



Application Notes

Date:

V-cone flowmeter

1993-11-23

Ref No:

93-21890/1 064

Application:

Exhaust gases from steel mill

Customer:

Mefos (Avesta-Sheffield steel mill), Avesta
Sweden

THE PROBLEM

Mefos "The Foundation for Metallurgical Research" is a research company for the Swedish steel industry which is one of the dominant industries in Sweden. In one of their projects assigned to them it was important for to measure flow for efficiency and enviromental reasons.

The flow meter should operate on hot exhaust gas from the AOD furnace with some contaminants at a temperature ranging from + 300 - + 800 °C in a pipe line of 1000 mm.

THE SOLUTION

Ansko which is the rep for the McCrometer V-cone flowmeter in Sweden was approached by Mefos for this application since the V-cone already had a good name in the steel industry on difficult applications like coke oven gas which is a very dirty gas. When McCrometer was approached they immediately informed that the V-cone had never been used for such hot applications and thus they would not give any guarantees for the meter nor did they at the time know what material to use.

Since the end customer Avesta is a world wide known supplier of stainless steel and special steels they informed that Avesta material 153MA would hold up for these extreme tempertures. Based on that information McCrometer quoted the 1000 mm inline V-cone but still only guaranteed the the meter for +350 °C also accepting the demand for extremely low differensial pressure at max flow i.e. full scale DP of 1.27 kPa.

The V-cone was shipped for this pilot project in a remarkably short time and installed at the Avesta steel mill plant with a support under the meter.

Ansko was given information back that the V-cone performed well but they needed some more information how to interpret the flow data obtained. Both Ansko and McCrometer had direct communications with the project manager to their full satisfaction.

Sometime later customer called to Ansko and told that they had discovered that their process conditions even had reached + 1100°C. The connecting pipes of another material than the V-cone had deformed but the meter was in good working condition. The deformed sections were replaced by sections made of 153MA and since then the this flowmeter has performed excellently.

V0040

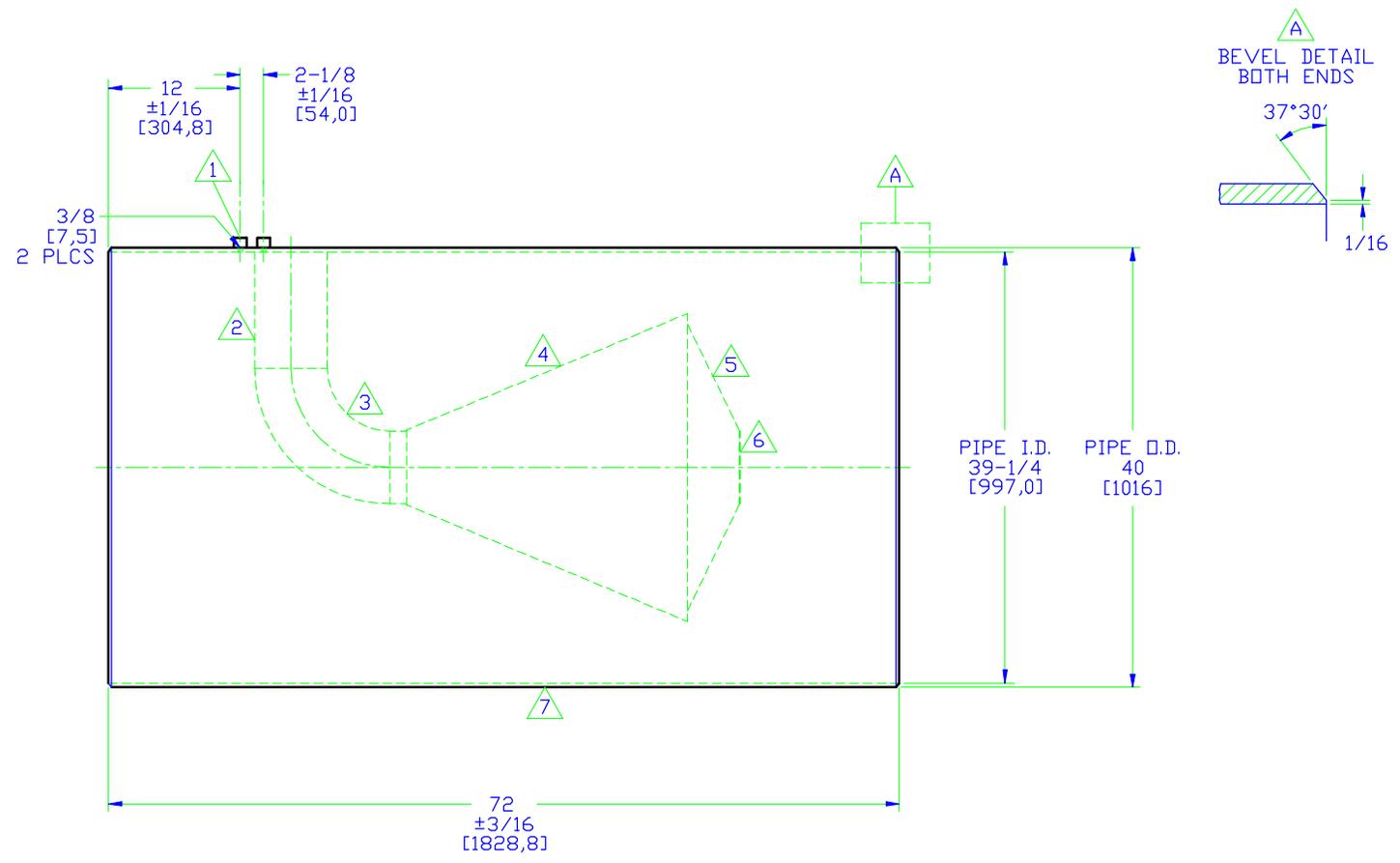
Customer	AVESTA SHEFFIELD
Project	
P.O. #	ANSKO SWEDEN #
Qty	1



