Gasunie Technical Standard

Material Specification Instrumentation

MSM-01-E

Instrument tubing and tube fittings
(material and sizing)

Version 18 *24-02-2025*

© Copyright
N.V. Nederlandse Gasunie
Postbus 19, 9700 MA Groningen (Netherlands)
Telephone +31 50 5219111

FOREWORD

This specification supersedes the seventeenth version of MSM-01-E.

With respect to the former version the following has been changed:
- Annex A: the header of table 4 has been changed.

Alterations are marked with a left margin line.

CONTENTS

SECTION NUMBERS CORRESPOND TO SECTION NUMBERS IN NEN EN 10216-5:2021:

1. SCOPE AND APPLICATION

This specification relates to:
- stainless steel seamless precision tubes, including couplings and fittings (twin ferrule and/or all thread types) in metric systems;
- the mounting and connection of instruments, equipment and ancillaries in high-pressure liquid and gas systems in Gasunie plants.

This specification applies under the following conditions:
- maritime conditions (from the shore till 40 km land inward), and
- non-maritime onshore conditions.

This specification applies to new projects, in which only metric seamless precision tubes and tube fittings shall be used.

In addition to table 1 the following media are applicable:
- (demi) water;
- helium;
- THT;
- oils.

1.1 Transport media

Table 1 indicates the transport media for which this specification is applicable.

Table 1: Transport media

Transport medium[1]	Natural gas	Hydrogen	Carbon dioxide	Nitrogen	(Hot) water	Ammonia
	Applicable	Applicable	Applicable	Applicable	Not judged[2]	Applicable

1 The table is based on suitability of the transport medium concerned.
The scope and media for which this specification is suitable are not automatically the same as the scope and media of underlying specifications. The scope and suitability for a medium are described for each specification.

2 Suitability shall be determined on the basis of an impact analysis. The requirements that do appear to be applicable shall be observed.

2. REFERENCES

This specification is subject to the requirements of the standards mentioned in this clause. Any supplements and errata notices are also applicable.

If the documents in this specification are mentioned with a date, this specific edition is applicable.

ANSI/ASME B 1.20.1	Pipe Threads, General Purpose (inch).
ASTM A 403/A 403M	Standard specification for wrought austenitic stainless steel piping fittings.
NEN-EN 10216-5[1] (April 2021)	Seamless steel tubes for pressure purposes - Technical delivery conditions; Part 5: Stainless steel tubes.
MSS-SP-99	Instrument valves.

[1] Depending on the country where the standard will be applied, DIN-EN or BS EN, for example, shall be chosen.

3. DEFINITIONS, ABBREVIATION AND SYMBOLS

In this specification the following definitions, abbreviations and symbols are applicable.

3.1 Definitions

Client	The person or persons who is/are responsible, on behalf of Gasunie, for supervising the fulfilment of the contract in general and the execution of the work in particular.
Fittings	Steel fittings and accessories required for connecting instrument tubes together and to equipment and/or ancillaries.
Service Provider	The party with whom the contract is or will be concluded.
Tube	Seamless steel precision tube with a maximum outside diameter of 25 mm for metric tubes.
Transport medium	A gaseous or liquefied substance that is transported by and/or stored in a Gasunie transport network; limited to: – natural gas; – hydrogen; – carbon dioxide; – nitrogen; – (hot) water; – ammonia. Note: Additives and other substances used in the medium or in the processes are therefore expressly outside the scope.

3.2 Abbreviation

THT	Tetrahydrothiofeen

3.3 Symbols

Symbol	Description	Unit
P	Pressure	bar (e)
T	Temperature	°C
WD	Wall thickness	mm

4. TUBE FITTINGS AND INSTRUMENTATION VALVES

4.1 Fittings

Client is standardised on stainless steel tube fittings of the following makes:
- "Hoke Gyrolok" tube fittings with twin (front and back) ferrules for stainless steel tube with an outside diameter of 3 mm, 6 mm and if applicable 10 mm;
- "Swagelok" tube fittings with twin (front and back) ferrules for stainless steel tube with an outside diameter of 12 mm, 16 mm and 25 mm.

All tube fittings shall be manufactured of stainless steel in accordance with ASTM A 403.

Tube fittings shall be used in combination with stainless steel tube as described in clause 5. All parts of the tube fittings, such as front and back ferrules and nuts, shall be of the same make as defined in this subclause.

Male and female connectors shall have NPT thread in one of the sizes given in table 2. NPT thread shall comply with ANSI B 1.20.1.

For connecting NPT thread to other sizes and thread types, Client is standardised on "Swagelok" brand tube and adapter fittings.

Table 2: NPT threads for stainless steel male and female connectors

Outside diameter of stainless steel tube	NPT thread (inch)
3 mm	$^1/_8$ or $^1/_4$
6 mm	$^1/_8$ or $^1/_4$
10 mm	$^1/_4$, $^3/_8$ or $^1/_2$
12 mm	$^1/_4$, $^3/_8$ or $^1/_2$
16 mm	$^1/_2$ or $^3/_4$
25 mm	1

4.2 Instrumentation valves

Instrumentation valves (needle, block and ball valves) which are included in the hook-up shall be in accordance with MSS-SP-99.

