



NET4GAS, s.r.o.

PRIMDA MODIFICATION

Noise Study

03.12.2018

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REVISION HISTORY

Rev.	Date	Issue, Purpose	Prepared	Checked	Approved
002	03.12.18	Approved	Eckbauer	Foltin	Schorling
001	16.11.18	Approved	Eckbauer	Foltin	Schorling
000	29.10.18	Approved	Eckbauer	Foltin	Schorling
B01	17.10.18	Issue for Review	Jurisic	Eckbauer	Schorling
A01	26.09.18	Issue for IDC	Jurisic	Brodnicek/ Eckbauer	Schorling
P02	24.09.18	Issue for DIC	Jurisic	Trummer / Eckbauer	Eckbauer
Rev.	Date	Issue, Purpose	Prepared	Checked	Approved

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1 GENERAL

1.1 Scope of the Document

Aim of this noise study is to investigate the noise emissions of the modification of the Distribution Node Přimda. The study will support the decision making process for noise protection measure of the Stations.

1.2 Definitions

Term	Explanation
Project	Modification of Distribution Node Přimda
Employer	NET4GAS
Consultant	ILF Consulting Engineers

1.3 Abbreviations

Term	Explanation
DN	Distribution Node
dB	decibel
dB(A)	A-weighted decibel
FCV	Flow control valve

1.4 References

No.	Number	Title
1	C4G-PRIM-CHE-RU05-STR-PID-100-DVZ	Piping & Instrumentation Diagram
2	C4G-PRIM-CHE-RU05-STR-PFD-090-DVZ	Process Flow Diagram
3	C4G-PRIM-CHE-RU05-GEN-SIT-014-DVZ	C.3 Coordination Layout

1.5 Codes and Standards

No.	Number	Title
1	ISO 9613	Acoustics -- Attenuation of sound during propagation outdoors
2	VDI 3760	Berechnung und Messung der Schallausbreitung in Arbeitsräumen
3	272/2011	GOVERNMENT REGULATION of 24 August 2011 on the protection of health from the adverse effects of noise and vibrations
4	TA Lärm	Technische Anleitung zum Schutz gegen Lärm

2 CALCULATION METHOD AND SOFTWARE

The calculations are based on ISO 9613 using frequency dependent sum levels to calculate resultant environmental noise levels from source sound power levels.

The propagation of noise is calculated by using the software "IMMI 2016", released by the company "Wölfel Measuring Systems" The software takes into account physical influences such as reflection on barriers and their screening effect.

The local meteorological influence C0 was set with 0 dB. The sound absorption in air was calculated by taking into account an ambient temperature of 10 °C and a relative humidity of 70 %.

Damping properties of soil components have been adopted for the surrounding countryside with a conservative value of 0.5 (slightly acoustically porous soil, arable land, meadows).

A noise map was generated based on a raster mesh size of 3 m x 3 m at a height of 4 m above ground level.

Reflections on walls and surfaces of 1st order with a reflection coefficient of 0.8 are taken into account.

3 INPUT DATA

3.1 Applicable Noise Limits

The acceptable sound pressure levels outside at residential areas in Czech Republic according to GOVERNMENT REGULATION No.272/2011 of 24 August 2011 on the protection of health from the adverse effects of noise and vibrations are:

- Noise Levels at fence: 85 dB(A)
- Noise Levels at nearest neighbour:
 - Day time* 50 dB(A)
 - Night-time* 40 dB(A)

* Day is defined as the 16 hours between 06:00 to 22:00. Night is defined as the 8 hours between 22:00 and 06:00.

For comparison, 0 dB is the threshold of hearing, 140 dB is the threshold of pain. A change of 1 dB is detectable only under laboratory conditions. A change of 10 dB corresponds approximately to halving or doubling the human sensed loudness of sound.

3.2 Noise Emission Data

The main noise sources at the DN Přimda are nine (9) flow control valves installed above ground. The noise generated by the control valves and emitted directly to the environment as well as by the upstream and downstream piping is being considered in this noise study. Four (4) of the nine (9) flow control valves are already existing at DN Přimda and use a 3+1 configuration during operation (60.1, 60.2, 60.3 and 60.4). The other five (5) flow control valves (60.12, 60.13, 60.14, 60.15, 60.16) belong to the new part of DN Přimda.

The emitted noise of the valves is depending on the differential pressure and the flow rate. For all throttling valves (FCVs) a pressure drop from 85 barg to 73.5 barg is being considered and the respective flows were confirmed by NET4GAS s.r.o. (see Table 3). Based on vendor data for low noise trim valves (see Attachment 2) for the respective flows and pressure levels, the noise emissions are being determined. The cases have been assessed regarding noise at the control valve and the piping according to VDI 3733.

Two very similar noise emission scenarios with simultaneous operation of the valves are being simulated. After the results of the point calculation have been determined the worst case noise emission scenario is being examined further and a more detailed noise map is generated for this case.

3.2.1 Scenario 1

In this scenario there is no overflow from Gazelle in the new part of DN Přimda and FCV 60.12 is closed (see Attachment 5). The only flow that reaches the valves 60.13 and 60.14 is from HPPL pipeline, which is lower than the flow in scenario 2. The flows through 60.15 and 60.16 are slightly lower compared to the ones in scenario 2.

The existing valves (60.1, 60.2, 60.3 and 60.4) face the complete flow from Gazelle pipeline due to the closure of FCV 60.12. Only three (3) of the existing valves operate at the same time. For the simulation the three valves closest to the nearest immission point (60.2, 60.3 and 60.4) are active.

The noise emission of the mentioned valves for scenario 1 are shown in Table 1.

Table 1 Calculated sound power level of FCVs for scenario 1

	Unit	Frequency spectrum								Sum
	Hz	63	125	250	500	1000	2000	4000	8000	
FCV 60.2	dB(A)	53.7	69.8	83.3	94.7	99.9	99.1	92.9	84.8	103.7
FCV 60.3	dB(A)	53.7	69.8	83.3	94.7	99.9	99.1	92.9	84.8	103.7
FCV 60.4	dB(A)	53.7	69.8	83.3	94.7	99.9	99.1	92.9	84.8	103.7
FCV 60.13	dB(A)	51.8	67.9	81.4	92.8	98.0	97.2	91.0	82.9	101.8
FCV 60.14	dB(A)	51.8	67.9	81.4	92.8	98.0	97.2	91.0	82.9	101.8
FCV 60.15	dB(A)	52.0	68.1	81.6	93.0	98.2	97.4	91.2	83.1	102.0
FCV 60.16	dB(A)	51.7	67.8	81.3	92.7	97.9	97.1	90.9	82.8	101.7

3.2.2 Scenario 2

During operation mode “Gas to Vesel” it is possible that four (4) FCVs (60.13, 60.14, 60.15, 60.16) operate simultaneously at the highest pressure drop (85 to 73.5 barg). The overflow from Gazelle pipeline which passes FCV 60.12 does not cause any significant noise emission, because the valve does not throttle at high flow and differential pressure operating conditions. But higher noise emission compared to scenario 1 are caused at FCV 60.13 and 60.14 due to the higher flow from Gazelle and HPPL pipeline. The flows through 60.15 and 60.16 are slightly higher compared to the ones in scenario 1 (see Attachment 6).

The existing valves (60.1, 60.2, 60.3 and 60.4) face a lower flow due to the overflow of Gazelle into the new part of DN Přimda and therefore have lower noise emission compared to scenario 1. Only three (3) of the existing valves operate at the same time. For the simulation the three valves closest to the nearest immission point (60.2, 60.3 and 60.4) are active.

The noise emission of the mentioned valves for scenario 2 are shown in Table 2.

Table 2 Calculated sound power level of FCVs for scenario 2

	Unit	Frequency spectrum								Sum
	Hz	63	125	250	500	1000	2000	4000	8000	
FCV 60.2	dB(A)	50.7	66.8	80.3	91.7	96.9	96.1	89.9	81.8	100.7
FCV 60.3	dB(A)	50.7	66.8	80.3	91.7	96.9	96.1	89.9	81.8	100.7
FCV 60.4	dB(A)	53.8	69.9	83.4	94.8	100.0	99.2	93.0	84.9	103.8
FCV 60.13	dB(A)	53.8	69.9	83.4	94.8	100.0	99.2	93.0	84.9	103.8
FCV 60.14	dB(A)	53.8	69.9	83.4	94.8	100.0	99.2	93.0	84.9	103.8
FCV 60.15	dB(A)	52.0	68.1	81.6	93.0	98.2	97.4	91.2	83.1	102.0
FCV 60.16	dB(A)	51.7	67.8	81.3	92.7	97.9	97.1	90.9	82.8	101.7

3.2.3 Comparison and worst case scenario

After performing a point calculation for both scenarios with the relevant immission points, scenario 1 is being defined as the worst case scenario due to a slightly higher noise emission. The results are shown in Table 6. The following detailed analysis only includes the worst case scenario 1.

The FCVs are modelled as point sources in the software IMMI according to vendor data.

The values for the flow and pressure used in the simulation are summarized in Table 3. The related piping sections can be found in Figure 1 and Figure 2.

Table 3 Pressure and flow for each piping section for the worst case noise emission scenario 1

Piping Section	Max. pressure in barg	flow in mcm/d
1.1	85	0
1.2	85	0
1.3	85	0
1.4	85	0
1.5	85	0
2.1	85	23.1
2.2	85	23.1
2.3	73.5	23.1
2.4	73.5	23.1
2.5	73.5	0
3.1	85	23.1
3.2	85	23.1
3.3	85	23.1
3.4	73.5	23.1
3.5	73.5	23.1
3.6	73.5	23.1
4.1	85	19.3
4.2	85	19.3
4.3	73.5	19.3
4.4	73.5	19.3
5.1	85	10.8
5.2	85	10.8
5.3	73.5	10.8
5.4	73.5	10.8

Furthermore, it is considered that the sound power that is emitted from the FCVs to the environment, is also induced to the inside of the pipes. Therefore the sound power level emitted by the above-ground pipes (see Figure 1) is taken into regard for the modelling in IMMI. The data from the Piping Class CS-100-0 (see Attachment 4) is being used for this calculation in accordance with the procedure given by VDI 3733. Further noise insulation up- or downstream of the control valve is not considered.

For the given pipe sections the results are shown in Table 4.

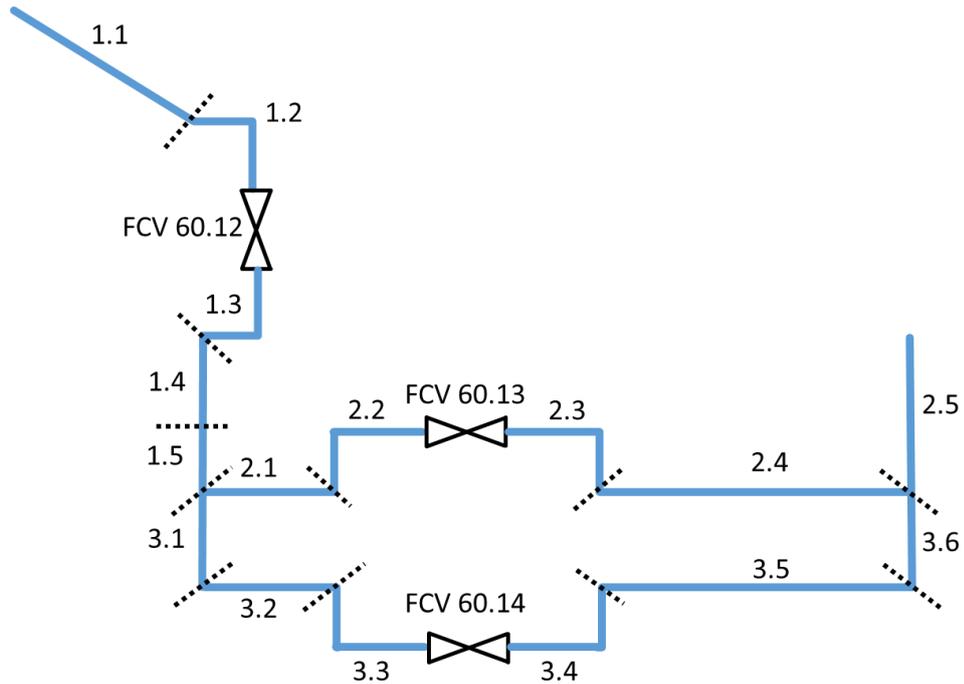


Figure 1 Piping sections at DN Přimda for FCV 60.12, 60.13 and 60.14

Table 4 Calculated sound power level of pipe sections at DN Přimda

Piping Section	Unit	Frequency spectrum								Sum
	Hz	63	125	250	500	1000	2000	4000	8000	
1.1	dB(A)	-	-	-	-	-	-	-	-	-
1.2	dB(A)	-	-	-	-	-	-	-	-	-
1.3	dB(A)	-	-	-	-	-	-	-	-	-
1.4	dB(A)	-	-	-	-	-	-	-	-	-
1.5	dB(A)	-	-	-	-	-	-	-	-	-
2.1	dB(A)	3.2	19.3	31.8	51.8	65.6	72.0	57.6	38.3	73.1
2.2	dB(A)	14.9	31.0	43.8	54.7	66.0	71.5	63.7	44.8	73.2
2.3	dB(A)	14.3	30.5	46.0	64.5	77.7	83.5	75.5	56.4	85.1
2.4	dB(A)	21.5	37.6	52.4	69.3	80.9	85.6	71.7	52.7	87.1
2.5	dB(A)	20.7	36.8	51.7	68.7	80.2	76.9	62.2	43.1	82.1
3.1	dB(A)	0.0	7.6	33.8	56.1	70.0	67.9	52.5	33.3	72.3
3.2	dB(A)	0.0	3.5	29.4	50.2	62.5	66.9	52.5	33.3	68.4
3.3	dB(A)	13.9	29.7	43.1	54.7	65.2	68.9	61.1	42.4	71.0
3.4	dB(A)	13.6	29.8	46.0	65.4	78.7	84.5	76.5	57.3	86.1
3.5	dB(A)	20.9	37.1	52.6	70.4	82.0	86.8	72.8	53.8	88.3
3.6	dB(A)	15.5	27.3	42.3	59.5	70.5	74.9	61.4	42.4	76.5

The remaining two FCVs 60.15 and 60.16 are in a different piping system close-by, which is also divided into sections (see Figure 2) in order to calculate the sound power level of the piping (see Table 5).

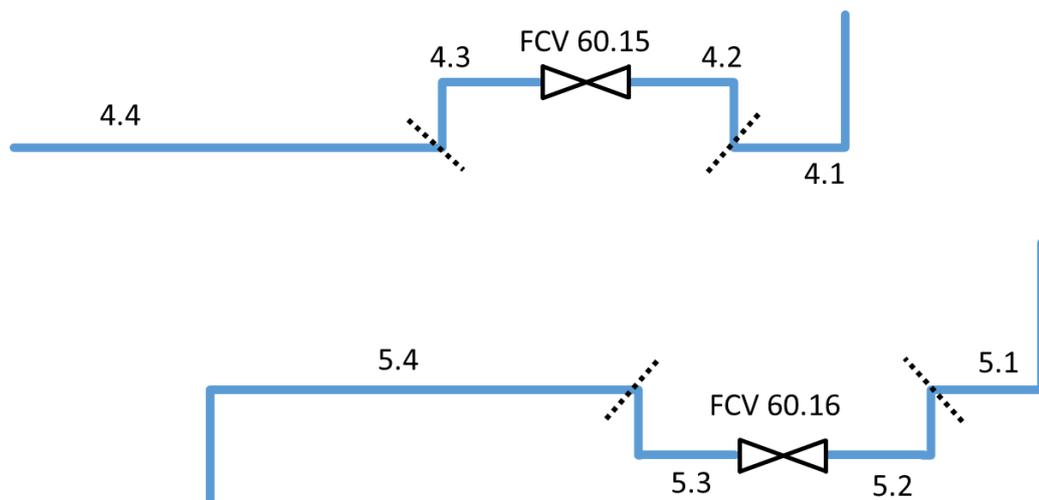


Figure 2 Piping sections at DN Přimda for FCV 60.15 and 60.16

Table 5 Sound power level of pipe sections at DN Přimda

Piping Section	Unit	Frequency spectrum								Sum
	Hz	63	125	250	500	1000	2000	4000	8000	
4.1	dB(A)	2	24	43.5	60.4	71.1	75.7	64.6	47.5	77.3
4.2	dB(A)	4.6	23.3	40.8	56.5	66	69.3	65.6	48.7	72.2
4.3	dB(A)	18.9	36.1	52.4	67.2	77.2	81.8	77.7	60.8	84.3
4.4	dB(A)	24.6	41.8	58.1	71.7	80.6	84.3	73.2	56.5	86.3
5.1	dB(A)	7.2	26.0	43.7	61.8	74.0	79.5	75.4	58.6	81.8
5.2	dB(A)	10.9	27.5	42.5	56.8	67.1	71.4	70.2	55.1	74.8
5.3	dB(A)	13	31.7	49.7	66.6	76.7	80.9	80	64.3	84.4
5.4	dB(A)	19	37.7	55.6	71.9	80.4	82.7	77	60.9	85.6

The noise emission of the above ground piping of the existing valves (60.1, 60.2, 60.3 and 60.4) was not considered, because the piping area is much smaller compared to the new part of DN Přimda and therefore has no significant influence on the noise emission at the immission points.

It has to be assured that the various sound emitters, especially valves and fittings, shall not show tonal components.

No upset cases are considered which would lead to additional emission sources like running of diesel generator, as these are expected to occur only in emergency and not during normal operation.

No difference in day and night time noise emission is expected, which is why only the night time (stricter noise immission levels) is considered in the following.

There are only minor roads in the area. These are small and do not regularly serve heavy traffic. There are no official statistics available to calculate the road noise. This is why the background noise is not determined in the study but covered by the safety margin.

3.3 Approach of the study

The expected noise at the immission points are calculated based on the sources in chapter 3.2. As the existing and background noise could not be quantified, a safety margin of 6 dB(A) should be deducted from the limits stated in chapter 3.1, which means that 34 dB(A) (TA Lärm) at the immission points would be acceptable.

