2012 台灣氧氣使用安全國際研討會

Oxygen Safety Seminar 2012 Taiwan

行政院勞工委員會

台灣區高壓氣體工業同業公會

Asia Industrial Gases Association

國立臺北科技大學

Standards for Oxygen

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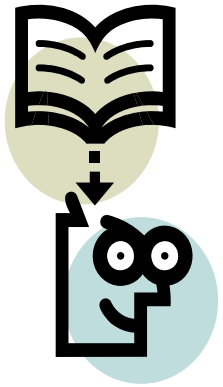
He has been working with oxygen system installations and maintenance activities for customer stations since 2004.

Michael graduated in 1986 from Chiao Tung University with a master degree in Mechanical Engineering.

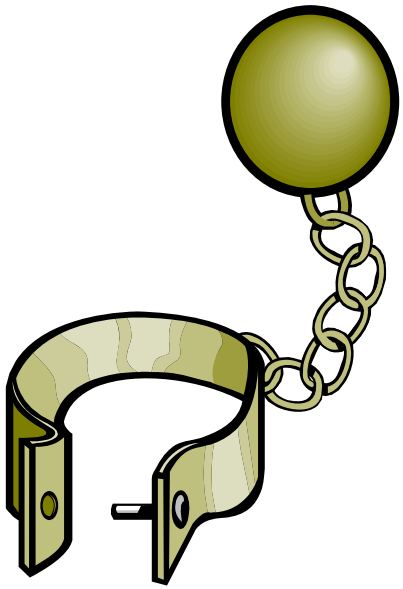
Introduction 簡介

- ✓The differences between type of documents ISO, EIGA, CGA
- ✓How to find the right document
- ✓Examples of documents

