade C A181 Grade 70
		X2 CrNi 19 11	X2CrNi19-11	1.4306	A182 Grade F304L A269 Grade TP304L A312 Grade TP304L A403 Grade WP304L
		X2 CrNiMo 17 13 2	X2CrNiMo17-12-2	1.4404	A182 Grade F316L A213 Grade TP316L A269 Grade TP316L A312 Grade TP316L A403 Grade WP316L
1.6	CN	X2 CrNiMo 18 14 3	X2CrNiMo18-14-3	1.4435	A358 Grade TP316L A454 Grade TP316L A511 Grade MT316L A409 Grade 316L
		X3 CrNiMoN 17 13	X3CrNiMoN17-13-3	1.4910	-

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		X5 CrNi 18 10	X5CrNi18-10	1.4301	A182 Grade F304 A269 Grade TP304 A312 Grade TP304 A358 Grade 304 A403 Grade WP304
		X5 CrNiMo 17 12 2	X5CrNiMo17-12-2	1.4401	A182 Grade F316 A269 Grade TP316 A240 Grade 316 A312 Grade TP316 A358 Grade 316 A403 Grade WP316
		X2CrNiMoN22-5-3	X2CrNiMoN22-5-3	1.4462	A182 Grade F51 A182 Grade F60
1.6	CN	X5 NiCrMoCuNb 20 18	-	1.4505	-
		X6 CrNiNb 18 10	X6CrNiNb18-10	1.4550	A182 Grade F347 A240 Grade 347 A269 Grade TP347 A312 Grade TP347 A358 Grade 347 A403 Grade WP347
		X6 CrNiTi 18 10	X6CrNiTi18-10	1.4541	A182 Grade F321 A249 Grade TP321 A312 Grade TP321 A376 Grade TP321 A403 Grade WP321 A454 Grade MT321
		X6 CrNiMoTi 17 12 2	X6CrNiMoTi17-12-2	1.4571	A182 Grade F317 A213 Grade TP316L A312 Grade TP316L A403 WP316L
1.8	CR	All other types of steel belonging to main material class 'CR'			
1.4	CU	CuNi10Fe1Mn	CuNi10Fe1Mn	2.0872	B466 - C70600 B467 - C70600
		CuNi30Mn1Fe	CuNi30Mn1Fe	2.0882	B466 - C71500 B467 - C71500 SB111-C71500
1.2	N	10 Ni 14	12Ni14	1.5637	A203 Grade D+E A333 Grade 3 A334 Grade 3 A350 Grade LF3
		14 Ni 6	-	1.5622	-
1.6	N1	X8 Ni 9	X8Ni9	1.5662	A333 Grade 8 A334 Grade 8 A522 Grade I A553 Grade I
1.1	TT	TStE 285	P275NL1	1.0488	A333 Grade 1 A350 Grade LF1 A662 Grade A
		TStE 255	S255NL	1.0463	A516 Grade 55
		TTSt 35V / TTSt 35N	-	1.0356	A333 Grade 1 A334 Grade 1 A556 Grade A2
		TTSt 41	P310NB	1.0437	A333 Grade 6 A414 Grade E
		-	P215NL	1.0451	-