If the immission limits are exceeded, measures to reduce noise emissions have to be taken. In this case, measures are proposed and the necessary reduction will be quantified.

3.4 Plant Layout

For the calculation, the elevation profile is considered (source: <https://opentopomap.org>). An overview of the DN Přimda and the position of the flow control valves are given in Figure 3 and Figure 4.

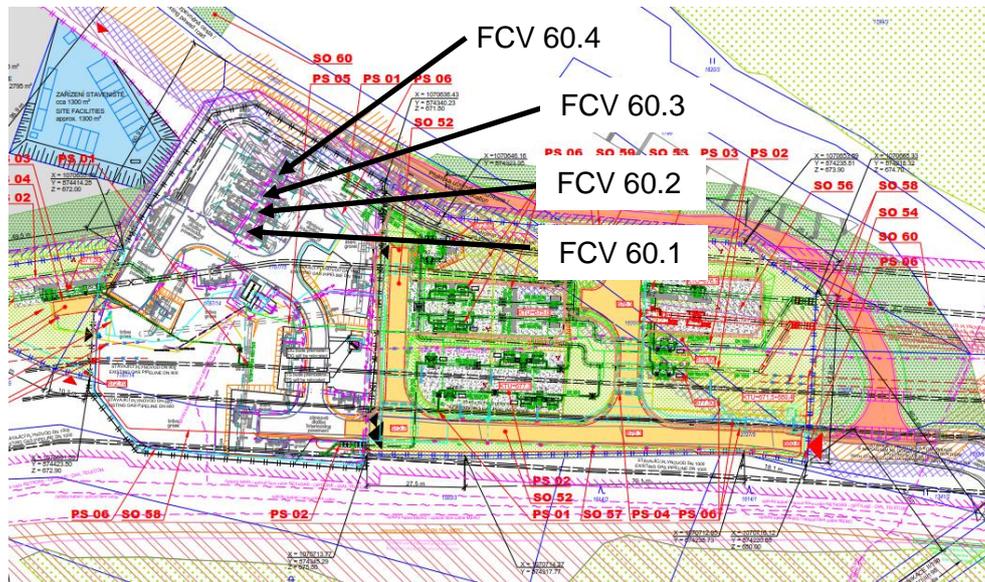


Figure 3 Location of FCVs in existing part of Distribution Node Přimda

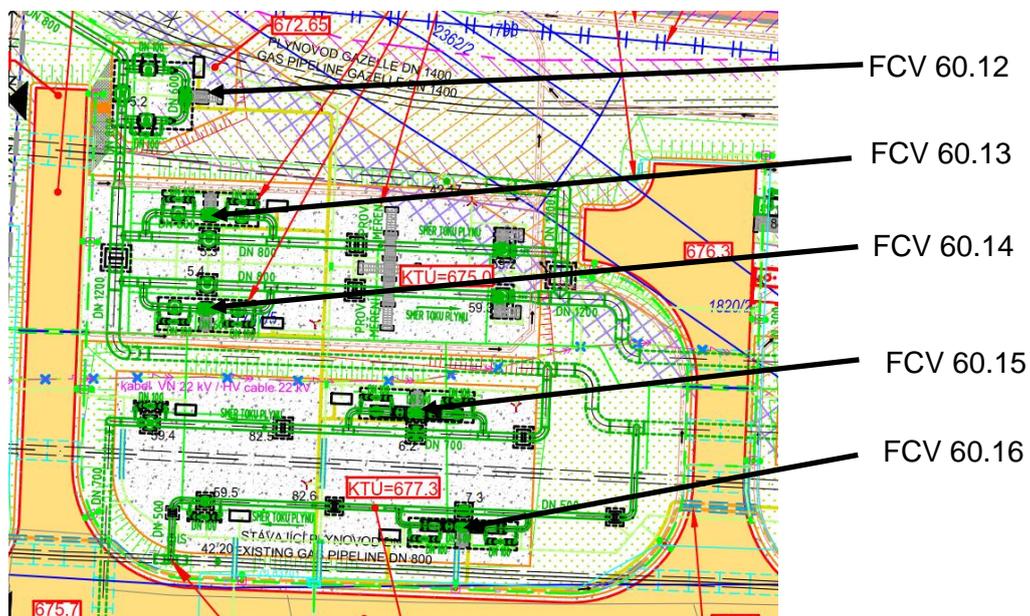


Figure 4 Location of FCVs in new part of Distribution Node Přimda

3.5 IMMI Model

The following screenshots show the IMMI model. It contains the topography and existing buildings. The nearest neighbouring buildings are modelled with an assumed building height of 4 m.

The colourations of the elements indicate their function:

- Red areas: Noise emission sources (Piping and FCVs)
- Blue areas: Buildings
- Green areas: Vegetation
- Gray lines: Contour lines

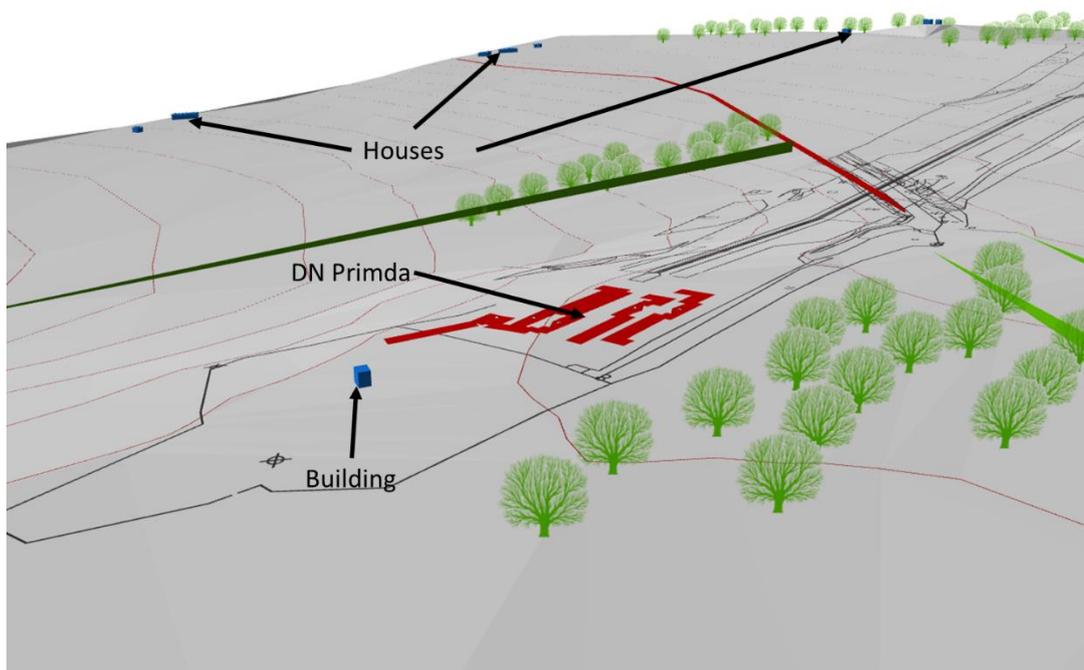


Figure 5 IMMI model overview

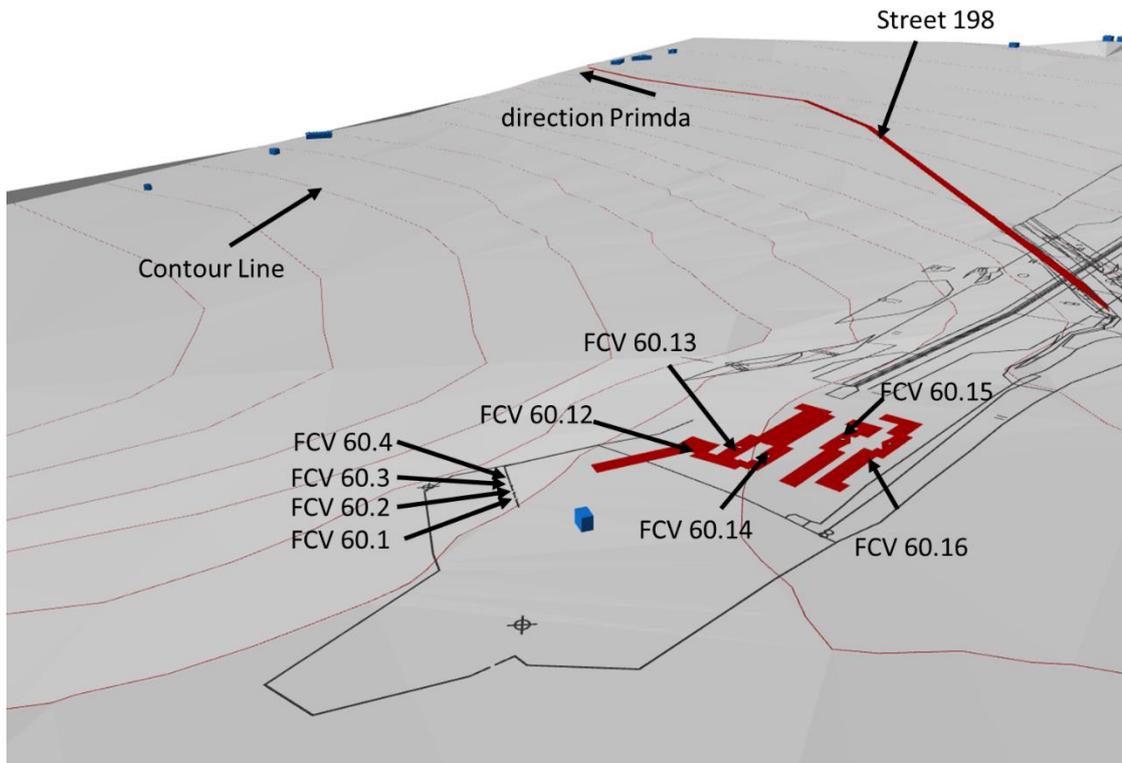


Figure 6 IMMI model of DN Přimda with location of the nine FCVs

The IMMI input data is listed in Attachment 1.

3.6 Immission Points

The location of the nearest neighbours has been identified via aerial image and immission points have been placed at 4 m height at 0.5 m in front of the building facade. The following figures show the placement of the emission points:

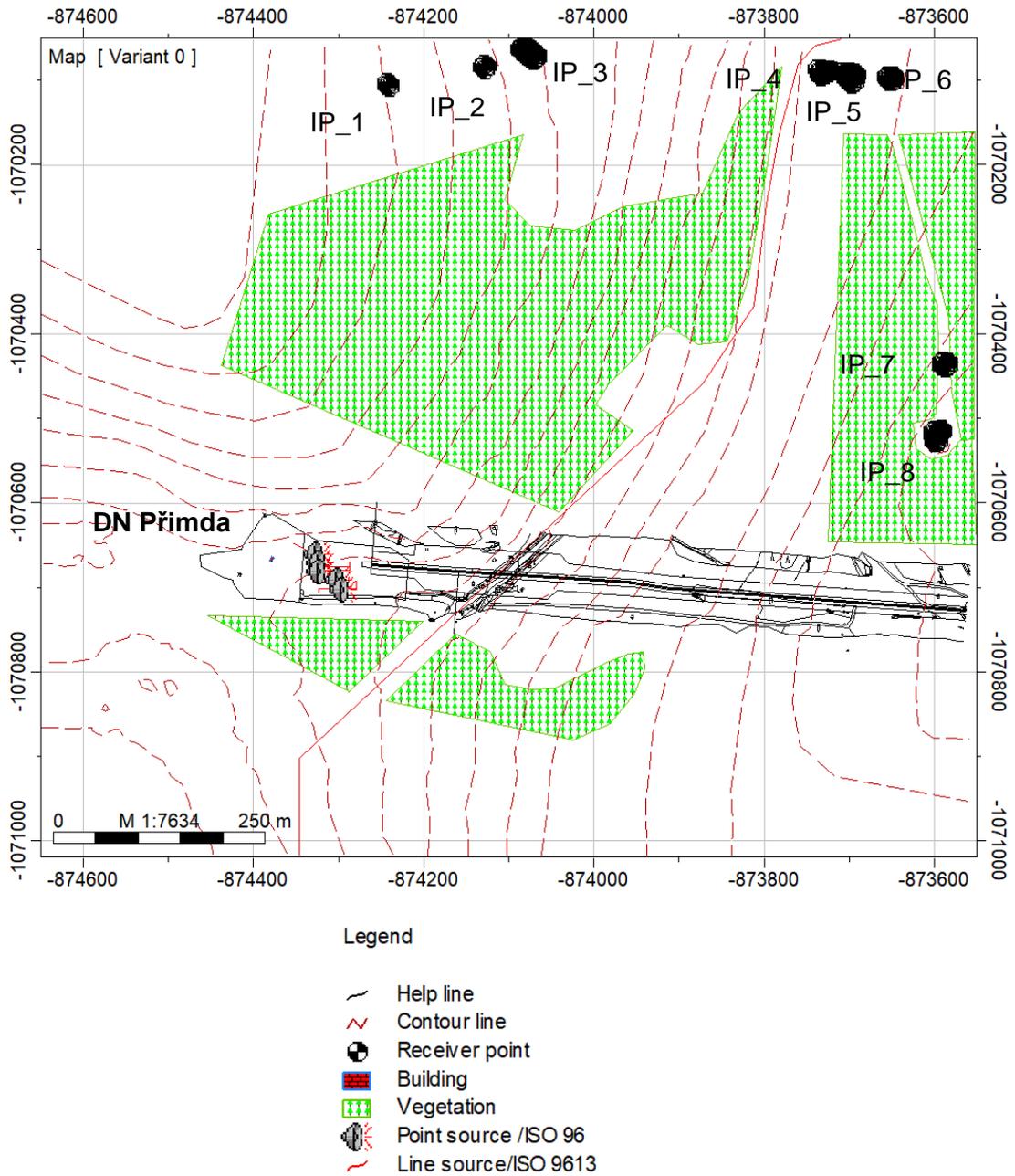


Figure 7 Immission points at DN Přimda

The distances from DN Přimda noise sources to the immission points are approximately

- IP_1 585 m
- IP_2 630 m
- IP_3 660 m
- IP_4 816 m
- IP_5 835 m
- IP_6 885 m
- IP_7 764 m
- IP_8 735 m

4 RESULTS

The calculated sound pressure levels at the immission points are given in the following:

Table 6 Calculated sound pressure level at the immission points

Immission Point	Scenario 1 (worst case)	Scenario 2
IP_1	42.5	42.1
IP_2	41.7	41.3
IP_3	41.1	40.7
IP_4	38.0	37.8
IP_5	37.7	37.5
IP_6	40.6	40.0
IP_7	38.8	38.6
IP_8	39.2	39.1

The noise limit of 34 dB(A) at the immission points is exceeded by up to 8.5 dB(A) at IP_1. At none of the considered immission points the noise limit is fulfilled. The immission point with the lowest sound pressure level is IP_5 with 37.7 dB(A)

Noise reduction measures have to be taken to lower the sound pressure level at the immission points by 8.5 dB(A).

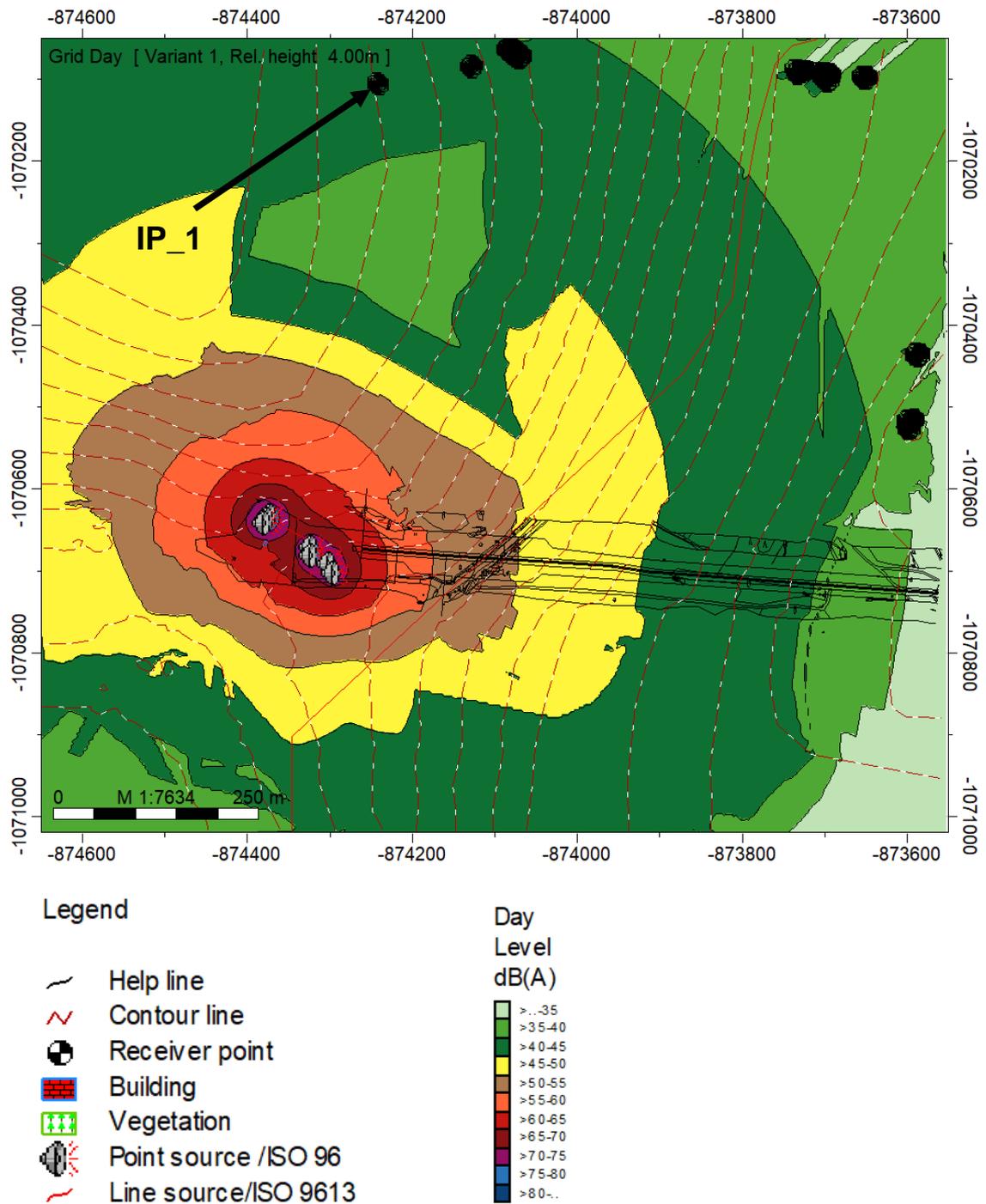


Figure 8: Noise map area for worst case scenario (scenario 1)

The neighbours at IP_1 are closest to the noise sources and therefore the most relevant for the specification of the maximum allowed sound pressure level (see Figure 8).