Differences between documents

Legislation	Standards	Industry Codes
Regulations	ISO/EN	EIGA/CGA
	 	
PED/TPED	**ISO15001**	**EIGA 13 (AIGA 21)**

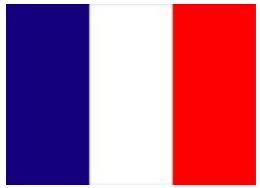
Documents and the law



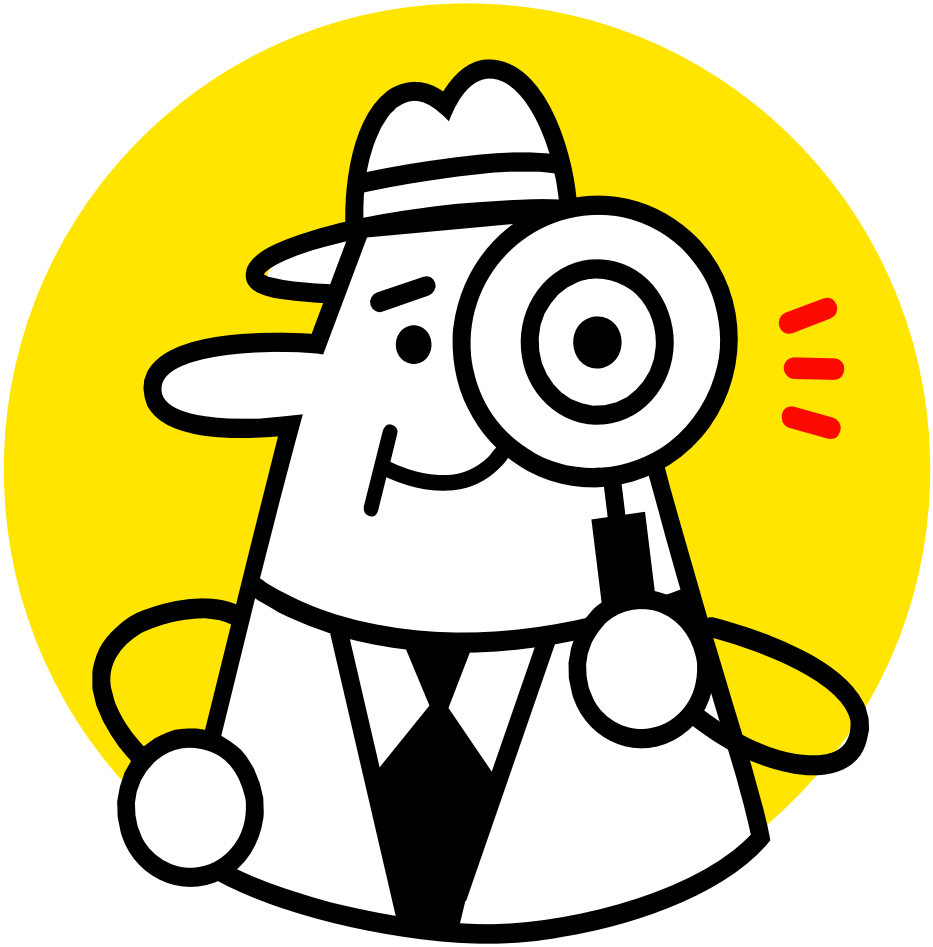
Oxygen and documents

Legislation and regulation	-	Little
Standards	-	Some
Industry codes / Guidance	-	LOTS

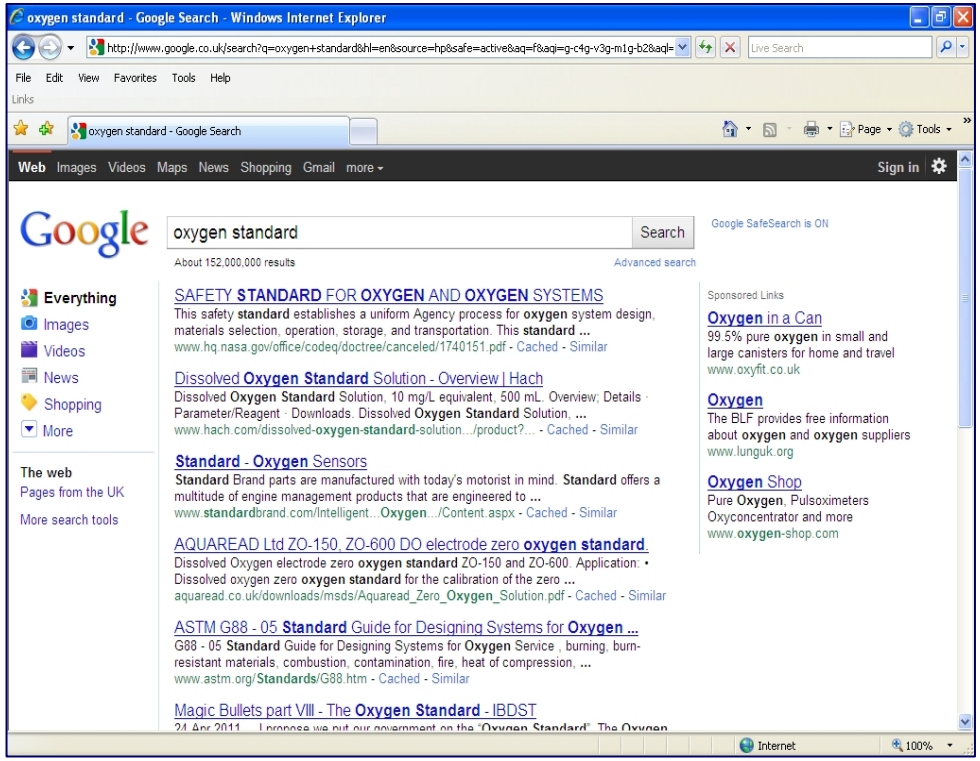
Harmonisation (EIGA,CGA, AIGA)



Finding a standard



Google “Oxygen Standard”



- **152,000,000 hits**
- **A lifetimes work to read them all**
- **Five times as many as obtained for “nitrogen standard”**

EIGA, CGA, ISO, EN et al

EIGA, CGA, AIGA, BCGA
ISO, EN, ADR, NFPA, NEC
BAM, ASTM

EIGA, CGA, ISO, EN et al "oxygen"