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		-	P265NL	1.0453	-
		TStE 355	P355NL1	1.0566	A333 Grade 6 A350 Grade LF2 A420 Grade WPL6 A541 Grade Class 3 A633 Grade D A841 Grade A Class 1
		TStE 460	P460NL1	1.8915	A633 Grade E API 5L X52, X60, X65, X70
1.8	W	10 CrMo 11	-	1.7276	-
		10 CrMo 9 10	10CrMo9-10	1.7380	A182 Grade F22 A213 Grade T22 A234 Grade WP22 A335 Grade P22
		12 CrMo 19 5	X12CrMo5	1.7362	A182 Grade F5 A213 Grade T5 A234 Grade WP5 A426 Grade CP5
		15 NiCuMoNb 5	15NiCuMoNb5-6-4	1.6368	A302 Grade B+C+D A508 Grade Class 2+3
		20 CrMoV 13 5	20CrMoV13-5-5	1.7779	-
		X8 CrNiNb 16 13	X8CrNiNb16-13	1.4961	A182 Grade F347H A249 Grade TP347H A312 Grade TP347H
		X8 CrNiMoNb 16 16	X8CrNiMoNb16-16	1.4981	-
		X8 CrNiMoVNb 16 13	X8CrNiMoVNb16-13	1.4988	-
		X12 CrMo 9 1	X11CrMo9-1	1.7386	A213 Grade T9 A335 Grade P9
		17 CrMoV 10	-	1.7766	-
1.0	W1	15 Mo 3	16Mo3	1.5415	A161 Grade T1 A209 Grade T1+ T1a+ T1b
		16 Mo 5	-	1.5423	A182 Grade F1 A234 Grade WP1 A335 Grade P1 A336 Grade F1
1.4	W2	13 CrMo 4 4	13CrMo4-5	1.7335	A182 Grade F11+F12 A213 Grade T12 A234 Grade WP12 A335 Grade P12 A691 Grade 1Cr A691 Grade Cl.32
2.3	W3	14 MoV 6 3	14MoV6-3	1.7715	A405 Grade P24
		X20 CrMoV 12 1	X20CrMoV11-1	1.4922	-


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	-	X10CrMoVNb9-1	X10CrMoVNb 9-1	1.4903	A182 Grade F91 A336 Grade F91 A335 Grade P91 A199 Grade T91 A213 Grade T91 A234 Grade WP91
1.8	AL	AlMg3	EN AW 5754-0	3.3535	Alloy 5052-0
		AlMg4.5Mn	EN AW 5083-0	3.3547	Alloy 5083-0
		AlMg5	EN AW 5019	3.3555	-
2.0	NI	X10 NiCrAlTi 32 20	X10NiCrAlTi32 -21	1.4876	Incoloy 800
		NiCr21Mo	NiCr21Mo	2.4858	Incoloy 825
		NiCr22Mo9Nb	NiCr22Mo9Nb	2.4856	Inconel 625

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Appendix 1: Example Bill of Material


 Linde Engineering Document Number Linde 32-R-LR (36) 36101.002		Bill of Material Piping				Proj.No. Proj. Name
Constr. Area 32		PU 36	Line 36101	Sheet 2		
AP1: M-8801 AP2: M-8801		P+E: BTU.180.1683	MED: P	AD1: 4 AD2: 4	AT1: 85 AT2: -176	Paint System: 88 Ins. Type: C
Releases:	Mat. Rev. 01	Iso Rev. 01				Printed
	02.07.2013	02.07.2013				DD.MM.JJJJ
	ENPP1 / PM	ENPP1 / PM				Max Example

Ident.	Prefabrication	Wght. [kg]	Factor	Qty.
				
W23248	[PIPE#WELDED @ 40 * XS] BAT: R DN1: 1000 DN2: MG: CN MAT: ASTM A358 GR.304/304L CL1 RKL: NGDM1 DA1: 1016 PN: Norm: ASME Noblinr.: B36.10/19 ME: 04 WD1: 12.7 INSP: TAG: Factors: V 1.2: 4.839 [DA1:1016 WD1:12.7] V 8.1: 0.725 [DN1:1000]	4917.9	86.526	15.55
H31475	[WN-FLANGE,-RF,CL150,SERIES A @ 40 * XS] BAT: F DN1: 1000 DN2: MG: CN MAT: ASTM A182 GR.F304/304L RKL: NGDM1 DA1: 1016 PN: 16 Norm: ASME Noblinr.: B16.47 ME: 01 WD1: 12.7 INSP: TAG: Factors: V 2.4: 3.843 [DN1:1000 PN:16]	364.0	3.843	1
Y07730	[ANALYSE#AP54A,(-RF) @ 40 X 1] BAT: AP54A DN1: 1000 DN2: 25 MG: CN MAT: RKL: NGDM1 DA1: 1016 PN: Norm: R-SP Noblinr.: 1004.002 / ASME ME: 12 WD1: INSP: TAG: 36-SC-103X Factors: -	11.0	6.553	1
KX0043	[TEMPERATURE#AP7X4,(-RF) @ 40 X 1.5] BAT: AP7X4 DN1: 1000 DN2: 40 MG: CN MAT: RKL: NGDM1 DA1: 1016 PN: Norm: R-SP Noblinr.: 1004.002 / ASME ME: 12 WD1: INSP: TAG: 36-Ti-102 Factors: -	11.2	4.828	1
H31829	[WELDOLET XS,XS WEIGHT @ 40 X 2 * XS/SCH10S] BAT: A DN1: 1000 DN2: 50 MG: CN MAT: ASTM A182 GR.F304/304L RKL: NGDM1 DA1: 1016 PN: Norm: MSS Noblinr.: SP-97 ME: 01 WD1: 12.7 INSP: TAG: Factors: V 3.6: 2.803 [DN2:50 DA2:60.3 HWK:CN]	0.8	2.803	1

