

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

氧氣系統相關的標準

By Michael Lin
Air Products

Michael Lin

林仲甫

Michael Lin joined Air Products in 2004 and is currently the *Regional Manager of Customer Engineering Asia*. 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
各個氧氣系統相關文件的使用, 例如 ISO, EIGA, CGA 等等
- ✓ How to find the right document
如何找到你所要的文件
- ✓ Examples of documents
氧氣相關文件的清單

Differences between documents

各個氧氣系統相關文件

Legislation

法規

Regulations



PED/TPED

Standards

標準

ISO/EN

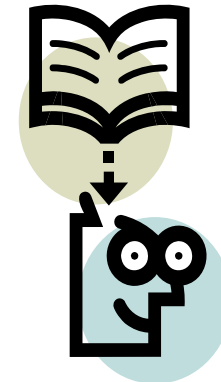


ISO15001

Industry Codes

工業規範

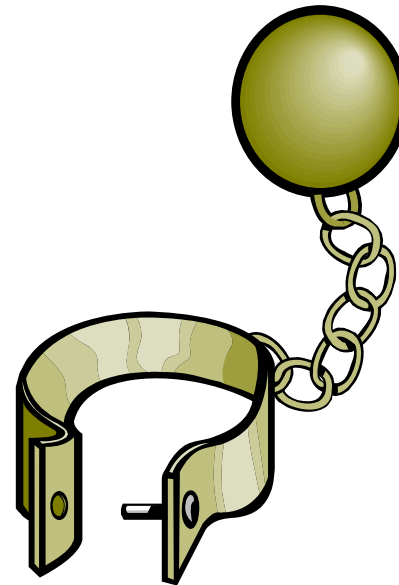
EIGA/CGA



EIGA 13 (AIGA 21)

Documents and the law

文件與法律



Oxygen and documents

氧氣系統與文件

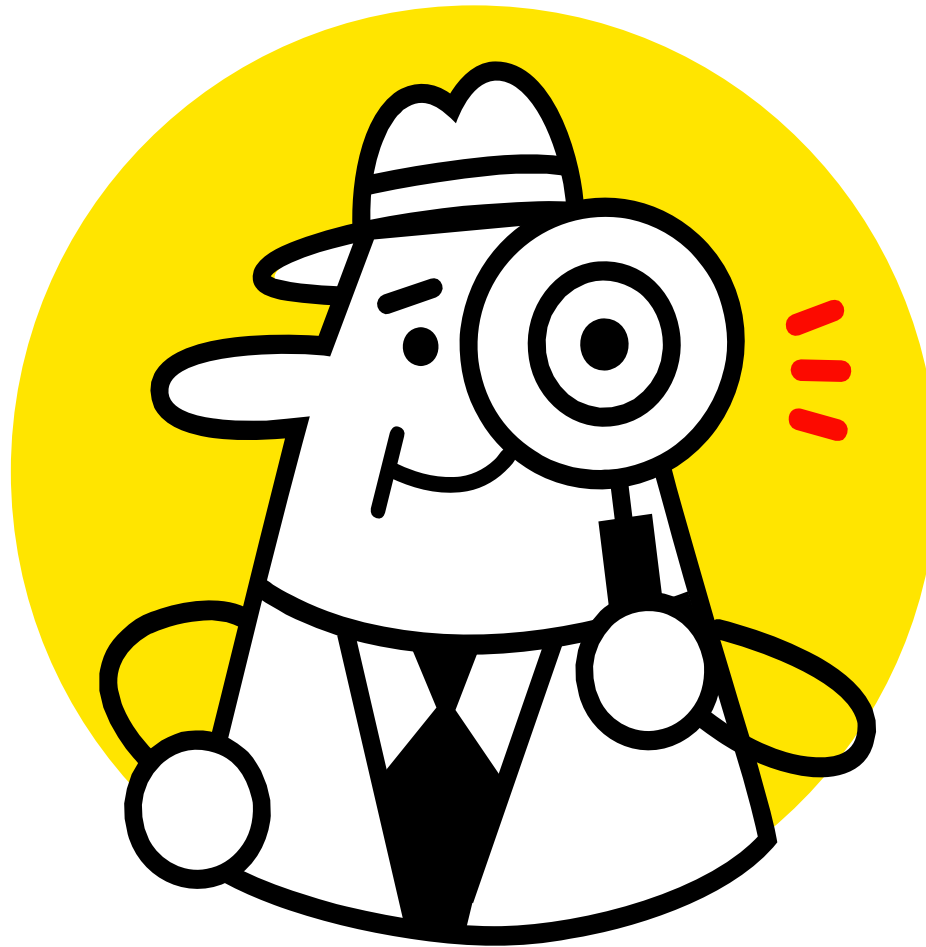
Legislation and regulation 立法與法規	-	Little 少許
Standards 標準	-	Some 一些
Industry codes / Guidance 工業規範 / 準則	-	LOTS 很多