	Hits
EIGA	150
CGA	95
ISO	605
EN	958
ASTM	3486
BAM	200+

Lists

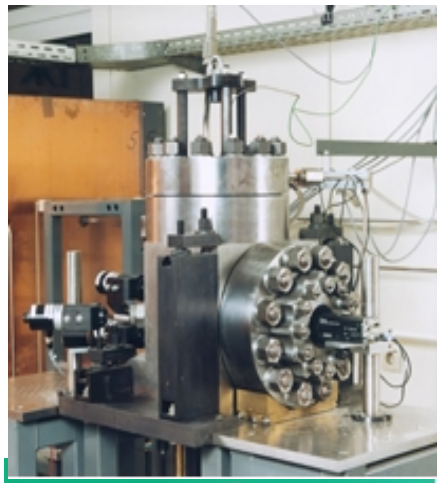
References and citations

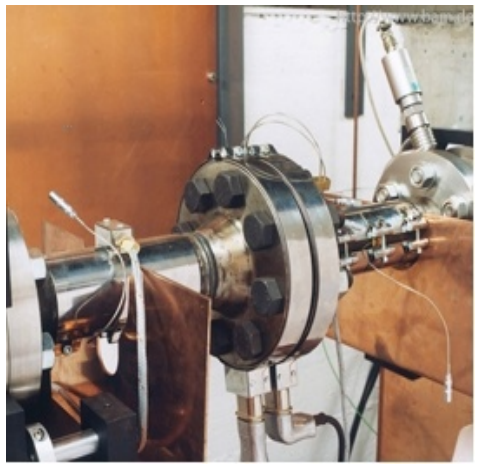
Examples of documents

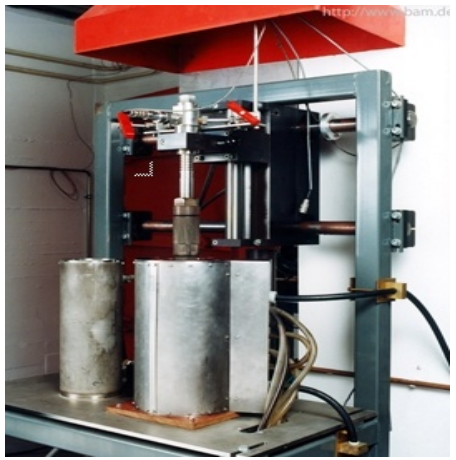
- Data creation and data
- Engineering guidance, codes of practice
- Business or subject specific

Data creation

ASTM G124	Promoted Combustion
D4809	Heat of combustion
D2863	O_2 index
G72	Auto Ignition
G86	Mechanical Impact
G74	Pneumatic impact







Data documents:

ASTM, NFPA, BAM, ISO

ASTM MNL36

Safe use of oxygen and Oxygen Systems

ASTM series

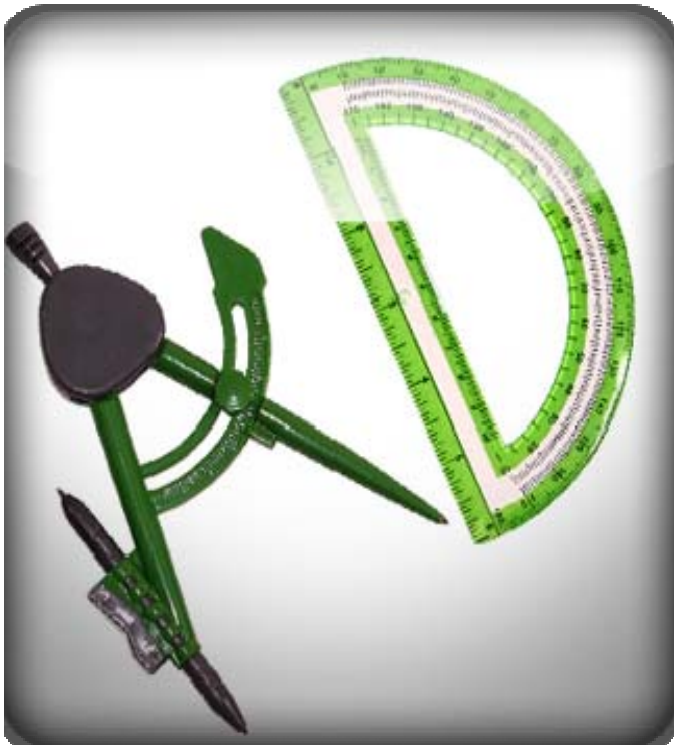
Flammability and Sensitivity of Materials in Oxygen Enriched Environments

NFPA 53 etc.