5 CONCLUSION

To safely comply within the applicable noise limits a safety margin of 6 dB(A) was deducted from the applicable (272/2011) noise immission limits, as information on background and existing noise is available. Background noise measurements can be made to allow for calculation without safety margin. This results in a limit of 34 dB(A) at the relevant immission points.

The limit is exceeded by 8.5 dB(A), which means that noise reduction measures have to be applied at the flow control valves, if the vendor cannot reduce the noise at the valves itself. The considered valves use a low noise trim. If a different type of valve construction with even lower noise is available, this type could be used to lower noise emissions.

If noise reduction of the FCV is necessary, one or a combination of the following measures shall be used:

- Noise insulation directly applied on the valves (see Attachment 3).
- Noise insulation hoods around the valves (see Attachment 4 for requirements).
- sound barriers or
- earth walls.

The noise estimation for such control valves and adjacent piping are very hard to predict since the calculation is based on theoretical input data. Therefore, the EPC Contractor shall perform noise measurements after commissioning of each station to prove that the actual noise values are in line with the allowable limits. In case that the actual noise values exceed the allowable limits, the EPC Contractor is obliged to perform suitable noise protection measures to comply with the allowed limits. Such noise measures are part of EPC Contractor scope of work.

6 ATTACHMENT

Attachment 1 List of IMMI Input Data

Project Properties				
Topic:	Noise			
Type of prediction:	Noise (national methods)			
Rating following::	No rating	No.	Period	Duration/h
		1	Day	16.00
		2	Night	8.00
Project notes				

Work area				
	from ...	to ...	Dimensions	Area
x /m	-874650.00	-873550.00	1100.00	1.07 km²
y /m	-1071020.00	-1070050.00	970.00	
z /m	-10.00	800.00	810.00	
Terrain height in the corners				
xmin / ymax (z4)	640.00	xmax / ymax (z3)	718.00	
xmin / ymin (z1)	665.00	xmax / ymin (z2)	727.00	

Available calculation areas												
Name	x min /m	x max /m	y min /m	y max /m	dx /m	dy /m	nx	ny	Reference	Height/m	Range	
Grid 0	-874650.00	-873550.00	-1071020.00	-1070050.00	20.00	20.00	56	49	relative	4.00	Work area	
Grid 1	-874650.00	-873550.00	-1071020.00	-1070050.00	3.00	3.00	367	324	relative	4.00	Work area	

Calculation parameters	Copy from "Reference Setting"	
Calculation model: General	Point calculation	Grid calculation
Adapt assessment area seamlessly to the receiver position		
L /m		
Terrain ridges as obstacles	Yes	Yes
Improved interpolation in boundary areas	Yes	Yes
Free field in front of refl. surfaces/m		
acc. to sources	1.0	1.0
acc. to immission points	1.0	1.0
House: white border in grid	No	No
Intermediate messages:	No	No
Calculation model: Parameters	"optimised"	"optimised"
Limiting range of sound sources:		
* Limit the search radius (distance source-IP):	No	No
* minimum level difference /dB:	No	No
Projection of line sound sources	Yes	Yes
Projection of area sound sources	Yes	Yes
Limit projection	No	No
* Radius /m around source:		
* Radius /m around IP:		
Minimum length for sections /m	1.0	1.0
Variable min. length for sections:		
* in percent of the distance from the IP source	No	No
Add. factor for distance criterion	1.0	1.0
Barrier attenuation differing from guideline:	No	No
* Cut-off limit for insertion loss:		
* Limit /dB for single screens:		
* Limit /dB for multiple screens:		
Calculate attenuation for VDI 2720. ISO9613		
* Lateral pathway	Yes	Yes
* Lateral pathway for image sources	No	No
Reflection		

Reflection (max. order)	1	1		
Limit the search radius (distance source-IP):	No	No		
* Search radius /m				
Limiting range of reflecting surfaces /m:				
* Radius around source or IP /m:	No	No		
* minimum level difference /dB:	No	No		
Image source from projection	Yes	Yes		
No refl. if entirely screened	Yes	Yes		
Save rays as help lines	No	No		
section control				
Section control acc. Schall 03 [2012]:	Yes	Yes		
Section control for other calculation methods. too:	No	No		
accelerated iteration (approximation):	No	No		
requested accuracy /dB:	0.1	0.1		
show intermediate results:	No	No		

Global parameters	Copy from "Reference Setting"					
Default for G outside DBOD-elements	0.50					
Temperature /°C	10					
Relative humidity /%	70					
Living area per inhab-/m² (=0.8*gross)	40.00					
Average storey height /m	2.80					
Simplified meteorology (Guideline Int. Comp. Methods):	Day	Evening	Night			
Simplified meteorology (Guideline Int. Comp. Methods):	0.00	0.00	0.00			

Parameters of library: ISO 9613-2	Copy from "Reference Setting"					
Downwind conditions	Yes					
Simplified equation (Nr. 7.3.2) for ground effect						
for frequency-dependent calculation	No					
for frequency-independent calculation	Yes					
Evaluating the mean height hm	according to ISO 9613-2 unmodified					
Simplified calculation using free propagation conditions (release 7.2.2.2)	No					
Attenuation due to screening - subtract negative ground effect	No					
Deduction no more than to -Dz	No					
"Additional recommendations" - ISO TR 17534-3	Yes					
ABar acc. "Erlass Thüringen" (2015-01-10)	No					
Accounts for vegetation	Yes					
Accounts for housing	Yes					
Accounts for ground effect	Yes					

Contour line (24)					Variant 0
HOEL001	HoeL	Group 0	Length /m	556.86	
			Constant abs. height /m	640.00	
			Take into account as diffracting edge	Yes	
HOEL002	HoeL	Group 0	Length /m	683.54	
			Constant abs. height /m	645.00	
			Take into account as diffracting edge	Yes	
HOEL003	HoeL	Group 0	Length /m	781.60	
			Constant abs. height /m	650.00	
			Take into account as diffracting edge	Yes	
HOEL004	HoeL	Group 0	Length /m	884.25	
			Constant abs. height /m	655.00	
			Take into account as diffracting edge	Yes	
HOEL005	HoeL	Group 0	Length /m	967.07	
			Constant abs. height /m	660.00	
			Take into account as diffracting edge	Yes	
HOEL006	HoeL	Group 0	Length /m	1063.73	
			Constant abs. height /m	665.00	
			Take into account as diffracting edge	Yes	
HOEL008	HoeL	Group 0	Length /m	1125.17	

			Constant abs. height /m	670.00
			Take into account as diffracting edge	Yes
HOEL009	HoeL	Group 0	Length /m	1233.42
			Constant abs. height /m	675.00
			Take into account as diffracting edge	Yes
HOEL010	HoeL	Group 0	Length /m	473.58
			Constant abs. height /m	670.00
			Take into account as diffracting edge	Yes
HOEL011	HoeL	Group 0	Length /m	291.57
			Constant abs. height /m	665.00
			Take into account as diffracting edge	Yes
HOEL012	HoeL	Group 0	Length /m	1116.89
			Constant abs. height /m	680.00
			Take into account as diffracting edge	Yes
HOEL013	HoeL	Group 0	Length /m	1071.49
			Constant abs. height /m	685.00
			Take into account as diffracting edge	Yes
HOEL014	HoeL	Group 0	Length /m	1057.57
			Constant abs. height /m	690.00
			Take into account as diffracting edge	Yes
HOEL015	HoeL	Group 0	Length /m	1039.18
			Constant abs. height /m	695.00
			Take into account as diffracting edge	Yes
HOEL016	HoeL	Group 0	Length /m	1033.00
			Constant abs. height /m	700.00
			Take into account as diffracting edge	Yes
HOEL017	HoeL	Group 0	Length /m	1021.56
			Constant abs. height /m	710.00
			Take into account as diffracting edge	Yes
HOEL018	HoeL	Group 0	Length /m	917.77
			Constant abs. height /m	720.00
			Take into account as diffracting edge	Yes
HOEL019	HoeL	Group 0	Length /m	789.59
			Constant abs. height /m	730.00
			Take into account as diffracting edge	Yes
HOEL020	HoeL	Group 0	Length /m	539.45
			Constant abs. height /m	730.00
			Take into account as diffracting edge	Yes
HOEL024	HoeL	Group 0	Length /m	25.22
			Constant abs. height /m	664.00
			Take into account as diffracting edge	Yes
HOEL025	HoeL	Group 0	Length /m	59.62
			Constant abs. height /m	667.00
			Take into account as diffracting edge	Yes
HOEL026	HoeL	Group 0	Length /m	53.30
			Constant abs. height /m	667.00
			Take into account as diffracting edge	Yes
HOEL028	HoeL	Group 0	Length /m	270.13
			Constant abs. height /m	666.00
			Take into account as diffracting edge	Yes
HOEL030	HoeL	Group 0	Length /m	101.71
			Constant abs. height /m	740.00
			Take into account as diffracting edge	Yes

Receiver point (80)							Variant 0
	Label	Group	Limit /dB(A)	Use	T1	T2	
IPkt001	279B4 1 H 1S/W	HOUSES_IMMISION_POINTS	Limit /dB(A)	---	-99.00	-99.00	
IPkt002	279B4 2 H 1N/W	HOUSES_IMMISION_POINTS	Limit /dB(A)	---	-99.00	-99.00	
IPkt003	279B4 3 H 1N/E	HOUSES_IMMISION_POINTS	Limit /dB(A)	---	-99.00	-99.00	
IPkt004	279B4 4 H 1S/E	HOUSES_IMMISION_POINTS	Limit /dB(A)	---	-99.00	-99.00	
IPkt005	Haus2_lm 1 H 1North	Group 0	Limit /dB(A)	---	-99.00	-99.00	
IPkt006	Haus2_lm 2 H 1East	Group 0	Limit /dB(A)	---	-99.00	-99.00	

IPkt007	Haus2_lm 3 H 1South	Group 0	Limit /dB(A)	---	-99.00	-99.00		
IPkt008	Haus2_lm 4 H 1West	Group 0	Limit /dB(A)	---	-99.00	-99.00		
IPkt009	Haus3_lm 1 H 1N/W	Group 0	Limit /dB(A)	---	-99.00	-99.00		
IPkt010	Haus3_lm 2 H 1N/W	Group 0	Limit /dB(A)	---	-99.00	-99.00		
IPkt011	Haus3_lm 3 H 1N/W	Group 0	Limit /dB(A)	---	-99.00	-99.00		
IPkt012	Haus3_lm 4 H 1N/E	Group 0	Limit /dB(A)	---	-99.00	-99.00		
IPkt013	Haus3_lm 5 H 1N/E	Group 0	Limit /dB(A)	---	-99.00	-99.00		
IPkt014	Haus3_lm 6 H 1N/E	Group 0	Limit /dB(A)	---	-99.00	-99.00		
IPkt015	Haus3_lm 7 H 1N/E	Group 0	Limit /dB(A)	---	-99.00	-99.00		
IPkt016	Haus3_lm 8 H 1N/E	Group 0	Limit /dB(A)	---	-99.00	-99.00		
IPkt017	Haus3_lm 9 H 1N/E	Group 0	Limit /dB(A)	---	-99.00	-99.00		
IPkt018	Haus3_lm 10 H 1N/E	Group 0	Limit /dB(A)	---	-99.00	-99.00		
IPkt019	Haus3_lm 11 H 1S/E	Group 0	Limit /dB(A)	---	-99.00	-99.00		
IPkt020	Haus3_lm 12 H 1S/E	Group 0	Limit /dB(A)	---	-99.00	-99.00		
IPkt021	Haus3_lm 13 H 1S/W	Group 0	Limit /dB(A)	---	-99.00	-99.00		
IPkt022	Haus3_lm 14 H 1S/W	Group 0	Limit /dB(A)	---	-99.00	-99.00		
IPkt023	Haus3_lm 15 H 1S/W	Group 0	Limit /dB(A)	---	-99.00	-99.00		
IPkt024	Haus3_lm 16 H 1S/W	Group 0	Limit /dB(A)	---	-99.00	-99.00		
IPkt025	Haus3_lm 17 H 1S/W	Group 0	Limit /dB(A)	---	-99.00	-99.00		
IPkt026	Haus3_lm 18 H 1S/W	Group 0	Limit /dB(A)	---	-99.00	-99.00		
IPkt027	Haus3_lm 19 H 1S/W	Group 0	Limit /dB(A)	---	-99.00	-99.00		
IPkt028	Haus 1 H 1West	Group 0	Limit /dB(A)	---	-99.00	-99.00		
IPkt029	Haus 2 H 1West	Group 0	Limit /dB(A)	---	-99.00	-99.00		
IPkt030	Haus 3 H 1South	Group 0	Limit /dB(A)	---	-99.00	-99.00		
IPkt031	Haus 4 H 1East	Group 0	Limit /dB(A)	---	-99.00	-99.00		
IPkt032	Haus 5 H 1North	Group 0	Limit /dB(A)	---	-99.00	-99.00		
IPkt033	Haus 6 H 1North	Group 0	Limit /dB(A)	---	-99.00	-99.00		
IPkt034	Haus 1 H 1West	Group 0	Limit /dB(A)	---	-99.00	-99.00		
IPkt035	Haus 2 H 1West	Group 0	Limit /dB(A)	---	-99.00	-99.00		
IPkt036	Haus 3 H 1South	Group 0	Limit /dB(A)	---	-99.00	-99.00		
IPkt037	Haus 4 H 1East	Group 0	Limit /dB(A)	---	-99.00	-99.00		
IPkt038	Haus 5 H 1North	Group 0	Limit /dB(A)	---	-99.00	-99.00		
IPkt039	Haus 6 H 1North	Group 0	Limit /dB(A)	---	-99.00	-99.00		
IPkt051	Haus 1 H 1West	Group 0	Limit /dB(A)	---	-99.00	-99.00		
IPkt052	Haus 2 H 1West	Group 0	Limit /dB(A)	---	-99.00	-99.00		
IPkt053	Haus 3 H 1South	Group 0	Limit /dB(A)	---	-99.00	-99.00		
IPkt054	Haus 4 H 1East	Group 0	Limit /dB(A)	---	-99.00	-99.00		
IPkt055	Haus 5 H 1North	Group 0	Limit /dB(A)	---	-99.00	-99.00		
IPkt056	Haus 1 H 1West	Group 0	Limit /dB(A)	---	-99.00	-99.00		
IPkt057	Haus 2 H 1West	Group 0	Limit /dB(A)	---	-99.00	-99.00		
IPkt058	Haus 3 H 1South	Group 0	Limit /dB(A)	---	-99.00	-99.00		
IPkt059	Haus 4 H 1East	Group 0	Limit /dB(A)	---	-99.00	-99.00		
IPkt060	Haus 5 H 1East	Group 0	Limit /dB(A)	---	-99.00	-99.00		
IPkt061	Haus 6 H 1North	Group 0	Limit /dB(A)	---	-99.00	-99.00		
IPkt062	Haus6_lm 1 H 1West	Group 0	Limit /dB(A)	---	-99.00	-99.00		
IPkt063	Haus6_lm 2 H 1West	Group 0	Limit /dB(A)	---	-99.00	-99.00		
IPkt064	Haus6_lm 3 H 1S/W	Group 0	Limit /dB(A)	---	-99.00	-99.00		
IPkt065	Haus6_lm 4 H 1South	Group 0	Limit /dB(A)	---	-99.00	-99.00		
IPkt066	Haus6_lm 5 H 1South	Group 0	Limit /dB(A)	---	-99.00	-99.00		
IPkt067	Haus6_lm 6 H 1East	Group 0	Limit /dB(A)	---	-99.00	-99.00		
IPkt068	Haus6_lm 7 H 1East	Group 0	Limit /dB(A)	---	-99.00	-99.00		
IPkt069	Haus6_lm 8 H 1North	Group 0	Limit /dB(A)	---	-99.00	-99.00		
IPkt070	Haus6_lm 9 H 1North	Group 0	Limit /dB(A)	---	-99.00	-99.00		
IPkt071	Haus6_lm 10 H 1North	Group 0	Limit /dB(A)	---	-99.00	-99.00		
IPkt102	Haus5_lm 1 H 1North	Group 0	Limit /dB(A)	---	-99.00	-99.00		
IPkt103	Haus5_lm 2 H 1North	Group 0	Limit /dB(A)	---	-99.00	-99.00		
IPkt104	Haus5_lm 3 H 1North	Group 0	Limit /dB(A)	---	-99.00	-99.00		
IPkt105	Haus5_lm 4 H 1North	Group 0	Limit /dB(A)	---	-99.00	-99.00		
IPkt106	Haus5_lm 5 H 1S/E	Group 0	Limit /dB(A)	---	-99.00	-99.00		
IPkt107	Haus5_lm 6 H 1S/E	Group 0	Limit /dB(A)	---	-99.00	-99.00		
IPkt108	Haus5_lm 7 H 1S/E	Group 0	Limit /dB(A)	---	-99.00	-99.00		
IPkt109	Haus5_lm 8 H 1S/W	Group 0	Limit /dB(A)	---	-99.00	-99.00		
IPkt110	Haus5_lm 9 H 1S/W	Group 0	Limit /dB(A)	---	-99.00	-99.00		

