

**Odorisation of Natural Gas**

COUNTRY	LEGAL				REQUIREMENTS SPECIFIED	ODORISATION CONTROL		
	Odourisation required Transport (T) Distribution (D)	Level of concentration required	Control required	Environmental permit	STANDARDS OR CODES	Where Transport (T) Distribution (D)	Frequency continuous (CI) period. inspect. (P)	How analytical olfactory
<b>F</b>	Yes - (T)	No	Yes	Yes	code GDF	T	CI.	analyt.
<b>D</b>	Yes (T,D) <sup>(1)</sup>	Yes	Yes	Yes (handling substance)	DVGW G 280-1 EN ISO 13734	T,D	CI - P	analyt.- olf.
<b>B</b>	Yes - (D) <sup>(2)</sup>	No	Yes	Yes	code ARGB	D/T <sup>(2)</sup>	CI - P	analyt - olf.
<b>I</b>	Yes - (D)	Yes <sup>(5)</sup>	Yes	Yes	UNI CIG 7133 <sup>(6)</sup> UNI CIG 9463 Dir 236/00 AEEG	D	6 months	analyt - olf.
<b>DK</b>	Yes - (D)	Yes	Yes	Yes	DVGW G 280 GR-A (Danish Gas Code)	D	CI - P	analyt.
<b>A</b>	Yes - (D)	Yes	Yes	Yes (transport)	ÖVGW G 79	D	CI - P	analyt.
<b>NL</b>	Yes (D)	No	No	Yes	NEN 1059 NEN 1091	T	CI	analyt.
<b>NO</b>	Yes - (D)	Yes	Yes	Yes	No	D	P	analyt.
<b>UK</b>	Yes <sup>(3)</sup> (T) (D)	No	Yes	Yes	Safety regulation 1996	(T) D <sup>(3)</sup>	CI - P	Olf <sup>(4)</sup> - analyt
<b>CH</b>	Yes T/D	Yes	Yes	No	SVGW G 11	D / T	P / 3months	analyt.
<b>E</b>	Yes - (T/D)	Yes	No	No	NTGS Code	T	CI - P	analyt.
<b>IRL</b>	Yes - (T/D)	No	Yes	Yes	Gas Act	T/D	CI	Analyt.
<b>SK</b>	Yes - (D)	Yes	Yes	No	STN 38 5550, TPP 918 01	(T) D	CI - P, 6-months	analyt. - olf.
<b>CZ</b>	Yes - (T,D)	No	Yes	Yes	TPG 91801, TPG 90501, G280	T,D	P / 6 months	analyt - olf.

- (1) The German law refers to DVGW codes or equivalent; odorisation in transport systems is optional
- (2) Transmission if required by the Authorities (permit)
- (3) UK : from 1998 must odourise 7bar and below. National Transmission System is not odourised (>35bar). Regional Transmission Systems are odourised.
- (4) UK: Olfactory is primary method
- (5) I: Directive 236/00 from AEEG (Regulatory body) considers only "positive controls" referred to UNI 7133
- (6) I: Recently re-issued as part of the National Safety Law for gas (Law 1083/71)

Note : Basic Safety Requirement in all countries :  
 The concentration of odorant in natural gas will be such to achieve the alert olfactory degree 2 on the scale of Sales, which corresponds to a gas leak of 1 % natural gas concentration into the air (equivalent to 20 % of LEL).

COUNTRY	At which point odorants are injected	Odorant	Classification Flammable (F) - Toxic (T) Irritant (I) Harmful (H)	Concentration mg/Nm <sup>3</sup> practical nominal (min-max)	Injection system	Users receiving odorized gas	By exception non-odorized
F	HP 30 → 80 bar	THT	F	25 (15-40)	Electronic Pump	Dom. Com. Ind.	Industry Dedicated pipe I
D	HP 16→70 bar City gate 0 →16 bar	THT TBM + EM Different Spotleak and Sentinel types Gasodor S-Free	F+H F+I F+I	16-20 (10 min) 5-8 min 5-8 min  12-16	Electronic Pump	Dom. Com. ind.	Industry
B <sup>(1)</sup>	City gate 0 →15 bar	THT Sentinel E	F+T F	20 (17-34) T(18-30) <sup>(1)</sup> 6 (5,4 - 7,1)	Electronic Pump	Dom. Com. Ind <sup>(1)</sup>	Industry
I	City gate 0 → 24 bar	Spotleak 2323/ Sentinel 50 THT Sentinel E	F+I  F+H F+I	4 (min)  32 (min) 8 (min)	Electronic Pump <sup>(5)</sup>  Electronic pump bypass	Dom. Com. Ind.	Industry
DK	Transmission 19 → 40 bars	THT	F+H	10 - 18 <sup>(2)</sup>	Electronic pump	Dom. Com. Ind.	No
A	City gate 0 → 25 bar	THT TBM + EM	F+H F+H	7,5 3	electronic pump bypass	Dom. Com. Ind.	Industry
NL	HP 40 →66,2 bar	THT	F	18 (10-36)	electronic pump	Dom. Com. Ind.	Industry Dedicated Pipe
NO	4 bar	THT	F	12-15	Electronic Pump	Dom. Com. Ind.	Industry
UK	Leaving National Transmission <sup>(3)</sup>	TBM+DMS <sup>(4)</sup>	F+T	(6-8)	gas powered pump	Any after injection <sup>(3)</sup> . D must be.	Any before injection <sup>(3)</sup>
CH	HP	THT	F+T	(15-30)	electronic pump bypass	Dom. Com. Ind.	some Industry
E	HP + re-odorisation Distribution	THT	F	22	electronic pump	Dom. Com. Ind.	No
IRL	Entering Transm.Systems	TBM DMS	F&I	6-8	Electronic pump	Dom, Com, Ind.	No
SK	0 – 40 bar	THT	F+H	8 - 22	electronic pump bypass	Dom. Com. Ind.	some Industry
CZ	0 →40 bar	THT TBM + DMS Sentinel F35 Spotleak 1005	F+H	9-22 4-8	electronic pump bypass	Dom. Com. Ind.	Industry

<sup>(1)</sup> if required by the Authorities (permit)

<sup>(2)</sup> at the injection system

<sup>(3)</sup>:UK: from 1998, exit from NTS, above 7bar. Legally agreed injection points

<sup>(4)</sup> UK: 80% TBM + 20% DMS, similar to Sentinel F80

<sup>(5)</sup> I: bypass admitted for small and new grids

In blue the updated situation

**DEFINITIONS**

<b>Scentinel E</b> or <b>Spotleak 1009</b>	<b>THT</b>	Tetrahydrothiophene			
	<b>EM</b>	Ethyl – Mercaptan			
	<b>TBM</b>	Tertiary Butyl Mercaptan	76 %		
	<b>+ IPM</b>	Isopropyl Mercaptan	16 %		
	<b>+ NPM</b>	Normal Propyl Mercaptan	8 %		
	<b>BE</b>	Diethylsulfide	+ TBM	+ EM	
		72 %	+ 22 %	+ 6 %	

**Scentinel x** (product name Chevron) : mixtures of THT, TDM, IPM, DMS, NPM

**Spotleak x** (product name Arkema): mixtures of THT, TDM, IPM, DMS, NPM

**Gasodor S-Free**: Ethylacrylat (66%), Methylacrylat (32%), 2-Ethyl-3-Methylpyrazin