Ident.	Erection	Wght. [kg]	Factor	Qty.
				
R20157	[SLIDING SUPPORT,PTFE,WELDED, C @ 40] BAT: GLFKC DN1: 1000 DN2: MG: CN MAT: MAT. GRP. 13 (CRNI-ST) RKL: AZ13 DA1: 1016 PN: Norm: LS Noblinr.: 545-36 ME: 01 WD1: INSP: TAG: Factors: V 7.2: 5.804 [GEW:172]	344.0	11.608	2

Ident.	Welding	Factor	Qty.
G55216	[BUTT WELD, REF.4.1 @ 40 * XS(12.70MM)] BAT: RN DN1: 1000 DN2: MG: CN MAT: 18/10 CRNI-L8145-10/2 RKL: NGDM1 DA1: 1016 PN: Norm: ASME Noblinr.: ME: 12 WD1: 12.7 INSP: TAG: Factors: V 3.1: 28.548 [DA1:1016 WD1:12.7 HWK:CN]	85.643	3
I57016	[BUTT WELD, REF.4.1 @ 1 * STD(3.38MM)] BAT: RN DN1: 25 DN2: MG: CN MAT: 18/10 CRNI-L8145-10/2 RKL: NGDM1 DA1: 33.4 PN: Norm: ASME Noblinr.: ME: 12 WD1: 3.38 INSP: TAG: Factors: V 3.1: 0.897 [DA1:33.4 WD1:3.38 HWK:CN]	0.897	1
I57017	[BUTT WELD, REF.4.1 @ 1.5 * STD(3.68MM)] BAT: RN DN1: 40 DN2: MG: CN MAT: 18/10 CRNI-L8145-10/2 RKL: NGDM1 DA1: 48.3 PN: Norm: ASME Noblinr.: ME: 12 WD1: 3.68 INSP: TAG: Factors: V 3.1: 1.138 [DA1:48.3 WD1:3.68 HWK:CN]	1.138	1

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 Linde Engineering Document Number Linde 32-R-LR (36) 36101.002		Bill of Material Piping		Proj.No. Proj. Name
Constr. Area 32		PU 36	Line 36101	Sheet 2
AP1: M-8801 AP2: M-8801		P+I: BTU.180.1683 MED: P	AD1: 4 AD2: 4	AT1: 85 AT2: -176 Paint System: 8B Ins. Type: C
Releases:	Mat. Rev. 01 02.07.2013 ENPP1 / PM	Iso Rev. 01 02.07.2013 ENPP1 / PM		Printed DD.MM.JJJJ Max Example
G55164	[BUTT WELD, REF.4.1 @ 2 * SCH10S(2.77MM)] BAT: RN DN1: 50 DN2: MG: CN MAT: 18/10 CRNHLG145-10/2 RKL: NGDM1 DA1: 60.3 PN: Norm: ASME Noblinr.: ME: 12 WD1: 2.77 INSP: TAG: Factors: V 3.1: 1.288 [DA1:60.3 WD1:2.77 HWK:CN]			1.288 1