IPkt111	Haus5_IM 10 H 1S/W	Group 0	Limit /dB(A)	---	-99.00	-99.00		
IPkt112	Haus5_IM 11 H 1S/W	Group 0	Limit /dB(A)	---	-99.00	-99.00		
IPkt113	Haus4_IM 1 H 1West	Group 0	Limit /dB(A)	---	-99.00	-99.00		
IPkt114	Haus4_IM 2 H 1West	Group 0	Limit /dB(A)	---	-99.00	-99.00		
IPkt115	Haus4_IM 3 H 1S/E	Group 0	Limit /dB(A)	---	-99.00	-99.00		
IPkt116	Haus4_IM 4 H 1S/E	Group 0	Limit /dB(A)	---	-99.00	-99.00		
IPkt117	Haus4_IM 5 H 1S/E	Group 0	Limit /dB(A)	---	-99.00	-99.00		
IPkt118	Haus4_IM 6 H 1S/E	Group 0	Limit /dB(A)	---	-99.00	-99.00		
IPkt119	Haus4_IM 7 H 1N/E	Group 0	Limit /dB(A)	---	-99.00	-99.00		
IPkt120	Haus4_IM 8 H 1N/E	Group 0	Limit /dB(A)	---	-99.00	-99.00		
IPkt121	Haus4_IM 9 H 1N/E	Group 0	Limit /dB(A)	---	-99.00	-99.00		

Building (11)				Variant 0	
HAUS001	Haus1_IM	Group 0	Reflection / Input type	Reflection coeff.(Rho=1-Alpha)	
			Absorption loss (dB)	0.97	
			Building use	Resid. building	
			With special insulation	No	
			Residential use /%	100	
			No. of inhabitants	0.33	
			Number of dwellings	0.16	
			Number of storeys	1.43	
HAUS002	Haus2_IM	Group 0	Reflection / Input type	Reflection coeff.(Rho=1-Alpha)	
			Absorption loss (dB)	0.97	
			Building use	Resid. building	
			With special insulation	No	
			Residential use /%	100	
			No. of inhabitants	0.95	
			Number of dwellings	0.45	
			Number of storeys	1.43	
HAUS003	Haus3_IM	Group 0	Reflection / Input type	Reflection coeff.(Rho=1-Alpha)	
			Absorption loss (dB)	0.97	
			Building use	Resid. building	
			With special insulation	No	
			Residential use /%	100	
			No. of inhabitants	4.22	
			Number of dwellings	2.01	
			Number of storeys	1.43	
HAUS004	Haus7_IM	Group 0	Reflection / Input type	Reflection coeff.(Rho=1-Alpha)	
			Absorption loss (dB)	0.97	
			Building use	Resid. building	
			With special insulation	No	
			Residential use /%	100	
			No. of inhabitants	1.31	
			Number of dwellings	1.00	
			Number of storeys	1.43	
HAUS005	Haus9_IM	Group 0	Reflection	--- No reflection	
			Building use	Resid. building	
			With special insulation	No	
			Residential use /%	100	
			No. of inhabitants	1.25	
			Number of dwellings	0.60	
			Number of storeys	1.43	
HAUS006	Haus8_IM	Group 0	Reflection / Input type	Reflection coeff.(Rho=1-Alpha)	
			Absorption loss (dB)	0.97	
			Building use	Resid. building	
			With special insulation	No	
			Residential use /%	100	
			No. of inhabitants	0.26	
			Number of dwellings	0.12	
			Number of storeys	1.43	
HAUS007	Haus10_IM	Group 0	Reflection / Input type	Reflection coeff.(Rho=1-Alpha)	
			Absorption loss (dB)	0.97	
			Building use	Resid. building	

			With special insulation	No	
			Residential use /%	100	
			No. of inhabitants	0.49	
			Number of dwellings	0.23	
			Number of storeys	1.43	
HAUS008	Haus6_IM	Group 0	Reflection / Input type	Reflection coeff.(Rho=1-Alpha)	
			Absorption loss (dB)	0.97	
			Building use	Resid. building	
			With special insulation	No	
			Residential use /%	100	
			No. of inhabitants	1.11	
			Number of dwellings	0.53	
			Number of storeys	1.43	
HAUS009	Haus5_IM	Group 0	Reflection / Input type	Reflection coeff.(Rho=1-Alpha)	
			Absorption loss (dB)	0.97	
			Building use	Resid. building	
			With special insulation	No	
			Residential use /%	100	
			No. of inhabitants	3.90	
			Number of dwellings	1.86	
			Number of storeys	1.43	
HAUS010	Haus4_IM	Group 0	Reflection / Input type	Reflection coeff.(Rho=1-Alpha)	
			Absorption loss (dB)	0.97	
			Building use	Resid. building	
			With special insulation	No	
			Residential use /%	100	
			No. of inhabitants	2.22	
			Number of dwellings	1.06	
			Number of storeys	1.43	
HAUS011	Haus	Group 0	Reflection / Input type	Reflection coeff.(Rho=1-Alpha)	
			Absorption loss (dB)	0.97	
			Building use	Resid. building	
			With special insulation	No	
			Residential use /%	100	
			No. of inhabitants	0.50	
			Number of dwellings	0.24	
			Number of storeys	1.43	

Vegetation (5)					Variant 0
DBwu001	Wald	Group 0	D in dB/100m	5.00	
			transparent during winter (OE-Norm)	Yes	
			Pollutants (Gauss):	D in %/100m	10.00
DBwu002	DBwu	Group 0	D in dB/100m	5.00	
			transparent during winter (OE-Norm)	No	
			Pollutants (Gauss):	D in %/100m	10.00
DBwu003	DBwu	Group 0	D in dB/100m	5.00	
			transparent during winter (OE-Norm)	No	
			Pollutants (Gauss):	D in %/100m	10.00
DBwu004	DBwu	Group 0	D in dB/100m	5.00	
			transparent during winter (OE-Norm)	No	
			Pollutants (Gauss):	D in %/100m	10.00
DBwu005	DBwu	Group 0	D in dB/100m	5.00	
			transparent during winter (OE-Norm)	No	
			Pollutants (Gauss):	D in %/100m	10.00

Point source /ISO 96 (8)													Variant 0
EZQi002	Label		FCV 60.13				Action radius/m				99999.00		
	Group		Group 0				Lw (Day) /dB(A)				101.78		
	Number of nodes		1				Lw (Night) /dB(A)				101.78		
	Length/ m		---				D0				0.00		
	Length/ m (2D)		---				High building/high noise source				No		
	Area /m²		---				Emission is				Sound power level (Lw)		
	Emiss. variant		Sum	16 Hz	31.5 Hz	63 Hz	125 Hz	250 Hz	500 Hz	1000 Hz	2000 Hz	4000 Hz	8000 Hz
	Day	Lw /dB (A)	101.8	0.0	0.0	51.8	67.9	81.4	92.8	98.0	97.2	91.0	82.9
	Night	Lw /dB (A)	101.8	0.0	0.0	51.8	67.9	81.4	92.8	98.0	97.2	91.0	82.9
EZQi003	Label		FCV 60.14				Action radius/m				99999.00		
	Group		Group 0				Lw (Day) /dB(A)				101.78		
	Number of nodes		1				Lw (Night) /dB(A)				101.78		
	Length/ m		---				D0				0.00		
	Length/ m (2D)		---				High building/high noise source				No		
	Area /m²		---				Emission is				Sound power level (Lw)		
	Emiss. variant		Sum	16 Hz	31.5 Hz	63 Hz	125 Hz	250 Hz	500 Hz	1000 Hz	2000 Hz	4000 Hz	8000 Hz
	Day	Lw /dB (A)	101.8	0.0	0.0	51.8	67.9	81.4	92.8	98.0	97.2	91.0	82.9
	Night	Lw /dB (A)	101.8	0.0	0.0	51.8	67.9	81.4	92.8	98.0	97.2	91.0	82.9
EZQi004	Label		FCV 60.15				Action radius/m				99999.00		
	Group		Group 0				Lw (Day) /dB(A)				101.98		
	Number of nodes		1				Lw (Night) /dB(A)				101.98		
	Length/ m		---				D0				0.00		
	Length/ m (2D)		---				High building/high noise source				No		
	Area /m²		---				Emission is				Sound power level (Lw)		
	Emiss. variant		Sum	16 Hz	31.5 Hz	63 Hz	125 Hz	250 Hz	500 Hz	1000 Hz	2000 Hz	4000 Hz	8000 Hz
	Day	Lw /dB (A)	102.0	0.0	0.0	52.0	68.1	81.6	93.0	98.2	97.4	91.2	83.1
	Night	Lw /dB (A)	102.0	0.0	0.0	52.0	68.1	81.6	93.0	98.2	97.4	91.2	83.1
EZQi005	Label		FCV 60.16				Action radius/m				99999.00		
	Group		Group 0				Lw (Day) /dB(A)				101.68		
	Number of nodes		1				Lw (Night) /dB(A)				101.68		
	Length/ m		---				D0				0.00		
	Length/ m (2D)		---				High building/high noise source				No		
	Area /m²		---				Emission is				Sound power level (Lw)		
	Emiss. variant		Sum	16 Hz	31.5 Hz	63 Hz	125 Hz	250 Hz	500 Hz	1000 Hz	2000 Hz	4000 Hz	8000 Hz
	Day	Lw /dB (A)	101.7	0.0	0.0	51.7	67.8	81.3	92.7	97.9	97.1	90.9	82.8
	Night	Lw /dB (A)	101.7	0.0	0.0	51.7	67.8	81.3	92.7	97.9	97.1	90.9	82.8
EZQi006	Label		60.4				Action radius/m				99999.00		
	Group		Group 0				Lw (Day) /dB(A)				103.68		
	Number of nodes		1				Lw (Night) /dB(A)				103.68		
	Length/ m		---				D0				0.00		
	Length/ m (2D)		---				High building/high noise source				No		
	Area /m²		---				Emission is				Sound power level (Lw)		
	Emiss. variant		Sum	16 Hz	31.5 Hz	63 Hz	125 Hz	250 Hz	500 Hz	1000 Hz	2000 Hz	4000 Hz	8000 Hz
	Day	Lw /dB (A)	103.7	0.0	0.0	53.7	69.8	83.3	94.7	99.9	99.1	92.9	84.8
	Night	Lw /dB (A)	103.7	0.0	0.0	53.7	69.8	83.3	94.7	99.9	99.1	92.9	84.8
EZQi011	Label		60.3				Action radius/m				99999.00		
	Group		Group 0				Lw (Day) /dB(A)				103.68		
	Number of nodes		1				Lw (Night) /dB(A)				103.68		
	Length/ m		---				D0				0.00		
	Length/ m (2D)		---				High building/high noise source				No		
	Area /m²		---				Emission is				Sound power level (Lw)		
	Emiss. variant		Sum	16 Hz	31.5 Hz	63 Hz	125 Hz	250 Hz	500 Hz	1000 Hz	2000 Hz	4000 Hz	8000 Hz
	Day	Lw /dB (A)	103.7	0.0	0.0	53.7	69.8	83.3	94.7	99.9	99.1	92.9	84.8
	Night	Lw /dB (A)	103.7	0.0	0.0	53.7	69.8	83.3	94.7	99.9	99.1	92.9	84.8
EZQi012	Label		60.2				Action radius/m				99999.00		
	Group		Group 0				Lw (Day) /dB(A)				103.68		
	Number of nodes		1				Lw (Night) /dB(A)				103.68		
	Length/ m		---				D0				0.00		
	Length/ m (2D)		---				High building/high noise source				No		
	Area /m²		---				Emission is				Sound power level (Lw)		
	Emiss. variant		Sum	16 Hz	31.5 Hz	63 Hz	125 Hz	250 Hz	500 Hz	1000 Hz	2000 Hz	4000 Hz	8000 Hz

	Day	Lw /dB (A)	103.7	0.0	0.0	53.7	69.8	83.3	94.7	99.9	99.1	92.9	84.8	
	Night	Lw /dB (A)	103.7	0.0	0.0	53.7	69.8	83.3	94.7	99.9	99.1	92.9	84.8	
EZQI013	Label		60.1				Action radius/m				99999.00			
	Group		Group 49				Lw (Day) /dB(A)				103.68			
	Number of nodes		1				Lw (Night) /dB(A)				103.68			
	Length/ m		---				D0				0.00			
	Length/ m (2D)		---				High building/high noise source				No			
	Area /m²		---				Emission is				Sound power level (Lw)			
	Emiss. variant		Sum	16 Hz	31.5 Hz	63 Hz	125 Hz	250 Hz	500 Hz	1000 Hz	2000 Hz	4000 Hz	8000 Hz	
	Day	Lw /dB (A)	103.7	0.0	0.0	53.7	69.8	83.3	94.7	99.9	99.1	92.9	84.8	
	Night	Lw /dB (A)	103.7	0.0	0.0	53.7	69.8	83.3	94.7	99.9	99.1	92.9	84.8	

Line source/ISO 9613 (25)														Variant 0
LIQI001	Label		MainStreet				Action radius/m				99999.00			
	Group		Group 0				D0				0.00			
	Number of nodes		9				High building/high noise source				No			
	Length/ m		1227.13				Emission is				SPL per unit length (Lw/m)			
	Length/ m (2D)		1226.67				Emi.	Emission	Sound insul.	Correction	Lw	Lw'		
	Area /m²		---					dB(A)	dB	dB	dB(A)	dB(A)		
							Day	25.00	-	-	55.89	25.00		
							Night	5.00	-	-	35.89	5.00		
LIQI005	Label		Pipe 60.13 sek 1				Action radius/m				99999.00			
	Group		Group 0				Lw (Day) /dB(A)				58.97			
	Number of nodes		2				Lw (Night) /dB(A)				58.97			
	Length/ m		3.00				Lw' (Day) /dB(A)				54.19			
	Length/ m (2D)		3.00				Lw' (Night) /dB(A)				54.19			
	Area /m²		---				D0				0.00			
							High building/high noise source				No			
							Emission is				Sound power level (Lw)			
	Emiss. variant		Sum	16 Hz	31.5 Hz	63 Hz	125 Hz	250 Hz	500 Hz	1000 Hz	2000 Hz	4000 Hz	8000 Hz	
	Day	Lw' /dB (A)	54.2	-4.8	-4.8	9.1	25.5	36.7	44.7	49.1	51.4	38.4	21.9	
	Night	Lw' /dB (A)	54.2	-4.8	-4.8	15.1	25.5	36.7	44.7	49.1	51.4	38.4	21.9	
LIQI009	Label		Pipe 60.15 Sek 3				Action radius/m				99999.00			
	Group		Group 0				Lw (Day) /dB(A)				77.33			
	Number of nodes		3				Lw (Night) /dB(A)				77.33			
	Length/ m		13.01				Lw' (Day) /dB(A)				66.19			
	Length/ m (2D)		13.00				Lw' (Night) /dB(A)				66.19			
	Area /m²		---				D0				0.00			
							High building/high noise source				No			
							Emission is				Sound power level (Lw)			
	Emiss. variant		Sum	16 Hz	31.5 Hz	63 Hz	125 Hz	250 Hz	500 Hz	1000 Hz	2000 Hz	4000 Hz	8000 Hz	
	Day	Lw' /dB (A)	66.2	-11.1	-11.1	-9.1	12.9	32.4	49.3	60.0	64.6	53.5	36.4	
	Night	Lw' /dB (A)	66.2	-11.1	-11.1	-9.1	12.9	32.4	49.3	60.0	64.6	53.5	36.4	
LIQI050	Label		Pipe 60.16 Sek 2				Action radius/m				99999.00			
	Group		Group 0				Lw (Day) /dB(A)				85.70			
	Number of nodes		3				Lw (Night) /dB(A)				85.70			
	Length/ m		27.53				Lw' (Day) /dB(A)				71.30			
	Length/ m (2D)		27.50				Lw' (Night) /dB(A)				71.30			
	Area /m²		---				D0				0.00			
							High building/high noise source				No			
							Emission is				Sound power level (Lw)			
	Emiss. variant		Sum	16 Hz	31.5 Hz	63 Hz	125 Hz	250 Hz	500 Hz	1000 Hz	2000 Hz	4000 Hz	8000 Hz	
	Day	Lw' /dB (A)	71.3	-14.4	-14.4	8.0	25.5	42.1	57.6	66.1	68.4	62.7	46.5	
	Night	Lw' /dB (A)	71.3	-14.4	-14.4	8.0	25.5	42.1	57.6	66.1	68.4	62.7	46.5	
LIQI011	Label		Pipe 60.16 Sek 3				Action radius/m				99999.00			
	Group		Group 0				Lw (Day) /dB(A)				81.80			
	Number of nodes		3				Lw (Night) /dB(A)				81.80			
	Length/ m		19.02				Lw' (Day) /dB(A)				69.00			
	Length/ m (2D)		19.00				Lw' (Night) /dB(A)				69.00			
	Area /m²		---				D0				0.00			
							High building/high noise source				No			
							Emission is				Sound power level (Lw)			