Oxygen enriched atmospheres

Guidance

- **EIGA, CGA, AIGA etc.**



EIGA Doc.13 (= CGA G4.4, AIGA 021/12)

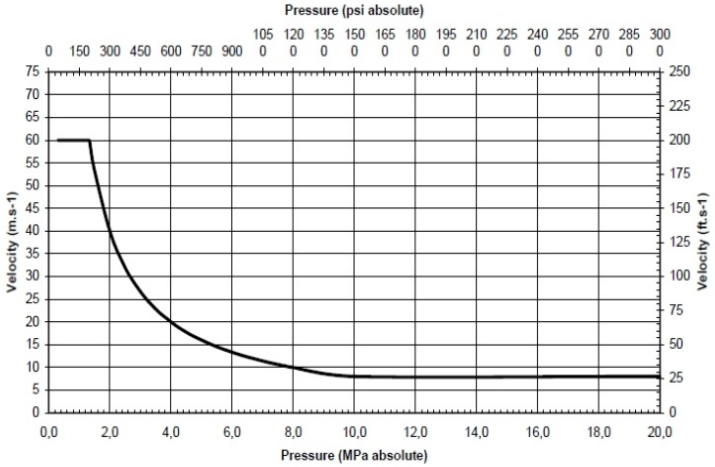


Figure 2: Non Impingement Velocity Curve

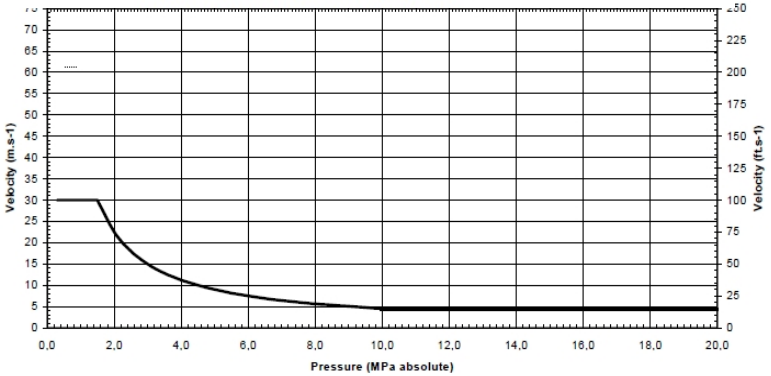


Figure 1: Impingement Velocity Curve

IGC DOC 13/02

Appendix D : Table of Exemption Pressures and Minimum Thicknesses

ENGINEERING ALLOYS	MINIMUM THICKNESS	EXEMPTION PRESSURE*
Brass Alloys**	None Specified	21 MPa (3000 psig)
Cobalt Alloys		
Stellite 6	None Specified	3.6 MPa (500 psig)
Stellite 6B	None Specified	3.6 MPa (500 psig)
Copper**	None Specified	21 MPa (3000 psig)
Copper- Nickel Alloys**	None Specified	21 MPa (3000 psig)
Ferrous Castings, Non Stainless		
Gray Cast Iron	3.18 mm (0.125")	0.27 MPa (25 psig)
Nodular Cast Iron	3.18 mm (0.125")	0.45 MPa (50 psig)
Ni Resist Type D2	3.18 mm (0.125")	2.2 MPa (300 psig)
Ferrous Castings, Stainless		
CF-3/CF-8,CF-3M/CF-8M,CG-8M	3.18 mm (0.125")	1.4 MPa (200 psig)
CF-3/CF-8,CF-3M/CF-8M,CG-8M	6.35 mm (0.250")	2.0 MPa (290 psig)
CN-7M	3.18 mm (0.125")	2.6 MPa (375 psig)
CN-7M	6.35 mm (0.25")	3.6 MPa (500 psig)
Nickel Alloys		
Hastelloy C-276	None specified	5.3 MPa (750 psig)