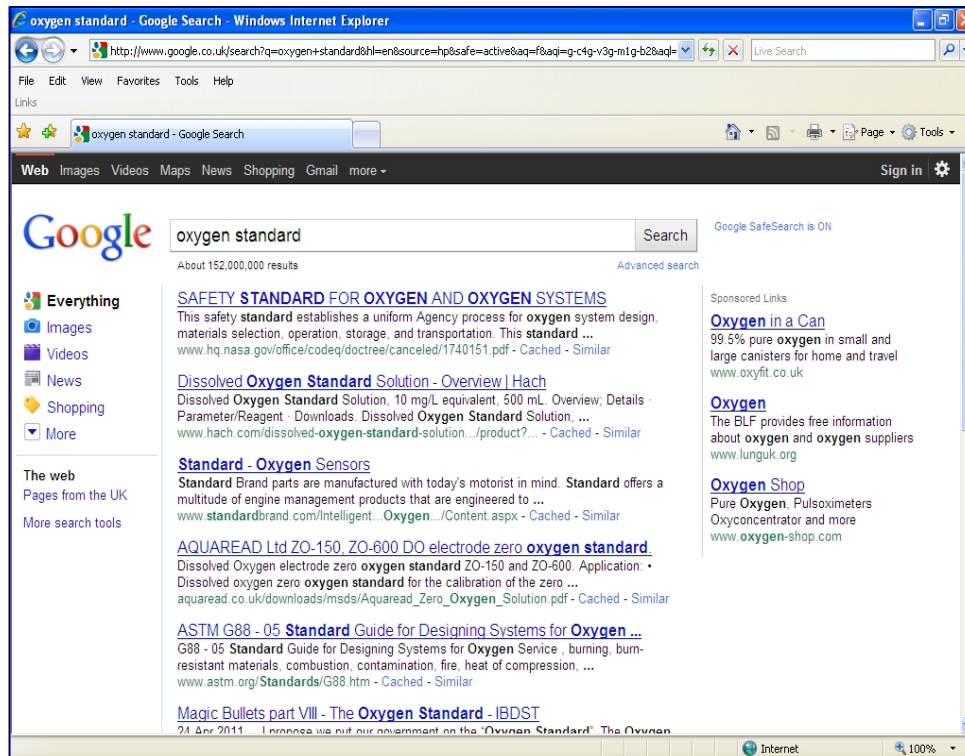
Harmonisation 調和化 (EIGA, CGA, AIGA)



Finding a standard 找到一份標準書



Google “Oxygen Standard” 用谷歌搜尋“氧氣標準”



- 152,000,000 hits
152,000,000 筆
- A lifetimes work to read them all
一輩子也讀不完
- Five times as many as obtained for “nitrogen standard”
是搜尋“氮氣標準”結果的5倍之多

EIGA, CGA, ISO, EN et al 提供氧氣相關標準的網站

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

EIGA, CGA, ISO, EN et al 在底下網址用”oxygen”搜尋

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

Lists

氧氣相關文件的清單



References and citations

參考文件與引用資料



Examples of documents 氧氣相關文件的清單

- ☐ Data creation and data
數據資料的建立
- ☐ Engineering guidance, codes of practice
工程設計準則, 實務規範
- ☐ Business or subject specific
產業或特定範圍所使用的規範