Sum Weight [kg]: 5648.9

Sum Factors: 205.127


Confirmation As-Built: _____

Ident.	Assemblies	Wght. [kg]	Factor	Qty.
Y07730	[ANALYSE#AP54A,(-RF) @ 40 X 1]	11.0	6.553	1
S83643 Pos.: A	[NOZZLE#AY,CL150 @ 40 * 1 * STD] BAT: DN1: 1000 DN2: 25 MG: CN MAT: ASTM A312 GR.F304/304L RKL: DA1: 1016 PN: 16 Norm: R-SF Noblinr.: -1041 ME: 01 WD1: 9.53 INSP: TAG: 36-SC-103X Factors: V 3.4B2: 3.218 [DAN_MM:70 WD_SHORT:11 HWK:CN]	1.0	3.218	1
W23420 Pos.: C	[WN-FLANGE,-RF,CL150 @ 1 * STD] BAT: DN1: 25 DN2: MG: CN MAT: ASTM A182 GR.F304/304L RKL: DA1: 33.4 PN: 16 Norm: ASME Noblinr.: B16.5 ME: 01 WD1: 3.38 INSP: TAG: 36-SC-103X Factors: V 2.4: 0.105 [DN1:25 PN:16]	1.4	0.105	1
H31242 Pos.: E	[BLIND FLANGE,-RF,CL150 @ 1] BAT: DN1: 25 DN2: MG: CN MAT: ASTM A182 GR.F304/304L RKL: DA1: 33.4 PN: 16 Norm: ASME Noblinr.: B16.5 ME: 01 WD1: INSP: TAG: 36-SC-103X Factors: V 2.6: 0.032 [DN1:25 PN:16]	0.9	0.032	1
U02370 Pos.: F	[FLANGE UNION,-RF,CL150 @ 1] BAT: DN1: 25 DN2: MG: MAT: RKL: DA1: 33.4 PN: 16 Norm: L8 Noblinr.: 428-01 ME: 12 WD1: INSP: TAG: 36-SC-103X Factors: V 4.1: 0.525 [DN1:25]	0.5	0.525	1
T57641 Pos.: FB	[FLANGE UNION,-RF,CL150 @ 1] BAT: DN1: 25 DN2: MG: MAT: RKL: DA1: 33.4 PN: 16 Norm: L8 Noblinr.: 428-01 ME: 12 WD1: INSP: TAG: 36-SC-103X Factors: V 4.1: 0.525 [DN1:25]	0.6	0.525	1
Z00825 Pos.: G	[GATE VALVE,-RF,CL150,EXTENDED BONNET @ 1] BAT: DN1: 25 DN2: MG: CN MAT: CRNI-STEEL RKL: DA1: 33.4 PN: 16 Norm: ASF Noblinr.: 1FR55/ASME ME: 01 WD1: INSP: TAG: 36-SC-103X Factors: V 6.1: 0.255 [DN1:25 PN:16]	6.0	0.255	1
I57016 Pos.: W	[BUTT WELD, REF.4.1 @ 1 * STD(3.38MM)] BAT: DN1: 25 DN2: MG: CN MAT: 18/10 CRNHLG145-10/2 RKL: DA1: 33.4 PN: Norm: ASME Noblinr.: ME: 12 WD1: 3.38 INSP: TAG: 36-SC-103X Factors: V 3.1: 0.897 [DA1:33.4 WD1:3.38 HWK:CN]	0.1	1.793	2