Inconel 600	None specified	6.9 MPa (1000 psig)
Inconel 625	3.18 mm (0.125")	8.7 MPa (1250 psig)
Inconel X-750	None specified	6.9 MPa (1000 psig)
Monel 400	None specified	21 MPa (3000 psig)
Monel K-500	None specified	21 MPa (3000 psig)
Nickel 200	None specified	21 MPa (3000 psig)
Stainless Steels, Wrought		
304/304L, 316/316L, 321, 347	3.18 mm (0.125")	1.4 MPa (200 psig)
304/304L, 316/316L, 321, 347	6.35 mm (0.250")	2.0 MPa (290 psig)
Carpenter 20 Cb-3	3.18 mm (0.125")	2.6 MPa (375 psig)
410	3.18 mm (0.125")	1.8 MPa (250 psig)
430	3.18 mm (0.125")	1.8 MPa (250 psig)
X3 NiCrMo 13-4	3.18 mm (0.125")	1.8 MPa (250 psig)
17-4PH (aged)	3.18 mm (0.125")	2.2 MPa (300 psig)
Tin Bronzes	None Specified	21 MPa (3000 psig)

* Exemption Pressure is the maximum pressure not subject to velocity limitations in high purity oxygen (nominal 99.7 %) where particle impingement may occur.
** Cast and wrought Mill Forms.
Note: This list does not include all possible exempt materials. Other materials may be added based on the results of testing as described in 4.2.1.

EIGA Doc.13 (= CGA G4.4, AIGA 021/12)

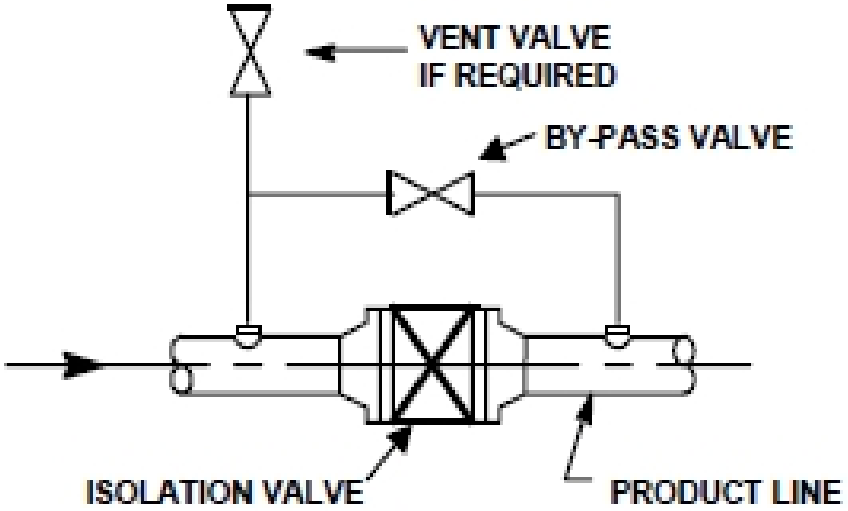
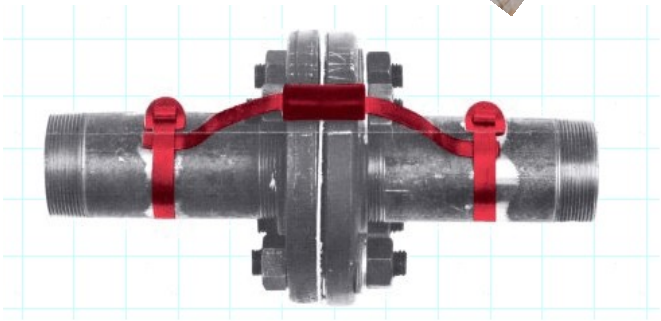


