

Gasunie Technical Standard

Material Specification
Instrumentation

MSM-01-E

**Instrument tubing and tube
fittings**
(material and sizing)

External

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N.V. Nederlandse Gasunie

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MSM-01-E

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This specification is drawn up by the Gasunie department
"Operations & Projects; Techniek - Electro en Instrumentatie"
(Operations & Projects; Technology - Electrical and Instrumentation).

The specification may be distributed to suppliers and contractors.

Issued by Gasunie department "Document Management".

FOREWORD

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

With respect to the former version the following has been changed:

- clause 1: footnote according standard materials has been changed;
- Annex A: Description similar to manufacturer's description.

Alterations are marked with a left margin line.

For tubes this specification is to be read in conjunction with the European standard EN 10216-5:2013.

MSM-01-E sets forth the requirements for material and sizing and [CSM-01-E](#) sets forth the requirements for installation and testing.

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1. SCOPE AND APPLICATION

This specification relates to stainless steel seamless precision tubes, including couplings and fittings in metric systems.

This specification relates to the mounting and connection of instruments, equipment, ancillaries and the like in high-pressure liquid and gas systems in Gasunie plants.

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

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.

This specification refers to materials which have been standardised within Gasunie. Other makes and/or types are not permitted¹.

¹

Concerning alternatives, it has to be demonstrated that these are at least equivalent in terms of functionality and costs.

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.
EN 10216-5 (December 2013)	Seamless steel tubes for pressure purposes - Technical delivery conditions; Part 5: Stainless steel tubes.
MSS-SP-99	Instrument valves.

3. DEFINITIONS

In this specification the following definitions are applicable:

Fittings	Steel fittings and accessories required for connecting instrument tubes together and to equipment and/or ancillaries.
Tube	Seamless steel precision tube with a maximum outside diameter of 16 mm for metric tubes.

4. TUBE FITTINGS

4.1 Fittings

Gasunie 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 and 6 mm;
- "Swagelok" tube fittings with twin (front and back) ferrules for stainless steel tube with an outside diameter of 12 mm and 16 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 preferred sizes given in table 1. NPT thread shall comply with [ANSI B 1.20.1](#).

No other sizes or thread types shall be used for male and female connectors with the exception of equipment where such connections are not available.

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

Table 1: Preferred NPT threads for stainless steel male and female connectors

Outside diameter of stainless steel tube	Preferred NPT thread (inch)
3 mm	$\frac{1}{8}$ or $\frac{1}{4}$
6 mm	$\frac{1}{8}$ or $\frac{1}{4}$
10 mm	$\frac{1}{4}$, $\frac{3}{8}$ or $\frac{1}{2}$
12 mm	$\frac{1}{4}$, $\frac{3}{8}$ or $\frac{1}{2}$
16 mm	$\frac{1}{2}$ or $\frac{3}{4}$

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 General requirements

Seamless stainless steel tubes for pressure purposes shall conform to [EN 10216-5:2013](#) and modifications and supplements as stated in this specification.

Sections not mentioned remain unaltered.

Additional requirements, which are not stated in [EN 10216-5:2013](#), are indicated with "addition".

Sections of [EN 10216-5:2013](#), which are not valid, are indicated with "deletion".

Requirements which are stated in [EN 10216-5:2013](#), that shall be replaced, are indicated with "substitution".

Gasunie choices are indicated as "choice".

The numberings and (sub)clauses in italics in this specification correspond to that in [EN 10216-5:2013](#), where the subject is covered by that specification and any additional (sub)clauses are numbered sequentially.

5.2 Modifications and supplements to EN 10216-5:2013

SECTION 4 **SYMBOLS AND ABBREVIATIONS** (*modification*)

addition	HV – Vickers hardness HRB - Rockwell hardness
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SECTION 7 **MANUFACTURING PROCESS**

choice	7.2.4 The delivery condition is cold finished bright annealed (CFA).
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SECTION 8 **REQUIREMENTS**

choice	8.2 <i>Chemical composition</i> Tubes shall be of steel grades 1.4401, 1.4404, 1.4435 or 1.4436.
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choice	8.8.4.1 <i>Tolerance on outside diameter and wall thickness</i> Tolerances classes D 4 and T 3 shall apply.
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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, article 12.71.123, coated 3 mm tubing shall be PVC coated, black coloured with a coating thickness of 1,5 mm.

ANNEX**A OUTSIDE DIAMETERS AND WALL THICKNESS (informative)**

Table 2: Outside diameters and wall thickness

Outside diameter (mm)	Inside diameter (mm)	Wall thickness (mm)	Gasunie article no.
3	1	1	12.71.020
3	1	1	12.71.121 (coiled)
3	1	1	12.71.123 (polyvinyl coated 1,5 mm, coiled)
6	4	1	12.71.026
6	4	1	12.71.027 (coiled)
12	10	1	12.71.040
16	13	1,5	12.71.060