5. TUBES

5.1 Tube selection

Client is standardised on stainless steel tube; see table 3 for Gasunie article numbers.

The diameters and wall thicknesses to be used are listed in table 4.

5.2 General requirements

Seamless stainless steel tubes for pressure purposes shall be conform NEN-EN 10216-5:2021 and modifications and supplements as stated in this specification.

Sections not mentioned remain unaltered.

Additional requirements, which are not stated in NEN-EN 10216-5:2021, are indicated with "addition".

Sections of NEN-EN 10216-5:2021, which are not valid, are indicated with "deletion".

Requirements which are stated in NEN-EN 10216-5:2021, that shall be replaced, are indicated with "substitution".

Client choices are indicated as "choice".

The numberings and (sub)clauses in italics in this specification correspond to that in NEN-EN 10216-5:2021, where the subject is covered by that specification and any additional (sub)clauses are numbered sequentially.

5.3 Modifications and supplements to NEN-EN 10216-5:2021

SECTION 4 SYMBOLS AND ABBREVIATIONS (modification)

addition
HV – Vickers hardness
HRB - Rockwell hardness

SECTION 7 MANUFACTURING PROCESS

7.2.4

choice
The delivery condition is cold finished bright annealed (CFA).

SECTION 8 REQUIREMENTS

8.2.2 Product analysis

choice Tubes shall be of steel grades 1.4401- 1.4404- 1.4435 or 1.4436.

8.8.4.1 Tolerances on outside diameter and wall thickness

choice Tolerances classes D 4 and T 3 shall apply.

8.9 Hardness (additional subsection)

The maximum hardness shall be:

- HRB 80 (converted superficial Rockwell hardness), or
- HV 185.

SECTION 9 INSPECTION

9.3 Summary of inspection and verification testing

choice Test category 1 is applicable (see table 15).

SECTION 11 VERIFICATION TEST METHODS

11.12 Hardness test (additional subsection)

The applied hardness test shall be left to the manufacturer's discretion. The chosen test shall be recorded in the inspection document.

SECTION 14 COATING (ADDITIONAL SECTION)

Reference is made to annex A, Gasunie article no. 1271123, coated 3 mm tubing shall be PVC coated, black coloured with a coating thickness of 1,5 mm.

6. RATIONALE

(This clause is intended for the Client only)

MSM-01-E sets forth the requirements for material and sizing and CSM-01-E sets forth the requirements for installation and testing.

MSM-01-E and CSM-01-E shall be consulted to ensure correct connection with equipment and/or ancillaries. These specifications shall also be consulted when purchasing or installing equipment and/or ancillaries.

All tube may be delivered by Client and/or Service Provider in accordance with this specification. Tubes delivered by Service providers, need Client's inspection on certificates within the quality administration of the regarding project.

Table 4 is based on the following documents, so that a leak-tight connection is guaranteed at all times:

- Design calculations in accordance with NEN-EN 13480-3 (see documentation 1);
- MS-01-107 datasheet (see documentation 2);
- Hoke Twin ferrule tube fittings tubing data charts (see documentation 3).

7. DOCUMENTATION

(This clause is intended for the Client only.)

In this specification the following informational documentation applies:

1 NEN-EN 13480-3 " Metallic industrial piping - Part 3: Design and calculation".
2 MS-01-107 datasheet rev. "V, February 2023", Swagelok.
3 Hoke Twin ferrule tube fittings tubing data charts, rev. "79308ENG September 2022 APS3037".

ANNEX

A OUTSIDE DIAMETERS AND WALL THICKNESS (NORMATIVE)

Table 3: Outside diameters, wall thickness and article numbers

Outside diameter (mm)	Inside diameter (mm)	Wall thickness (WD) (mm)	Gasunie article no.
3	1	1	1271020
3	1	1	1271121 (coiled)
3	1	1	1271123 (polyvinyl coated 1,5 mm, coiled)
6	4	1	1271026
6	4	1	1271027 (coiled)
12	10	1	1271040
12	9	1,5	1271132
12	8	2	1271135
16	13	1,5	1271060
16	12	2	1271137
25	20	2,5	1271130

Table 4: Tube selection for all gas and liquid applications

ONSHORE INSTALLATIONS

Pressure [bar (e)] / Temperature [C°]	***P* ≤ 80**	**80 < *P* ≤ 200**	**200 < *P* ≤ 300**
T < 200	3 / 6 / 12 mm *WD* = 1 16 mm WD 1,5/25 mm WD 2,5	3 / 6 mm *WD* 1 12 mm WD 1,5/16 mm *WD* 2 25 mm WD 2,5	3 mm *WD* 1 12 mm *WD* 2 / 16 mm *WD* 2,5
200 ≤ *T* < 250		3 / 6 mm WD 1 12 mm *WD* 1,5/16 mm WD 2	