Figure 3: By-pass installation

EIGA Doc.13 (= CGA G4.4, AIGA 021/12)



Cleaning

SAE-AIR	1176A
SAE-AIR	1176A
ASTM	G93
ASTM	G127
ASTM	G131
CGA	G4.1
CGA	O2DIR2000
EIGA	Doc. 33 (AIGA 12/04)
ISO	15001
ISO	23208
BCGA	TR3

Policies and Position Papers

CGA	PS1
CGA	PS13
CGA	PS15
CGA	PS19
CGA	SB2
CGA	SB31
CGA	SPE
EIGA	Doc. 04= **AIGA 008/11**
EIGA	NL 79
EIGA	PP 14

Medical

CGA	SB31
EIGA	Doc. 73 = **AIGA 59/09**
EIGA	Doc. 89
EIGA	Doc. 93 = **AIGA 64/09**
EIGA	Doc. 98
EIGA	Doc. 104
EIGA	Doc. 128
EIGA	NL 71
ISO	8359
ISO	15001
CNIS	GB 8982-88
CNIS	GB 12130-95
CNIS	GB/T 8986-88

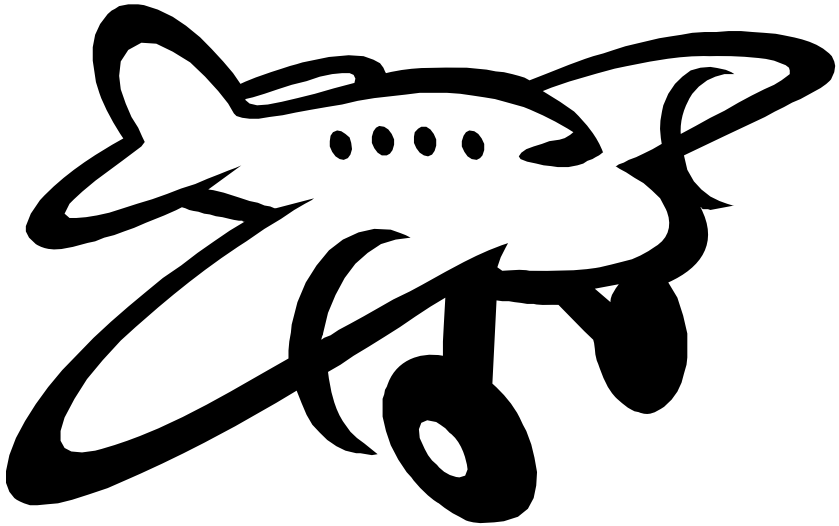
Medical – EIGA Doc.128 example

Design & operation of vehicles for medical oxygen homecare deliveries

Aerospace (and space)

SAE-AIR	1176A
SAE-AIR	171C
SAE-AIR	505
SAE-AIR	822A
SAE-AIR	825B
SAE-AIR	847
SAE-AIR	1059A
SAE-AIR	1069
SAE-AIR	1176A
SAE-AIR	1223
SAE-AIR	1389
SAE-AIR	1390
SAE-AIR	1392
SAE-ARP	433
SAE-ARP	1109B
SAE-ARP	1320A
SAE-ARP	1398
SAE-ARP	1532A
SAE-AMS	3012
SAE-AS	452A
SAE-AS	861
SAE-AS	916B
SAE-AS	1046B

SAE-AS	1065
SAE-AS	1066A
SAE-AS	1214A
SAE-AS	1224B
SAE-AS	1225A
SAE-AS	1248A
SAE-AS	1303A
SAE-AS	1304A
SAE-AS	8010B
SAE-AS	8026A
SAE-AS	8027
SAE-AS	8047
SAE-AS	1046B
CGA	P8.2
CGA	P31
CGA	P35
CGA	SB9
ISO	8775
ISO	14624-4
ISO	14951-1
CNIS	GB 8983-88
CNIS	GB 16993-97



Thank you

Original Presentation by
Daniel Tregear (AP)
at EIGA 2012 Meeting

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