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<div>Linde</div> <div>Linde Engineering</div> <div>Document Number Linde</div> <div>32-R-LR (36) 36101.002</div>		<div>Bill of Material</div> <div>Piping</div>				<div>Proj.No.</div> <div>Proj. Name</div>			
Constr. Area		PU	Line	Sheet					
32		36	36101	2					
AP1: M-3801		P+I: BTU.180.1683		MED: P	AD1: 4	AT1: 66	Paint System: 8B		
AP2: M-3801					AD2: 4	AT2: -175	Ins. Type: C		
Releases:		Mat. Rev. 01	Iso Rev. 01				Printed		
		02.07.2013	02.07.2013				DD.MM.JJJJ		
		ENPP1 / PM	ENPP1 / PM				Max Example		
X27382	[ANALYSIS PIPE#XS,-RF,CL150 @ 1]						0.5	0.100	1
Pos.: XS	BAT:	DN1: 25	DN2:	MG: CN	MAT: SS - F304/304L				
	RKL:	DA1: 33.4	PN: 16	Norm: ASME	Nobinr.: 491-11 / ASME				
	ME: 01	WD1:	INSP:	TAG: 36-SC-103X					
	Factors: V 4.4: 0.100 [DN1:25]								
U02370	[FLANGE UNION,-RF,CL150 @ 1]						0.5	0.525	1
S66693	[STUD BOLT @ .5 * 2.75]						0.2	0.000	4
Pos.: 1	BAT:	DN1: 15	DN2:	MG: CN	MAT: ASTM A193 GR.88M CL.2				
	RKL:	DA1:	PN:	Norm: ASME	Nobinr.: B16.5				
	ME: 01	WD1:	INSP:	TAG: 36-SC-103X					
	Factors: -								
I22473	[HEXAGON NUT,HEAVY-TYPE @ .5]						0.2	0.000	8
Pos.: 2	BAT:	DN1: 15	DN2:	MG: CN	MAT: ASTM A194 GR.8M				
	RKL:	DA1:	PN:	Norm: ASME	Nobinr.: B18.2.2				
	ME: 01	WD1:	INSP:	TAG: 36-SC-103X					
	Factors: -								
907783	[SPIRAL-WOUND GASKET,CL150,-ASME B16.5 @ 1]						0.1	0.000	1
Pos.: 3	BAT:	DN1: 25	DN2:	MG: VB	MAT: SS-GRAPHITE				
	RKL:	DA1:	PN: 16	Norm: ASME	Nobinr.: B16.20				
	ME: 01	WD1:	INSP:	TAG: 36-SC-103X					
	Factors: -								
T57641	[FLANGE UNION,-RF,CL150 @ 1]						0.6	0.525	1
S66695	[STUD BOLT @ .5 * 3.25]						0.3	0.000	4
Pos.: 1	BAT:	DN1: 15	DN2:	MG: CN	MAT: ASTM A193 GR.88M CL.2				
	RKL:	DA1:	PN:	Norm: ASME	Nobinr.: B16.5				
	ME: 01	WD1:	INSP:	TAG: 36-SC-103X					
	Factors: -								
I22473	[HEXAGON NUT,HEAVY-TYPE @ .5]						0.2	0.000	8
Pos.: 2	BAT:	DN1: 15	DN2:	MG: CN	MAT: ASTM A194 GR.8M				
	RKL:	DA1:	PN:	Norm: ASME	Nobinr.: B18.2.2				
	ME: 01	WD1:	INSP:	TAG: 36-SC-103X					
	Factors: -								
907783	[SPIRAL-WOUND GASKET,CL150,-ASME B16.5 @ 1]						0.1	0.000	2
Pos.: 3	BAT:	DN1: 25	DN2:	MG: VB	MAT: SS-GRAPHITE				
	RKL:	DA1:	PN: 16	Norm: ASME	Nobinr.: B16.20				
	ME: 01	WD1:	INSP:	TAG: 36-SC-103X					
	Factors: -								
KX0043	[TEMPERATURE#AP7X4,(-RF) @ 40 X 1.5]						11.2	4.828	1
X39416	[WELDOLET XS,XS WEIGHT @ 40 X 1.5 * XS/STD]						0.6	2.388	1
Pos.: A1	BAT:	DN1: 1000	DN2: 40	MG: CN	MAT: ASTM A182 GR.F304/304L				
	RKL:	DA1: 1016	PN:	Norm: MSS	Nobinr.: SP-97				
	ME: 01	WD1: 12.7	INSP:	TAG: 36-TI-102					
	Factors: V 3.6: 2.388 [DN2:40 DA2:48.3 HWK:CN]								
W22406	[PIPE#SMLS. @ 1.5 * STD]						2.0	0.181	0.5
Pos.: B	BAT:	DN1: 40	DN2:	MG: CN	MAT: ASTM A312 GR.TP304/304L				
	RKL:	DA1: 48.3	PN:	Norm: ASME	Nobinr.: B36.10/19				
	ME: 04	WD1: 3.68	INSP:	TAG: 36-TI-102					
	Factors: V 1.1: 0.309 [DA1:48.3 WD1:3.68] V 6.1: 0.053 [DN1:40]								
W24759	[WN-FLANGE,-RF,CL600 @ 1.5 * STD]						3.6	0.195	1
Pos.: C	BAT:	DN1: 40	DN2:	MG: CN	MAT: ASTM A182 GR.F304/304L				
	RKL:	DA1: 48.3	PN: 94	Norm: ASME	Nobinr.: B16.5				
	ME: 01	WD1: 3.68	INSP:	TAG: 36-TI-102					
	Factors: V 2.4: 0.195 [DN1:40 PN:94]								