	Emiss. variant		Sum	16 Hz	31.5 Hz	63 Hz	125 Hz	250 Hz	500 Hz	1000 Hz	2000 Hz	4000 Hz	8000 Hz
	Day	Lw' /dB (A)	69.0	-12.8	-12.8	-2.0	15.4	31.7	49.1	61.2	66.7	62.6	45.8
	Night	Lw' /dB (A)	69.0	-12.8	-12.8	-2.0	15.4	31.7	49.1	61.2	66.7	62.6	45.8
LIQI012	Label	Pipe 60.13 sek 5					Action radius/m					99999.00	
	Group	Group 0					Lw (Day) /dB(A)					85.01	
	Number of nodes	2					Lw (Night) /dB(A)					85.01	
	Length/ m	6.01					Lw' (Day) /dB(A)					77.22	
	Length/ m (2D)	6.00					Lw' (Night) /dB(A)					77.22	
	Area /m²	---					D0					0.00	
							High building/high noise source					No	
							Emission is					Sound power level (Lw)	
	Emiss. variant		Sum	16 Hz	31.5 Hz	63 Hz	125 Hz	250 Hz	500 Hz	1000 Hz	2000 Hz	4000 Hz	8000 Hz
	Day	Lw' /dB (A)	77.2	-7.8	-7.8	21.7	39.0	53.9	66.5	75.3	71.3	56.8	39.8
	Night	Lw' /dB (A)	77.2	-7.8	-7.8	21.7	39.0	53.9	66.5	75.3	71.3	56.8	39.8
LIQI018	Label	Pipe 60.14 Sek 2					Action radius/m					99999.00	
	Group	Group 0					Lw (Day) /dB(A)					54.73	
	Number of nodes	2					Lw (Night) /dB(A)					54.73	
	Length/ m	3.00					Lw' (Day) /dB(A)					49.95	
	Length/ m (2D)	3.00					Lw' (Night) /dB(A)					49.95	
	Area /m²	---					D0					0.00	
							High building/high noise source					No	
							Emission is					Sound power level (Lw)	
	Emiss. variant		Sum	16 Hz	31.5 Hz	63 Hz	125 Hz	250 Hz	500 Hz	1000 Hz	2000 Hz	4000 Hz	8000 Hz
	Day	Lw' /dB (A)	49.9	-4.8	-4.8	8.1	24.0	36.0	42.7	45.5	45.8	32.8	16.3
	Night	Lw' /dB (A)	49.9	-4.8	-4.8	8.1	24.0	36.0	42.7	45.5	45.8	32.8	16.3
LIQI031	Label	Pipe 60.12 sek 5					Action radius/m					99999.00	
	Group	Group 0					Lw (Day) /dB(A)					73.53	
	Number of nodes	3					Lw (Night) /dB(A)					73.53	
	Length/ m	8.52					Lw' (Day) /dB(A)					64.22	
	Length/ m (2D)	8.50					Lw' (Night) /dB(A)					64.22	
	Area /m²	---					D0					0.00	
							High building/high noise source					No	
							Emission is					Sound power level (Lw)	
	Emiss. variant		Sum	16 Hz	31.5 Hz	63 Hz	125 Hz	250 Hz	500 Hz	1000 Hz	2000 Hz	4000 Hz	8000 Hz
	Day	Lw' /dB (A)	64.2	-9.3	-9.3	4.2	21.1	35.2	49.2	58.5	62.5	48.6	31.8
	Night	Lw' /dB (A)	64.2	-9.3	-9.3	4.2	21.1	35.2	49.2	58.5	62.5	48.6	31.8
LIQI032	Label	Pipe 60.12 Sek 1					Action radius/m					99999.00	
	Group	Group 0					Lw (Day) /dB(A)					69.09	
	Number of nodes	3					Lw (Night) /dB(A)					69.09	
	Length/ m	8.52					Lw' (Day) /dB(A)					59.78	
	Length/ m (2D)	8.50					Lw' (Night) /dB(A)					59.78	
	Area /m²	---					D0					0.00	
							High building/high noise source					No	
							Emission is					Sound power level (Lw)	
	Emiss. variant		Sum	16 Hz	31.5 Hz	63 Hz	125 Hz	250 Hz	500 Hz	1000 Hz	2000 Hz	4000 Hz	8000 Hz
	Day	Lw' /dB (A)	59.8	-9.3	-9.3	9.3	25.9	39.2	50.6	58.0	52.8	38.3	21.6
	Night	Lw' /dB (A)	59.8	-9.3	-9.3	9.3	25.9	39.2	50.6	58.0	52.8	38.3	21.6
LIQI021	Label	Pipe 60.12 Sek 2					Action radius/m					99999.00	
	Group	Group 0					Lw (Day) /dB(A)					65.93	
	Number of nodes	2					Lw (Night) /dB(A)					65.93	
	Length/ m	8.35					Lw' (Day) /dB(A)					56.71	
	Length/ m (2D)	8.30					Lw' (Night) /dB(A)					56.71	
	Area /m²	---					D0					0.00	
							High building/high noise source					No	
							Emission is					Sound power level (Lw)	
	Emiss. variant		Sum	16 Hz	31.5 Hz	63 Hz	125 Hz	250 Hz	500 Hz	1000 Hz	2000 Hz	4000 Hz	8000 Hz
	Day	Lw' /dB (A)	56.7	-9.2	-9.2	5.6	22.1	35.3	45.7	51.9	54.2	40.9	24.2
	Night	Lw' /dB (A)	56.7	-9.2	-9.2	5.6	22.1	35.3	45.7	51.9	54.2	40.9	24.2
LIQI022	Label	Pipe 60.14 Sek 1					Action radius/m					99999.00	
	Group	Group 0					Lw (Day) /dB(A)					60.06	
	Number of nodes	2					Lw (Night) /dB(A)					60.06	
	Length/ m	4.52					Lw' (Day) /dB(A)					53.51	
	Length/ m (2D)	4.50					Lw' (Night) /dB(A)					53.51	

Area /m ²		---				D0								0.00	
						High building/high noise source								No	
						Emission is								Sound power level (Lw)	
Emiss. variant		Sum	16 Hz	31.5 Hz	63 Hz	125 Hz	250 Hz	500 Hz	1000 Hz	2000 Hz	4000 Hz	8000 Hz			
Day	Lw' /dB (A)	53.5	-6.5	-6.5	10.4	26.8	38.8	47.0	51.3	45.1	31.2	14.7			
Night	Lw' /dB (A)	53.5	-6.5	-6.5	10.4	26.8	38.8	47.0	51.3	45.1	31.2	14.7			
LIQI040	Label	Pipe 60.14 Sek 3				Action radius/m								99999.00	
	Group	Group 0				Lw (Day) /dB(A)								64.86	
	Number of nodes	3				Lw (Night) /dB(A)								64.86	
	Length/ m	8.76				Lw' (Day) /dB(A)								55.43	
	Length/ m (2D)	8.75				Lw' (Night) /dB(A)								55.43	
	Area /m²	---				D0								0.00	
						High building/high noise source								No	
						Emission is								Sound power level (Lw)	
Emiss. variant		Sum	16 Hz	31.5 Hz	63 Hz	125 Hz	250 Hz	500 Hz	1000 Hz	2000 Hz	4000 Hz	8000 Hz			
Day	Lw' /dB (A)	55.4	-9.4	-9.4	10.3	26.3	39.2	46.1	50.1	52.1	45.6	29.8			
Night	Lw' /dB (A)	55.4	-9.4	-9.4	10.3	26.3	39.2	46.1	50.1	52.1	45.6	29.8			
LIQI028	Label	Pipe 60.14 sek 4				Action radius/m								99999.00	
	Group	Group 0				Lw (Day) /dB(A)								88.37	
	Number of nodes	3				Lw (Night) /dB(A)								88.37	
	Length/ m	8.75				Lw' (Day) /dB(A)								78.95	
	Length/ m (2D)	8.75				Lw' (Night) /dB(A)								78.95	
	Area /m²	---				D0								0.00	
						High building/high noise source								No	
						Emission is								Sound power level (Lw)	
Emiss. variant		Sum	16 Hz	31.5 Hz	63 Hz	125 Hz	250 Hz	500 Hz	1000 Hz	2000 Hz	4000 Hz	8000 Hz			
Day	Lw' /dB (A)	78.9	-9.4	-9.4	11.8	28.9	45.4	61.0	72.1	77.2	69.4	52.3			
Night	Lw' /dB (A)	78.9	-9.4	-9.4	11.7	28.9	45.4	61.0	72.1	77.2	69.4	52.3			
LIQI029	Label	Pipe 60.14 sek 5				Action radius/m								99999.00	
	Group	Group 0				Lw (Day) /dB(A)								90.67	
	Number of nodes	2				Lw (Night) /dB(A)								90.67	
	Length/ m	28.51				Lw' (Day) /dB(A)								76.12	
	Length/ m (2D)	28.50				Lw' (Night) /dB(A)								76.12	
	Area /m²	---				D0								0.00	
						High building/high noise source								No	
						Emission is								Sound power level (Lw)	
Emiss. variant		Sum	16 Hz	31.5 Hz	63 Hz	125 Hz	250 Hz	500 Hz	1000 Hz	2000 Hz	4000 Hz	8000 Hz			
Day	Lw' /dB (A)	76.1	-14.5	-14.5	13.7	30.9	46.8	60.9	70.3	74.5	60.7	43.7			
Night	Lw' /dB (A)	76.1	-14.5	-14.5	13.7	30.9	46.8	60.9	70.3	74.5	60.7	43.7			
LIQI034	Label	Pipe 60.12 Sek 4				Action radius/m								99999.00	
	Group	Group 0				Lw (Day) /dB(A)								80.10	
	Number of nodes	2				Lw (Night) /dB(A)								80.10	
	Length/ m	26.17				Lw' (Day) /dB(A)								65.92	
	Length/ m (2D)	26.11				Lw' (Night) /dB(A)								65.92	
	Area /m²	---				D0								0.00	
						High building/high noise source								No	
						Emission is								Sound power level (Lw)	
Emiss. variant		Sum	16 Hz	31.5 Hz	63 Hz	125 Hz	250 Hz	500 Hz	1000 Hz	2000 Hz	4000 Hz	8000 Hz			
Day	Lw' /dB (A)	65.9	-14.2	-14.2	-5.4	14.0	31.7	48.5	59.1	64.1	56.3	39.4			
Night	Lw' /dB (A)	65.9	-14.2	-14.2	-5.4	14.0	31.7	48.5	59.1	64.1	56.3	39.4			
LIQI036	Label	Pipe 60.13 sek 2				Action radius/m								99999.00	
	Group	Group 0				Lw (Day) /dB(A)								65.04	
	Number of nodes	3				Lw (Night) /dB(A)								65.04	
	Length/ m	8.78				Lw' (Day) /dB(A)								55.61	
	Length/ m (2D)	8.75				Lw' (Night) /dB(A)								55.61	
	Area /m²	---				D0								0.00	
						High building/high noise source								No	
						Emission is								Sound power level (Lw)	
Emiss. variant		Sum	16 Hz	31.5 Hz	63 Hz	125 Hz	250 Hz	500 Hz	1000 Hz	2000 Hz	4000 Hz	8000 Hz			
Day	Lw' /dB (A)	55.6	-9.4	-9.4	10.2	26.3	38.7	45.9	50.1	52.5	45.9	30.0			
Night	Lw' /dB (A)	55.6	-9.4	-9.4	10.2	26.3	38.7	45.9	50.1	52.5	45.9	30.0			
LIQI024	Label	Pipe 60.13 sek 3				Action radius/m								99999.00	
	Group	Group 0				Lw (Day) /dB(A)								87.18	

	Number of nodes	3	Lw (Night) /dB(A)										87.18
	Length/ m	8.77	Lw' (Day) /dB(A)										77.75
	Length/ m (2D)	8.75	Lw' (Night) /dB(A)										77.75
	Area /m²	---	D0										0.00
			High building/high noise source										No
			Emission is										Sound power level (Lw)
	Emiss. variant		Sum	16 Hz	31.5 Hz	63 Hz	125 Hz	250 Hz	500 Hz	1000 Hz	2000 Hz	4000 Hz	8000 Hz
	Day	Lw' /dB (A)	77.8	-9.4	-9.4	13.5	30.7	46.2	60.4	70.9	76.0	68.2	51.1
	Night	Lw' /dB (A)	77.8	-9.4	-9.4	13.5	30.7	46.2	60.4	70.9	76.0	68.2	51.1
LIQI025	Label	Pipe 60.13 sek 4				Action radius/m				99999.00			
	Group	Group 0				Lw (Day) /dB(A)				89.55			
	Number of nodes	2				Lw (Night) /dB(A)				89.55			
	Length/ m	28.51				Lw' (Day) /dB(A)				75.00			
	Length/ m (2D)	28.50				Lw' (Night) /dB(A)				75.00			
	Area /m²	---				D0				0.00			
			High building/high noise source										No
			Emission is										Sound power level (Lw)
	Emiss. variant		Sum	16 Hz	31.5 Hz	63 Hz	125 Hz	250 Hz	500 Hz	1000 Hz	2000 Hz	4000 Hz	8000 Hz
	Day	Lw' /dB (A)	75.0	-14.5	-14.5	15.6	32.9	47.8	60.4	69.3	73.3	59.6	42.6
	Night	Lw' /dB (A)	75.0	-14.5	-14.5	15.6	32.9	47.8	60.4	69.3	73.3	59.6	42.6
LIQI039	Label	Pipe 60.14 Sek 6				Action radius/m				99999.00			
	Group	Group 0				Lw (Day) /dB(A)				78.92			
	Number of nodes	2				Lw (Night) /dB(A)				78.92			
	Length/ m	4.50				Lw' (Day) /dB(A)				72.39			
	Length/ m (2D)	4.49				Lw' (Night) /dB(A)				72.39			
	Area /m²	---				D0				0.00			
			High building/high noise source										No
			Emission is										Sound power level (Lw)
	Emiss. variant		Sum	16 Hz	31.5 Hz	63 Hz	125 Hz	250 Hz	500 Hz	1000 Hz	2000 Hz	4000 Hz	8000 Hz
	Day	Lw' /dB (A)	72.4	-6.5	-6.5	16.3	29.1	44.5	58.1	66.8	70.6	57.2	40.3
	Night	Lw' /dB (A)	72.4	-6.5	-6.5	16.3	29.1	44.5	58.1	66.8	70.6	57.2	40.3
LIQI044	Label	Pipe 60.12 Sek 3				Action radius/m				99999.00			
	Group	Group 0				Lw (Day) /dB(A)				65.22			
	Number of nodes	2				Lw (Night) /dB(A)				65.22			
	Length/ m	2.66				Lw' (Day) /dB(A)				60.97			
	Length/ m (2D)	2.65				Lw' (Night) /dB(A)				60.97			
	Area /m²	---				D0				0.00			
			High building/high noise source										No
			Emission is										Sound power level (Lw)
	Emiss. variant		Sum	16 Hz	31.5 Hz	63 Hz	125 Hz	250 Hz	500 Hz	1000 Hz	2000 Hz	4000 Hz	8000 Hz
	Day	Lw' /dB (A)	61.0	-4.2	-4.2	15.4	31.8	44.3	53.5	59.0	53.2	39.2	22.7
	Night	Lw' /dB (A)	61.0	-4.2	-4.2	15.4	31.8	44.3	53.5	59.0	53.2	39.2	22.7
LIQI045	Label	Pipe 60.15 Sek 4				Action radius/m				99999.00			
	Group	Group 0				Lw (Day) /dB(A)				72.29			
	Number of nodes	3				Lw (Night) /dB(A)				72.29			
	Length/ m	8.01				Lw' (Day) /dB(A)				63.26			
	Length/ m (2D)	8.00				Lw' (Night) /dB(A)				63.26			
	Area /m²	---				D0				0.00			
			High building/high noise source										No
			Emission is										Sound power level (Lw)
	Emiss. variant		Sum	16 Hz	31.5 Hz	63 Hz	125 Hz	250 Hz	500 Hz	1000 Hz	2000 Hz	4000 Hz	8000 Hz
	Day	Lw' /dB (A)	63.3	-9.0	-9.0	-0.9	16.5	32.5	47.5	57.1	60.4	56.6	39.7
	Night	Lw' /dB (A)	63.3	-9.0	-9.0	-0.9	16.5	32.5	47.5	57.1	60.4	56.6	39.7
LIQI047	Label	Pipe 60.15 Sek 1				Action radius/m				99999.00			
	Group	Group 0				Lw (Day) /dB(A)				84.43			
	Number of nodes	3				Lw (Night) /dB(A)				84.43			
	Length/ m	8.00				Lw' (Day) /dB(A)				75.40			
	Length/ m (2D)	8.00				Lw' (Night) /dB(A)				75.40			
	Area /m²	---				D0				0.00			
			High building/high noise source										No
			Emission is										Sound power level (Lw)
	Emiss. variant		Sum	16 Hz	31.5 Hz	63 Hz	125 Hz	250 Hz	500 Hz	1000 Hz	2000 Hz	4000 Hz	8000 Hz
	Day	Lw' /dB (A)	75.4	-9.0	-9.0	13.5	30.1	45.3	58.7	68.3	72.9	68.9	51.9

	Night	Lw' /dB (A)	75.4	-9.0	-9.0	13.5	30.1	45.3	58.7	68.3	72.9	68.9	51.9	
LIQI048	Label	Pipe 60.15 Sek 2				Action radius/m				99999.00				
	Group	Group 0				Lw (Day) /dB(A)				86.39				
	Number of nodes	2				Lw (Night) /dB(A)				86.36				
	Length/ m	24.73				Lw' (Day) /dB(A)				72.46				
	Length/ m (2D)	24.70				Lw' (Night) /dB(A)				72.43				
	Area /m²	---				D0				0.00				
						High building/high noise source				No				
						Emission is				Sound power level (Lw)				
	Emiss. variant		Sum	16 Hz	31.5 Hz	63 Hz	125 Hz	250 Hz	500 Hz	1000 Hz	2000 Hz	4000 Hz	8000 Hz	
	Day	Lw' /dB (A)	72.5	-13.9	-13.9	14.4	30.9	46.0	58.4	66.9	70.5	59.4	42.7	
	Night	Lw' /dB (A)	72.4	-13.9	-13.9	13.8	30.5	45.7	58.3	66.8	70.5	59.4	42.7	
LIQI053	Label	Pipe 60.16 Sek 4				Action radius/m				99999.00				
	Group	Group 0				Lw (Day) /dB(A)				75.07				
	Number of nodes	3				Lw (Night) /dB(A)				75.07				
	Length/ m	8.00				Lw' (Day) /dB(A)				66.04				
	Length/ m (2D)	8.00				Lw' (Night) /dB(A)				66.04				
	Area /m²	---				D0				0.00				
						High building/high noise source				No				
						Emission is				Sound power level (Lw)				
	Emiss. variant		Sum	16 Hz	31.5 Hz	63 Hz	125 Hz	250 Hz	500 Hz	1000 Hz	2000 Hz	4000 Hz	8000 Hz	
	Day	Lw' /dB (A)	66.0	-9.0	-9.0	6.0	22.3	36.4	48.8	58.4	62.6	61.5	46.4	
	Night	Lw' /dB (A)	66.0	-9.0	-9.0	6.0	22.3	36.4	48.8	58.4	62.6	61.5	46.4	
LIQI054	Label	Pipe 60.16 Sek 1				Action radius/m				99999.00				
	Group	Group 0				Lw (Day) /dB(A)				84.45				
	Number of nodes	3				Lw (Night) /dB(A)				84.45				
	Length/ m	8.01				Lw' (Day) /dB(A)				75.41				
	Length/ m (2D)	8.00				Lw' (Night) /dB(A)				75.41				
	Area /m²	---				D0				0.00				
						High building/high noise source				No				
						Emission is				Sound power level (Lw)				
	Emiss. variant		Sum	16 Hz	31.5 Hz	63 Hz	125 Hz	250 Hz	500 Hz	1000 Hz	2000 Hz	4000 Hz	8000 Hz	
	Day	Lw' /dB (A)	75.4	-9.0	-9.0	7.3	24.8	41.6	57.7	67.8	71.9	71.0	55.3	
	Night	Lw' /dB (A)	75.4	-9.0	-9.0	7.3	24.8	41.6	57.7	67.8	71.9	71.0	55.3	