DESC V-CONE 40" AVESTA 153MA W/ BEVELED ENDS		
DATE 1-30-1994	BY RNP	APP KIM LEWIS

V-Cone S/N	Tag #
94012506	

FILE V0040999



NOTES:

- 1. DIMENSIONS ARE SHOWN IN INCHES AND MILLIMETERS [...].
- 2. METER LIFTING EYES, FLOW DECAL, AND TAG ARE NOT SHOWN.

FLOW →

1	AVESTA 153MA	COUPLING 1/2 NPT 3000#	5	AVESTA 153MA	.
2	AVESTA 153MA	.	6	AVESTA 153MA	.
3	AVESTA 153MA	.	7	AVESTA 153MA	PIPE 40 SCH STD
4	AVESTA 153MA	.	8		

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V-Cone Sizing Program version 3.12 (11/94)

10/01/1997

file name:94012506

sized:03/10/1994

meter identification: 94012506 tag:
 application customer: MEFOS AVESTA
 V-Cone model number: V0000

fluid: Air/-gas- comments: _____

isentropic exponent: 1.368

Operating Conditions:

temperature: 350.000 C base T: 32.000 F, 0.000 C
 pressure: 0.050 barG base P: 14.691psiA, 1.013barA
 fluid mass: 0.594kg/m3 base Z: 1.000
 viscosity: 0.031 cP
 Z-factor: 1.000

Meter Specifications:

inside diameter: 39.400in
 cone diameter: 20.774in
 beta ratio: 0.8497
 Fa: 1.0131

turndown: 2.0to1 Cf: 0.6763

- Cf is estimated by prog. - PRELIMINARY APPLICATION SIZING ONLY!

Properties (238.900R(Tc) 548.700psiA(Pc) 28.914(Mw) 0.997(SG))

FLOWRATE (NCMH)	DIFF-PRESS (kPas)	Y-factor	VELOCITY (m/s)	REYNOLDS NUMBER	COEFFICIENT OF FLOW
60014.	1.2708	0.98413	46.0	8.8152e+05	0.67634
54007.	1.0228	0.98720	41.4	7.9328e+05	0.67634
51289.	0.92002	0.98847	39.4	7.5335e+05	0.67634
49091.	0.84118	0.98945	37.7	7.2107e+05	0.67634
47151.	0.77472	0.99028	36.2	6.9257e+05	0.67634
45367.	0.71616	0.99101	34.8	6.6637e+05	0.67634
43687.	0.66322	0.99167	33.5	6.4170e+05	0.67634
42079.	0.61454	0.99228	32.3	6.1808e+05	0.67634
40521.	0.56923	0.99284	31.1	5.9519e+05	0.67634
38998.	0.52667	0.99338	29.9	5.7282e+05	0.67634
37497.	0.48641	0.99388	28.8	5.5077e+05	0.67634
36008.	0.44813	0.99436	27.6	5.2891e+05	0.67634
34523.	0.41155	0.99482	26.5	5.0709e+05	0.67634
33033.	0.37646	0.99526	25.3	4.8521e+05	0.67634
31531.	0.34270	0.99568	24.2	4.6314e+05	0.67634
30007.	0.31012	0.99609	23.0	4.4076e+05	0.67634

sized by: _____, _____, approval: _____, _____

Ketema/McCrometer Division phone:(909) 652-6811 FAX: (909) 652-3078
 warnings: .high temp.