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<div> Linde Engineering</div>		<div>Bill of Material</div> <div>Piping</div>				<div>Proj.No.</div> <div>Proj. Name</div>		
Document Number Linde 32-R-LR (36) 36101.002								
Constr. Area		PU	Line	Sheet				
32		36	36101	2				
AP1: M-8801 AP2: M-8801		P+I: BTU.180.1683	MED: P	AD1: 4 AD2: 4	AT1: 85 AT2: -175	Paint System: 8B Ins. Type: C		
Releases:		Mat. Rev. 01	Iso Rev. 01			Printed		
		02.07.2013	02.07.2013			DD.MM.JJJJ		
		ENPP1 / PM	ENPP1 / PM			Max Example		
U78734	[LAP-JOINT FLANGE,CL600 @ 1.5]					2.9	0.195	1
Pos.: CX	BAT:	DN1: 40	DN2:	MG: CN	MAT: ASTM A182 GR.F304/304L			
	RKL:	DA1: 48.3	PN: 94	Norm: ASME	Noblnr.: B16.5			
	ME: 01	WD1:	INSP:	TAG: 36-TI-102				
	Factors: V 2.4: 0.195 [DN1:40 PN:94]							
Z82616	[FLANGE UNION,-RF,CL600 @ 1.5]					2.1	0.731	1
Pos.: F	BAT:	DN1: 40	DN2:	MG:	MAT:			
	RKL:	DA1: 48.3	PN: 94	Norm: L3	Noblnr.: 428-01			
	ME: 12	WD1:	INSP:	TAG: 36-TI-102				
	Factors: V 4.2: 0.731 [DN1:40]							
I57017	[BUTT WELD, REF.4.1 @ 1.5 * STD(3.68MM)]					0.0	1.138	1
Pos.: W	BAT:	DN1: 40	DN2:	MG: CN	MAT: 18/10 CRNI-L3145-10/2			
	RKL:	DA1: 48.3	PN:	Norm: ASME	Noblnr.:			
	ME: 12	WD1: 3.68	INSP:	TAG: 36-TI-102				
	Factors: V 3.1: 1.138 [DA1:48.3 WD1:3.68 HWK:CN]							
Z82616	[FLANGE UNION,-RF,CL600 @ 1.5]					2.1	0.731	1
S66937	[STUD BOLT @ .75 * 6.5]					1.2	0.000	4
Pos.: 1	BAT:	DN1: 20	DN2:	MG: CN	MAT: ASTM A193 GR.B8M CL.2			
	RKL:	DA1:	PN:	Norm: ASME	Noblnr.: B16.5			
	ME: 01	WD1:	INSP:	TAG: 36-TI-102				
	Factors: -							
I22475	[HEXAGON NUT,HEAVY-TYPE @ .75]					0.7	0.000	8
Pos.: 2	BAT:	DN1: 20	DN2:	MG: CN	MAT: ASTM A194 GR.8M			
	RKL:	DA1:	PN:	Norm: ASME	Noblnr.: B18.2.2			
	ME: 01	WD1:	INSP:	TAG: 36-TI-102				
	Factors: -							
892499	[SPIRAL-WOUND GASKET,CL600,-ASME B16.5 @ 1.5]					0.1	0.000	1
Pos.: 3	BAT:	DN1: 40	DN2:	MG: VB	MAT: SS-GRAPHITE			
	RKL:	DA1:	PN: 94	Norm: ASME	Noblnr.: B16.20			
	ME: 01	WD1:	INSP:	TAG: 36-TI-102				
	Factors: -							