Attachment 2 Preliminary Vendor Data



Valve sizing calculation
Axial control valve

Client	NET4GAS	Mokveld ref.	65167-004-00	File name	65167-004-1.ms
Project	Primada	Calculated by	GVDO	Issue date	10-sep-18
Client ref.	CONTROL VALVE - DN 600 - DATA	Tag number(s)	60.12	Version	v015
Application	Control Valve	Pipe size DN	600 mm		
Medium	Methane	Wall thickness	16 mm		

PROCESS CONDITIONS			Case 1	Case 2
Inlet pressure	P_1	[barg]	85	85
Outlet pressure	P_2	[barg]	73.5	73.5
Flow rate	Q	[nm ³ /hr]	812500	1120833
Inlet temperature	T_1	[deg. C]	25	25
Outlet temperature	T_2	[deg. C]	21	21
Density gas	G_0	[MW]	16.30	16.30
Specific heat ratio (C_p/C_v)	κ	[-]	1.31	1.31
Compressibility in	Z_1	[-]	0.87	0.87
Compressibility out	Z_2	[-]	0.87	0.87

SIZING RESULTS			Case 1	Case 2
Capacity required	C_v	[-]	865	1193
% of selected capacity		[%]	14	20
Turndown ratio		[-]	1 : 48	1 : 66
Valve recovery factor	F_1	[-]	0.78	0.78
Valve outlet velocity	v	[m/s]	12	16
		[Mach]	0.03	0.04
Sound Pressure Level	SPL	[dBA]	84	85



Valve sizing calculation
Axial control valve

Client	NET4GAS	Mokveld ref.	PB44343	File name	65168-004-1.ms
Project	Primda	Calculated by	GVDO	Issue date	10-sep-18
Client ref.	RU05_STR_SPC_505_03_DDL	Tag number(s)	60.13. 60.14	Version	v015
Application	Control Valve	Pipe size DN	600 mm		
Medium	Methane	Wall thickness	16 mm		

PROCESS CONDITIONS

			Case 1	Case 2
Inlet pressure	P ₁	[barg]	85	85
Outlet pressure	P ₂	[barg]	73.5	73.5
Flow rate	Q	[nm ³ /hr]	812500	1120833
Inlet temperature	T ₁	[deg. C]	25	25
Outlet temperature	T ₂	[deg. C]	21	21
Density gas	G _g	[MW]	16.30	16.30
Specific heat ratio (C _p /C _v)	κ	[-]	1.31	1.31
Compressibility in	Z ₁	[-]	0.87	0.87
Compressibility out	Z ₂	[-]	0.87	0.87

SIZING RESULTS

Capacity required	C _v	[-]	865	1193
% of selected capacity		[%]	14	20
Turndown ratio		[-]	1 : 48	1 : 66
Valve recovery factor	F ₁	[-]	0.78	0.78
Valve outlet velocity	v	[m/s]	12	16
		[Mach]	0.03	0.04
Sound Pressure Level	SPL	[dBA]	84	85

NODE PŘIMDA MODIFICATION
PRESSURE CONTROL AND SAFETY SHUTOFF VALVES DN300 - DN1400 DATASHEET

RU05_STR_SPC_504_03_DDL

CONTROL VALVE - DN 500 - DATA SHEET							
GENERAL INFORMATION							
1	LOCATION		PRIMDA - RU 05		5	QUANTITY	1
3	EQUIPMENT		PRESSURE / FLOW CONTROL VALVE		6	P&ID-No.	C4G-PRIM-CHE-RU05-STR-PID-101
4	TAG No.		60.15		7	TECHNICAL SPECIFICATION	RU05_STR_SPC_505_03_DDL
OPERATION AND DESIGN DATA							
9	AMBIENT CONDITIONS		RU05_STR_SPC_505_03_DDL		17	OUTLET SETTING PRESSURE	
10	FLUID		NATURAL GAS		18	ΔP @ FULL OPEN	Max. 0.5 bar
11	GAS COMPOSITION		RU05_STR_SPC_505_03_DDL		19	DESIGN PRESSURE	85.0 barg
12	PIPING CLASS		#600		20	DESIGN TEMPERATURE	-20°C / +50°C
13	INSTALLATION		ABOVEGROUND		21		
14	DESIGN CODE / STANDARD		ČSN EN 1349		22		
15	MINIMUM SAFETY FACTOR		2,15		23		
16	FLANGE STANDARD / RATING		ASME B16.5 - RF / #600		24		
OPERATING / SERVICE CONDITIONS							
26		UNITS	CONDITION 1	CONDITION 2	CONDITION 3	CONDITION 4	SHUT-OFF
27	FLOW RATE	Nm ³ /h	958 333	958 333	250 000	250 000	
28	INLET PRESSURE P1	barg	85,0	49,4	85,0	49,4	
29	OUTLET PRESSURE P2	barg	73,5	48,4	73,5	49,3	P2set=73,5
30	DIFFERENTIAL PRESSURE ΔP = P1 - P2	barg	11,5	0,0	11,5	0,0	
31	INLET TEMPERATURE	°C	25	25	25	25	
32	MOLAR WEIGHT	Kg/Kmol	16,3	16,3	16,3	16,3	
33	VISCOSITY / SPECIFIC HEATS RATIO						
34	VAPOR PRESS. Pv / CRITICAL PRESS. Pc						
35	REQUIRED Cv		1028	4303	268	3505	
36	TRAVEL	%					
37	CALCULATED NOISE	dB(A)	85	69	79	65	Max.85dB(A)
38	COMPRESSIBILITY (Z)		0.87	0.91	0.87	0.91	
39	SOLIDS CONC. / PARTICLE SIZE						
VALVE DATA							
41	VALVE TYPE	RZD-REQX	51	SUPPORT LEGS	YES		
42	VALVE BODY TYPE / DIMENSION	* PISTON	52	FLOW DIRECTION	BI-DIRECTIONAL		
43	NOMINAL PIPE SIZE	DN 500	53	MAX. ALLOWABLE NOISE	< 85 dB(A) @ 1 m		
44	PIPELINE CONNECTION TYPE / SIZE	FLANGE / FLANGE	54	MAX. VALVE LIFT	202 mm		
45	MAIN SEALS	PTFE	55	STEM DIAMETER			
46	SECONDARY SEALS		56	ADJUSTABLE LIMIT STOP	No		
47	VALVE CHARACTERISTIC	EQUAL PERCENTAGE	57	LEAKAGE CLASS	EN 1349 - CLASS V		
48	TRIM TYPE	AXIAL CONTROL VALVE	58				
49	SOUND ABSORPTION		59				
50	POSITION INDICATOR	YES	60				
ACTUATOR AND ACCESSORIES							
62	ACTUATOR TYPE	Pneum. - Nat. Gas (proc. med.)	73	POWER SUPPLY FOR SOLENOID VALVE	N/A		
63	MANUFACTURER / MODEL	Mokveld / M525-2VS-7	74	EXP. PROOF-LIMIT SWITCHES			
64	AIR SUPPLY PRESSURE	85,0 barg (Natural Gas)	75	EXP. PROOF-HOUSING	EEx d		
65	MIN SUPPLY AIR PRESS. FOR OPERAT.	35,6 barg (Natural Gas)	76	STROKING TIME TO OPEN	(max. 100 s)		
66	POSITIONER SIGNAL	4 - 20 mA	77	STROKING TIME TO CLOSE	(max. 100 s)		
67	DESIGN TORQUE FOR ACTUATOR	YES, WITH LIMIT SWITCH	78	TEMPERATURE CLASS	T3		
68	ELECTRICAL POWER SUPPLY	N/A	79	POSITIONER MANUFACT. / MODEL	Siemens Sipart PS2		
69	SIGNALLING AND CONTROL CONTACTS	4 - 20 mA	80	SOLENOID VALVE MANUFACT. / MODEL			
70	HAZARDOUS AREA	ZONE 2	81	HANDWHEEL	YES (DISCONNECTING)		
71	IP-CODE	IP 65 (IEC 60529)	82	INSULATING CLASS	I		
72	AIR QUALITY	N/A (Natural Gas DVGW G260)	83	CORROSION PROTECTION	CATAGORIE KN		
84	DIMENSIONS, WEIGHT, MECHANICAL AND ELECTRICAL INTERFACES						
85	FITTING LENGTH	1194 mm F to F	89	WEIGHT (VALVE)	1620 kg		
86	FITTING HEIGHT		90	WEIGHT (VALVE + ACTUATOR)	2420 kg		
87	AIR SUPPLY CONNECTION	N/A	91	CABLE CONNECTION TYPE	Exd CABLE GROMMET		
88			92	CABLE CONNECTION SIZE	2x M25x1.5, 1x M20x1.5		
MATERIALS, TESTING AND DOCUMENTATION							
94	MATERIAL VALVE BODY	ASTM A351 Gr. LCC	103	TIGHTNESS TEST	ČSN EN 12266-1, 2		
95	MATERIAL INTERNALS	Carbon Steel	104	PRESSURE TESTING STANDARD	ČSN 12266-1		
96	MATERIAL END CONNECTIONS		105	SAFETY INTEGRITY LEVEL	IEC 61508/61511 SIL 2		
97	MATERIAL STEM	1.7218 - A322 G41300	106	FIRE SAFE TESTING	API SPEC 6FA / ISO 10497		
98	MATERIAL BOLTS / NUTS	N/A	107	ATEX CERTIFICATION	ACC. TO ATEX 2014/34/EU		
99	MATERIAL SEAT / SEAL	PTFE	108	TEST OF MATERIAL	ITE-GENER-STR-SPC-815		
100	VALVE CORROSION PROTECTION	3 layer system total 240 Mu	109	FINAL ACCEPTANCE TEST	ACC. TO EN 10204.3.2		
101		Top color RAL 1023	110	CE-CONFORMITY	PED 2014/68/EU Module G		
102			111				
NOTES							
113	◆ To be filled in/confirmed by Vendor						
114	This data sheet shall be read with document "RU05_STR_SPC_505_03_DDL Pressure Control and Safety Shutoff Valves DN 300 - DN 1400 Specification"						
117	To be supplied with couterflanges, seals and joining material.						
118							
119							
120							
121							
122							
123							

NODE PRIMDA MODIFICATION
PRESSURE CONTROL AND SAFETY SHUTOFF VALVES DN300 - DN1400 DATASHEET

RU05_STR_SPC_504_03_DDL

CONTROL VALVE - DN 400 - DATA SHEET								
GENERAL INFORMATION								
1	LOCATION			PRIMDA - RU 05	5	QUANTITY		1
3	EQUIPMENT			PRESSURE / FLOW CONTROL VALVE	6	P&ID-No.		C4G-PRIM-CHE-RU05-STR-PID-101
4	TAG No.			60.16	7	TECHNICAL SPECIFICATION		RU05_STR_SPC_505_03_DDL
OPERATION AND DESIGN DATA								
9	AMBIENT CONDITIONS			RU05_STR_SPC_505_03_DDL	17	OUTLET SETTING PRESSURE		
10	FLUID			NATURAL GAS	18	ΔP @ FULL OPEN		Max. 0.5bar
11	GAS COMPOSITION			RU05_STR_SPC_505_03_DDL	19	DESIGN PRESSURE		85.0 barg
12	PIPING CLASS			#600	20	DESIGN TEMPERATURE		-20°C / +50°C
13	INSTALLATION			ABOVEGROUND	21			
14	DESIGN CODE / STANDARD			ČSN EN 1349	22			
15	MINIMUM SAFETY FACTOR			2,15	23			
16	FLANGE STANDARD / RATING			ASME B16.5 - RF / #600	24			
OPERATING / SERVICE CONDITIONS								
26		UNITS	CONDITION 1	CONDITION 2	CONDITION 3	CONDITION 4	Full Open	NOTE
27	FLOW RATE	Nm ³ /h	541 667	541 667	250 000	250 000	541 667	
28	INLET PRESSURE P1	barg	85,0	49,4	85,0	49,4	85,0	
29	OUTLET PRESSURE P2	barg	73,5	49,4	73,5	49,2	84,5	P2set=73,5
30	DIFFERENTIAL PRESSURE ΔP = P1 - P2	barg	11,5	0,0	11,5	0,2	0,5	
31	INLET TEMPERATURE	°C	25	25	25	25	25	
32	MOLAR WEIGHT	Kg/Kmol	16,3	16,3	16,3	16,3	16,3	
33	VISCOSITY / SPECIFIC HEAT RATIO							
34	VAPOR PRESS. Pv / CRITICAL PRESS. Pc							
35	REQUIRED Cv		581	2432	268	2482	2516	
36	TRAVEL	%						
37	CALCULATED NOISE	dB(A)	85	68	82	<65	<65	Max.85dB(A)
38	COMPRESSIBILITY (Z)		0.87	0.91	0.87	0.91	0.87	
39	SOLIDS CONC. / PARTICLE SIZE							
VALVE DATA								
41	VALVE TYPE	RZD-REQX		51	SUPPORT LEGS		YES	
42	VALVE BODY TYPE / DIMENSION	* PISTON		52	FLOW DIRECTION		BI-DIRECTIONAL	
43	NOMINAL PIPE SIZE	DN 400		53	MAX. ALLOWABLE NOISE		< 85 dB(A) @ 1 m	
44	PIPELINE CONNECTION TYPE / SIZE	FLANGE / FLANGE		54	MAX. VALVE LIFT		167 mm	
45	MAIN SEALS	PTFE		55	STEM DIAMETER			
46	SECONDARY SEALS			56	ADJUSTABLE LIMIT STOP			
47	VALVE CHARACTERISTIC	EQUAL PERCENTAGE		57	LEAKAGE CLASS		EN 1349 - CLASS V	
48	TRIM TYPE	AXIAL CONTROL VALVE		58				
49	SOUND ABSORPTION			59				
50	POSITION INDICATOR	YES		60				
ACTUATOR AND ACCESSORIES								
61	ACTUATOR TYPE	Pneum. - Nat. Gas (proc. med.)		73	POWER SUPPLY FOR SOLENOID VALVE		N/A	
63	MANUFACTURER / MODEL	Mokveld / M425-3VS-6		74	EXP. PROOF-LIMIT SWITCHES			
64	AIR SUPPLY PRESSURE	85,0 barg (Natural Gas)		75	EXP. PROOF-HOUSING		EEx d	
65	MIN. SUPPLY AIR PRESS. FOR OPERATION	35,6 barg (Natural Gas)		76	STROKING TIME TO OPEN		(max. 100 s)	
66	POSITIONER SIGNAL	4 - 20 mA		77	STROKING TIME TO CLOSE		(max. 100 s)	
67	DESIGN TORQUE FOR ACTUATOR	YES, WITH LIMIT SWITCH		78	TEMPERATURE CLASS		T3	
68	ELECTRICAL POWER SUPPLY	N/A		79	POSITIONER MANUFACT / MODEL		Siemens Sipart PS2	
69	SIGNALLING AND CONTROL CONTACTS	4 - 20 mA		80	SOLENOID VALVE MANUFACT / MODEL			
70	HAZARDOUS AREA	ZONE 2		81	HANDWHEEL		YES (DISCONNECTING)	
71	IP-CODE	IP 65 (IEC 60529)		82	INSULATING CLASS		I	
72	AIR QUALITY	N/A (Natural Gas DVGW G260)		83	CORROSION PROTECTION		CATAGORIE KN	
DIMENSIONS, WEIGHT, MECHANICAL AND ELECTRICAL INTERFACES								
85	FITTING LENGTH	991 mm F to F		89	WEIGHT (VALVE)		980 kg	
86	FITTING HEIGHT			90	WEIGHT (VALVE + ACTUATOR)		720 kg	
87	AIR SUPPLY CONNECTION	N/A		91	CABLE CONNECTION TYPE		Exd CABLE GROMMET	
88				92	CABLE CONNECTION SIZE		2x M25x1.5, 1x M20x1.5	
MATERIALS, TESTING AND DOCUMENTATION								
94	MATERIAL VALVE BODY	ASTM A351 Gr. LCC		103	TIGHTNESS TEST		ČSN EN 12266-1, 2	
95	MATERIAL INTERNALS	CARBON STEEL		104	PRESSURE TESTING STANDARD		ČSN 12266-1	
96	MATERIAL END CONNECTIONS			105	SAFETY INTEGRITY LEVEL		IEC 61508/61511 SIL 2	
97	MATERIAL STEM	1.7218 - A322 G41300		106	FIRE SAFE TESTING		API SPEC 6FA / ISO 10497	
98	MATERIAL BOLTS / NUTS			107	ATEX CERTIFICATION		ACC. TO ATEX 2014/34/EU	
99	MATERIAL SEAT / SEAL			108	TEST OF MATERIAL		ITE-GENER-STR-SPC-815	
100	VALVE CORROSION PROTECTION	3 layer system total 240 μm		109	FINAL ACCEPTANCE TEST		ACC. TO EN 10204 3.2	
101		Top color RAL 1023		110	CE-CONFORMITY		PED 2014/68/EU Module G	
102				111				
NOTES								
113	◆ To be filled in/confirmed by Vendor							
114	This data sheet shall be read with document "RU05_STR_SPC_505_03_DDL Pressure Control and Safety Shutoff Valves DN 300 - DN 1400 Specification"							
117	To be supplied with couterflanges, seals and joining material.							
118								
119								
120								
121								
122								
123								



Valve sizing calculation
Axial control valve

Client	NET4GAS	Mokveld ref.	50979	File name	50979-Primada.i
Project	Primda	Calculated by		Issue date	15-okt-18
Client ref.		Tag number(s)	60.1,60.2, 60.3,60.4	Version	v015

Application		Pipe size DN	750 mm
Medium	Natural gas	Wall thickness	17.6 mm

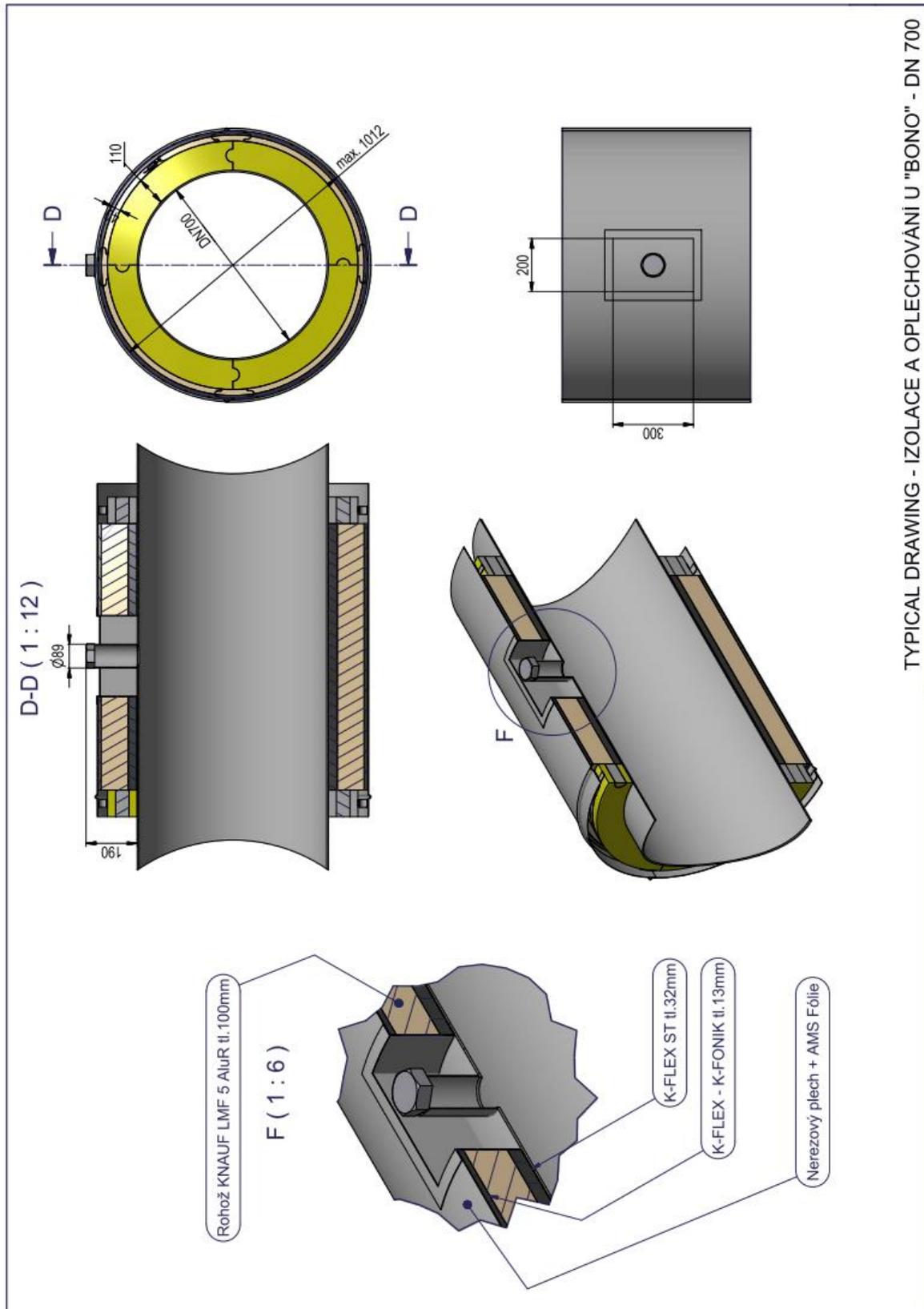
PROCESS CONDITIONS

			Case 1	Case 2
Inlet pressure	P_1	[bara]	85	85
Outlet pressure	P_2	[bara]	73.5	73.5
Flow rate	Q	[nm ³ /hr]	1267917	665416
Inlet temperature	T_1	[deg. C]	10	10
Outlet temperature	T_2	[deg. C]	6	6
Density gas	G_g	[MW]	18.16	18.16
Specific heat ratio (C_p/C_v)	κ	[-]	1.32	1.32
Compressibility in	Z_1	[-]	0.84	0.84
Compressibility out	Z_2	[-]	0.84	0.84

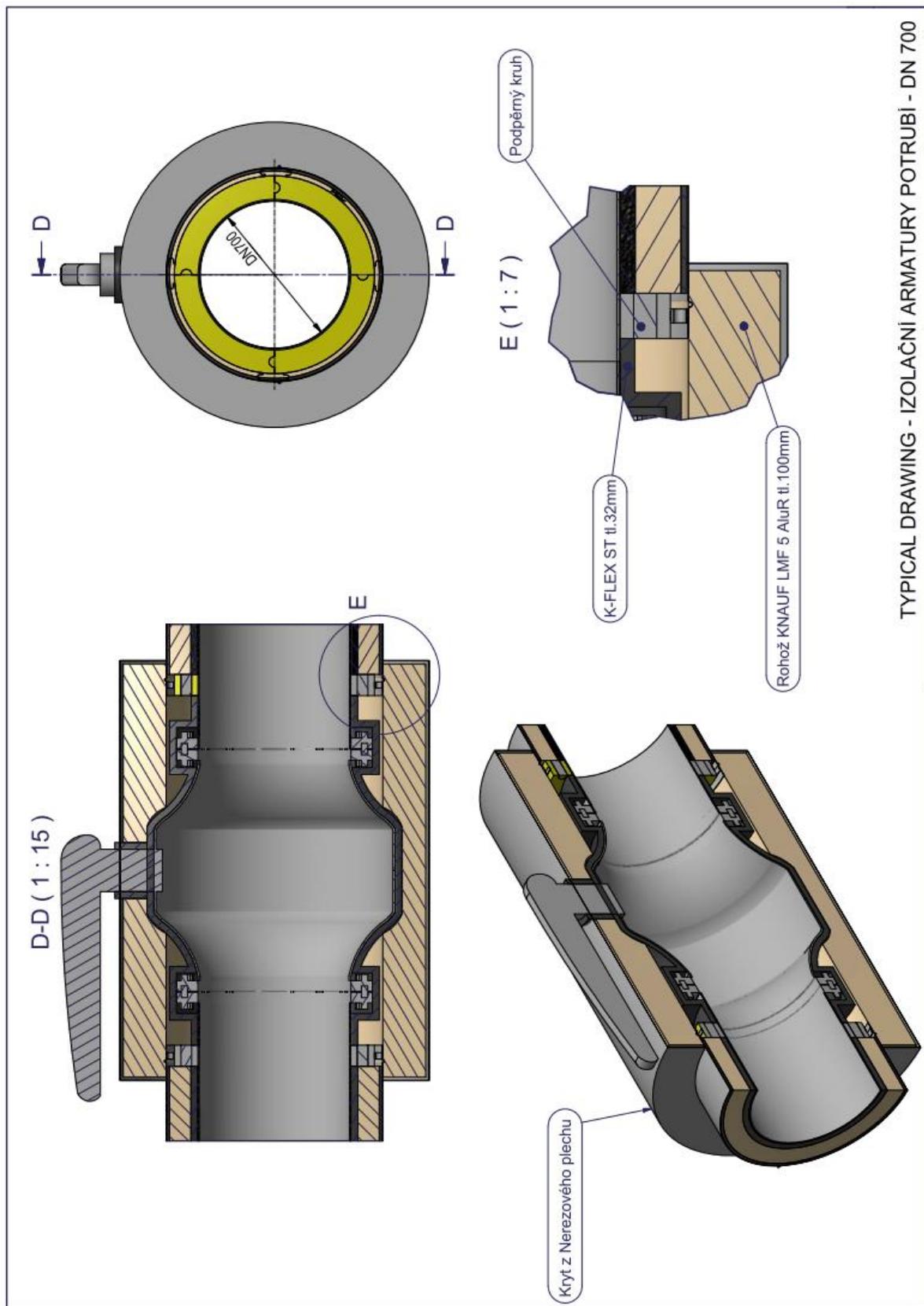
SIZING RESULTS

Capacity required	C_v	[-]	1385	727
% of selected capacity		[%]	14	7
Turndown ratio		[-]	1 : 53	1 : 28
Valve recovery factor	F_1	[-]	0.75	0.75
Valve outlet velocity	v	[m/s]	11	6
		[Mach]	0.03	0.02
Sound Pressure Level	SPL	[dBA]	85	82

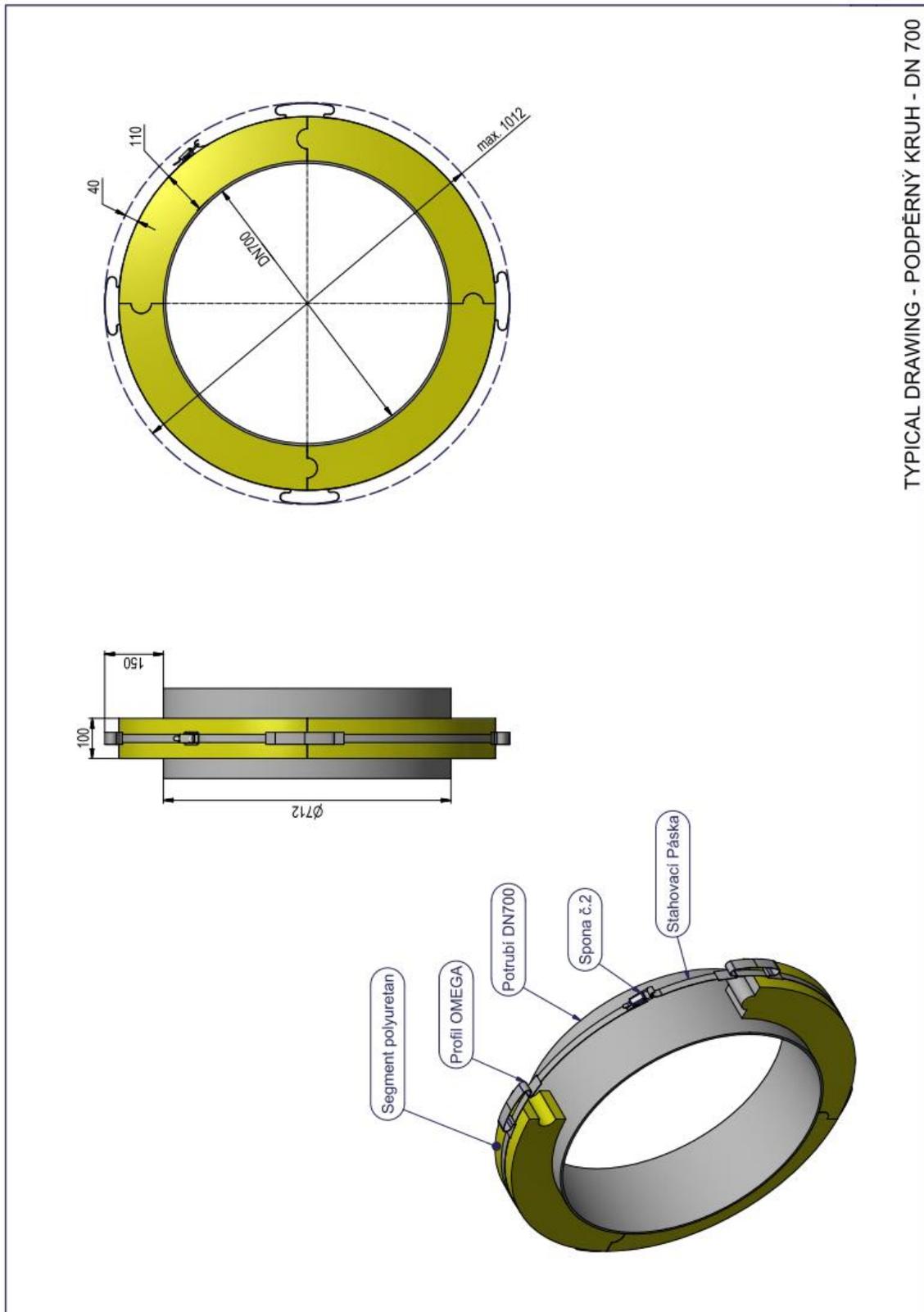
Attachment 3 insulation directly applied on the valves



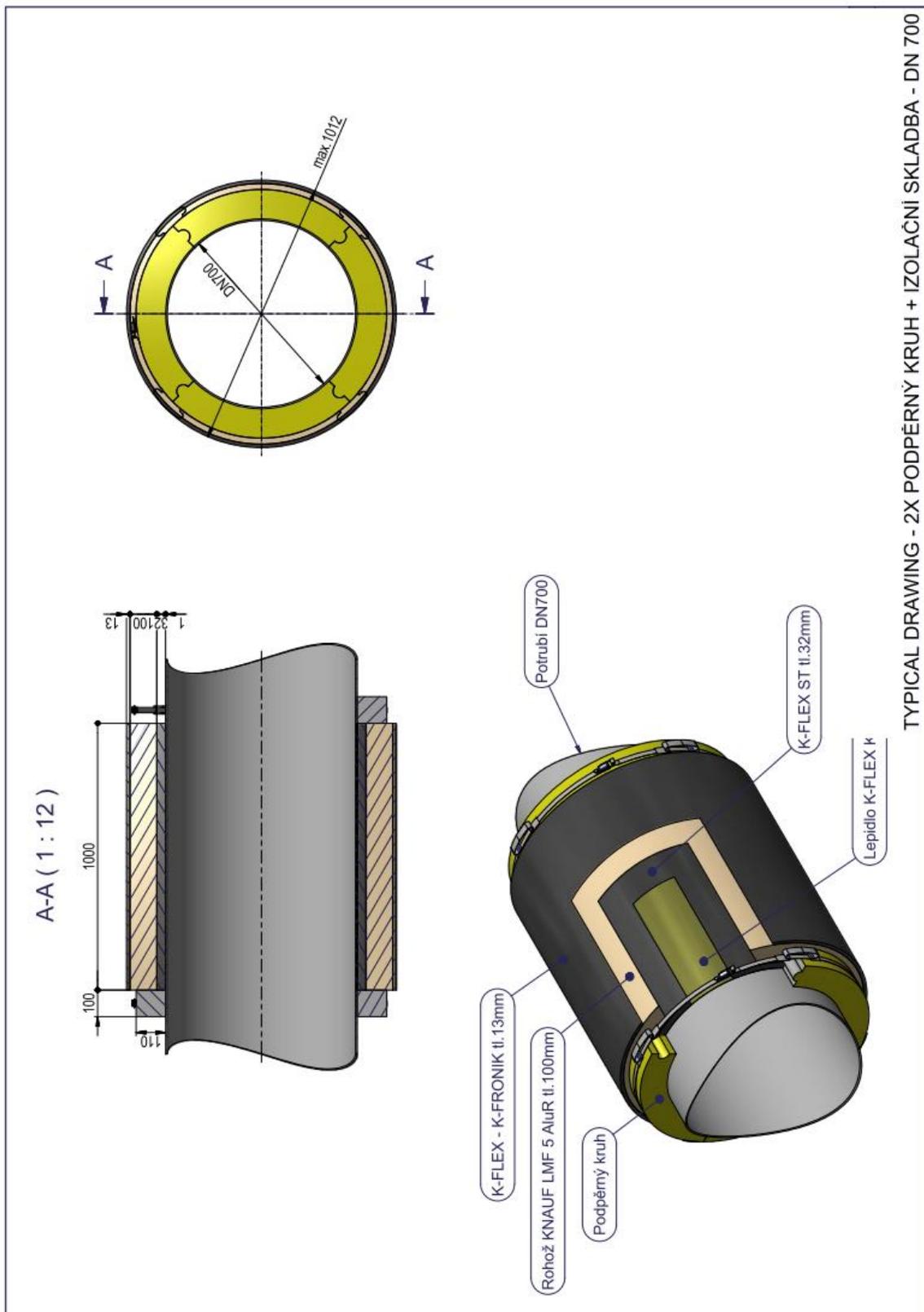
Attachment 3 insulation directly applied on the valves



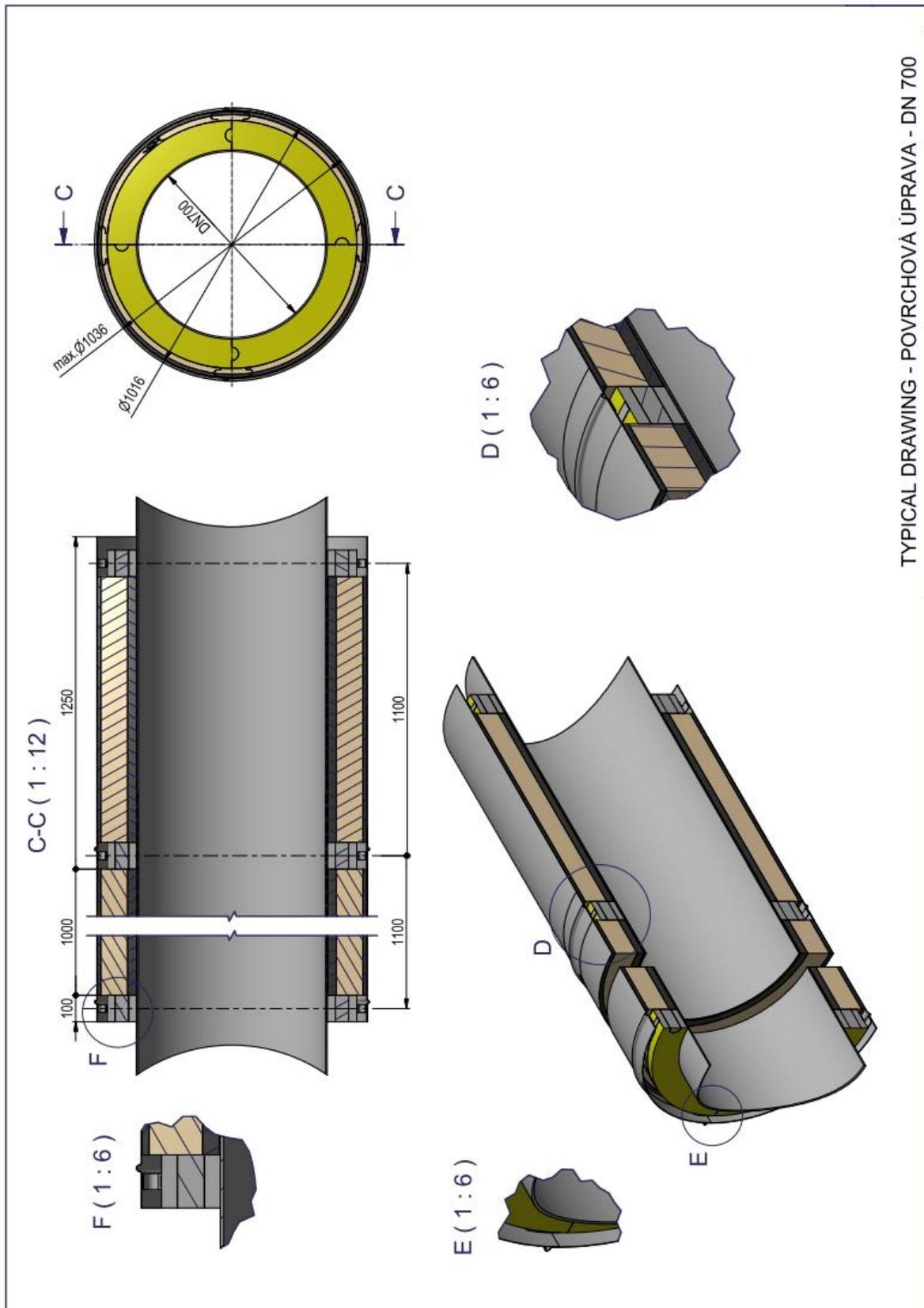
Attachment 3 insulation directly applied on the valves



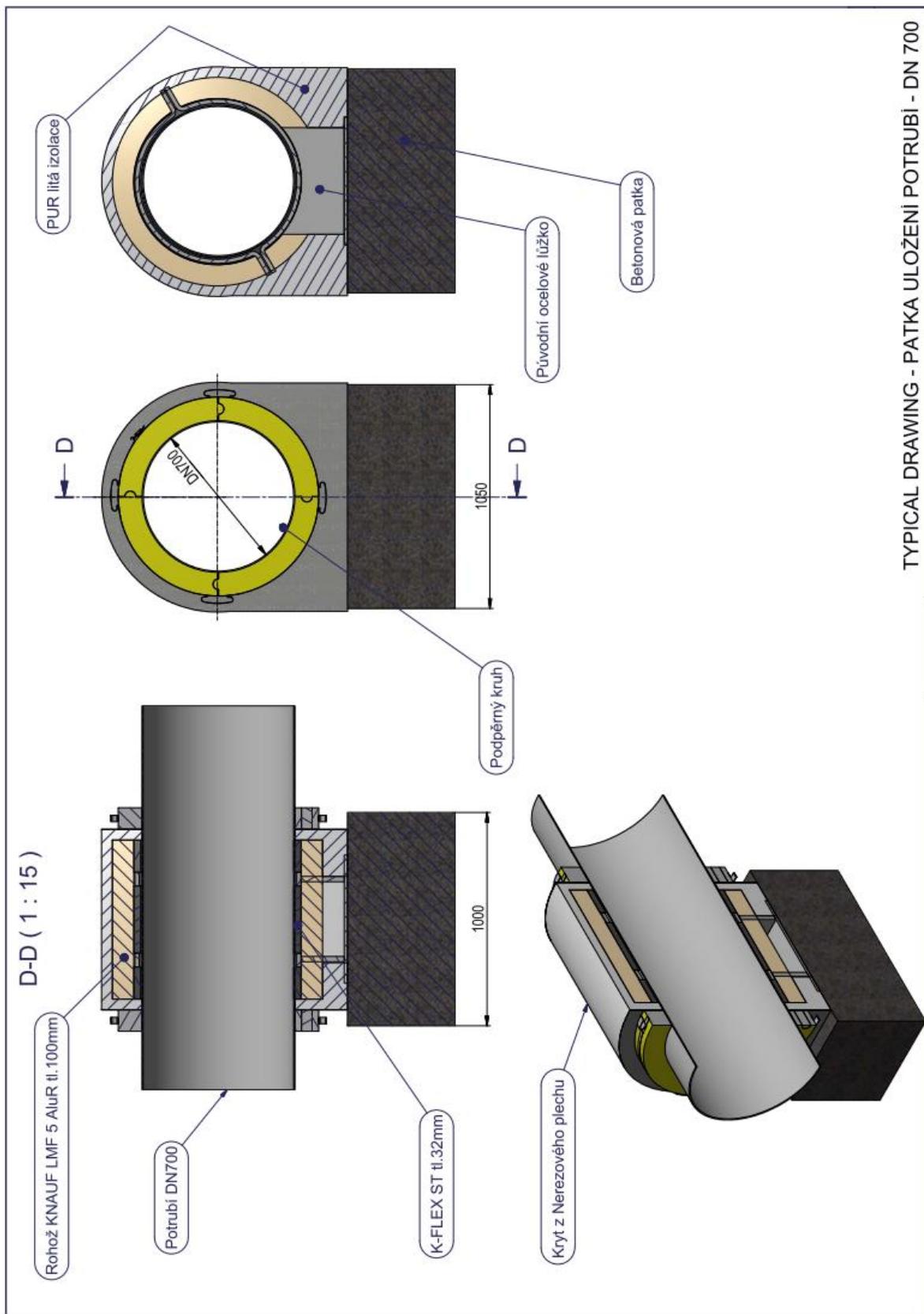
Attachment 3 insulation directly applied on the valves



Attachment 3 insulation directly applied on the valves



Attachment 3 insulation directly applied on the valves



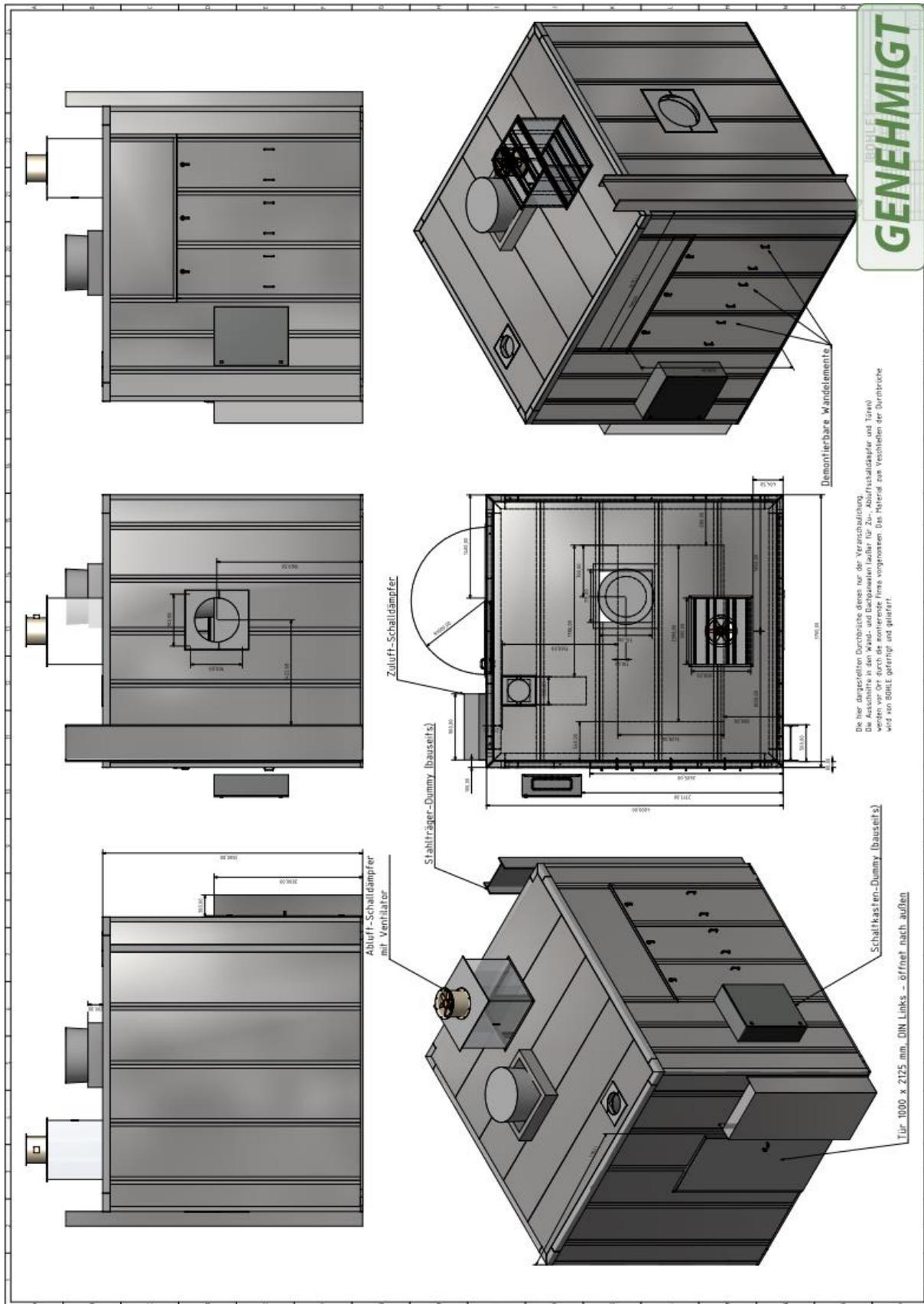
TYPICAL DRAWING - PATKA ULOŽENÍ POTRUBÍ - DN 700

Attachment 4 Requirements and typical for noise insulation hood

Expected requirements for noise insulation hood (not concluding):

- Size to fit the valves (approx. 3 m x 3 m x 3 m)
- Noise reduction as specified
- Good accessibility (e.g. doors on both sides)
- Good ventilation to avoid ex zone or gas detectors if ex zone cannot be avoided
- Silencers for ventilation
- Inside lighting
- Foundation as plate or points (to be defined by static calculation)
- Steel frame to hold insulation plates

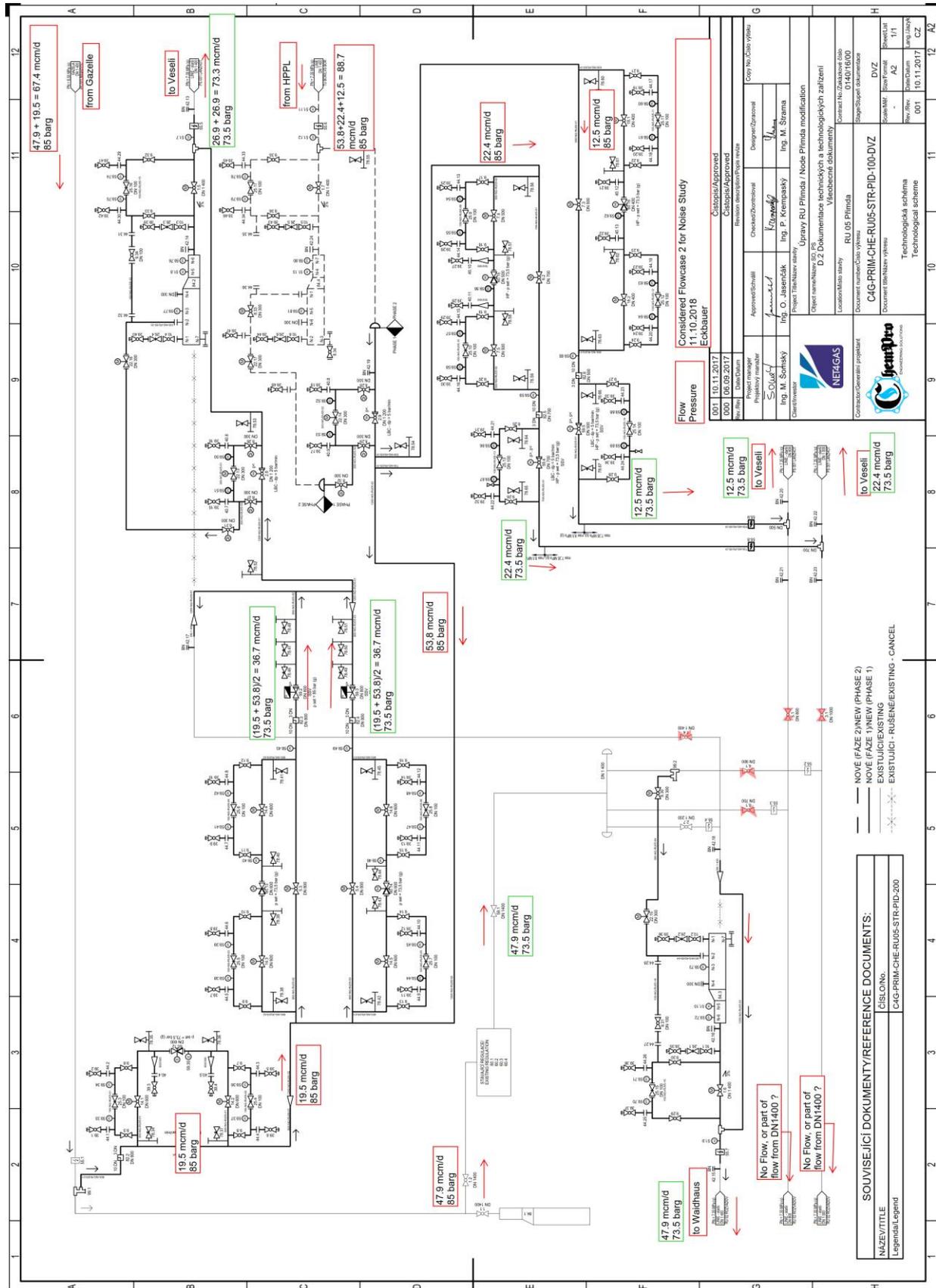
Attachment 4 Requirements and typical for noise insulation hood



Attachment 5 Piping Class CS-100-0

		PIPING CLASS										Designation					CS100-0	
Base Material		Carbon Steel					Service: Natural Gas Piping											
Facing		RF		ASME CLASS		600		Color Coding										
Corrosion Allow.		0 mm						Design Code					ČSN EN 1594, TPG 702 04					
Design Conditions	Design Pressure (barg)	100																
	Design Temperature (°C)	-20 to +50					Pressure/ Temperature limits:					-20°C	38°C	50°C				
Pipe Dimensions	Nominal Pipe Size [DN]	25	40	50	80	100	150	200	250	300	350	400	450	500	600	700	800	
	Nominal Pipe Size [inch]	1	1½	2	3	4	6	8	10	12	14	16	18	20	24	28	32	
	Outer Diameter [mm]	33.4	48.3	60.3	88.9	114.3	168.3	219.1	273.0	323.8	355.6	406.4	457.0	508.0	610.0	711.0	813.0	
	Wall Thickness [mm]	4.00	4.00	4.00	4.00	4.50	7.10	8.80	11.00	8.80	10.00	11.00	12.50	12.50	16.00	17.50	17.50	
	Nominal Pipe Size [DN]	900	1000	1100	1200	1400												
	Nominal Pipe Size [inch]	36	40	44	48	56												
	Outer Diameter [mm]	914.0	1016.0	1118.0	1219.0	1422.0												
Wall Thickness [mm]	20.00	20.00	22.20	22.20	28.00													
Description		NPS		Code	Manufacturing/ Pressure Rating	Material & Standard		Design		NOTES								
		from	to															
Pipes	Pipe	1"	2"		seamless	L290NE	ČSN EN ISO 3183	ČSN EN ISO 3183										
		3"	10"		seamless	L290NE	ČSN EN ISO 3183	ČSN EN ISO 3183										
		12"	28"		long.welded	L360NE	ČSN EN ISO 3183	ČSN EN ISO 3183										
		32"	36"		long.welded	L415NE	ČSN EN ISO 3183	ČSN EN ISO 3183										
		40"	56"		long.welded	L485ME	ČSN EN ISO 3183	ČSN EN ISO 3183										
Flanges	Welding Neck Flanges	1"	10"		Forged / 600# RF	ASTM A350 LF2	ASTM A350	ASME B16.5										
		12"	24"		Forged / 600# RF	ASTM A350 LF2	ASTM A350	ASME B16.5										
		28"	36"		Forged / 600# RF	A694 Gr. F60	ASTM A694	ASME 16.47										
		40"	56"		Forged / 600# RF	A694 Gr. F70	ASTM A694	ASME 16.47										
	Blinds	1"	10"		Forged / 600# RF	ASTM A350 LF2	ASTM A350	ASME B16.5										
		12"	24"		Forged / 600# RF	ASTM A350 LF2	ASTM A350	ASME B16.5										
		28"	36"		Forged / 600# RF	A694 Gr. F60	ASTM A694	ASME 16.47										
		40"	56"		Forged / 600# RF	A694 Gr. F70	ASTM A694	ASME 16.47										

Attachment 6 Flow Scenario 1 (worst case)



Attachment 7 Flow Scenario 2