Data creation 數據資料的建立

ASTM
G124 Promoted
Combustion

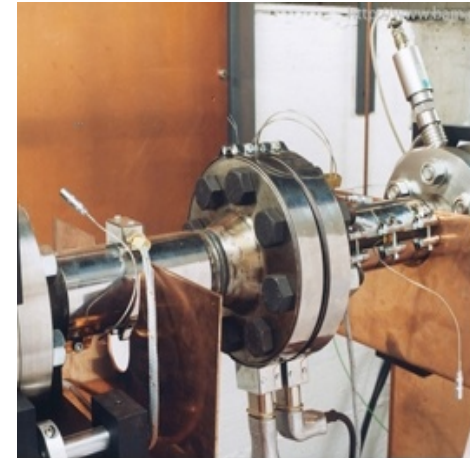
D4809 Heat of
combustion

D2863 O₂ index

G72 Auto Ignition

G86 Mechanical
Impact

G74 Pneumatic
impact



Data documents 數據相關的文件

ASTM, NFPA, BAM, ISO

ASTM MNL36

Safe use of oxygen and Oxygen Systems

ASTM series

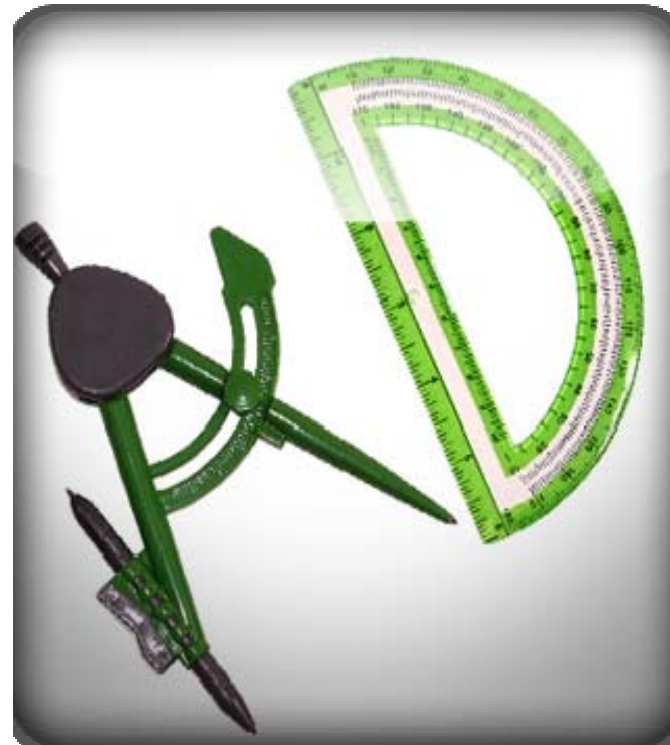
Flammability and Sensitivity of Materials in
Oxygen Enriched Environment

NFPA 53 etc.

Oxygen enriched atmospheres

Guidance 設計準則

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



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

配管設計 – 材料選擇

IGC

DOC 13/02

Appendix D : Table of Exemption Pressures and Minimum Thicknesses

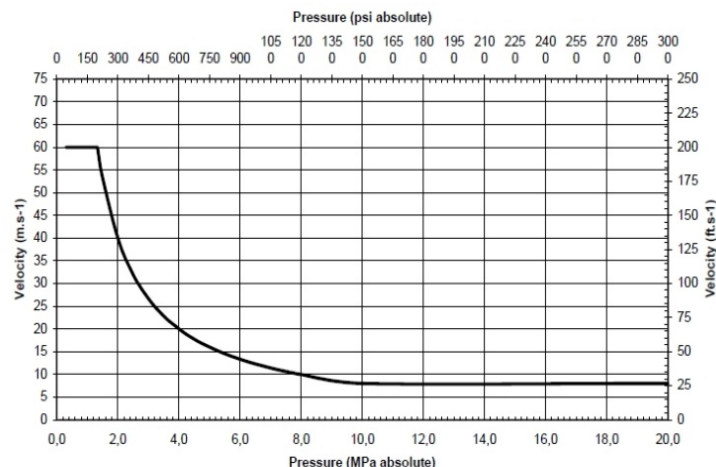


Figure 2: Non Impingement Velocity Curve

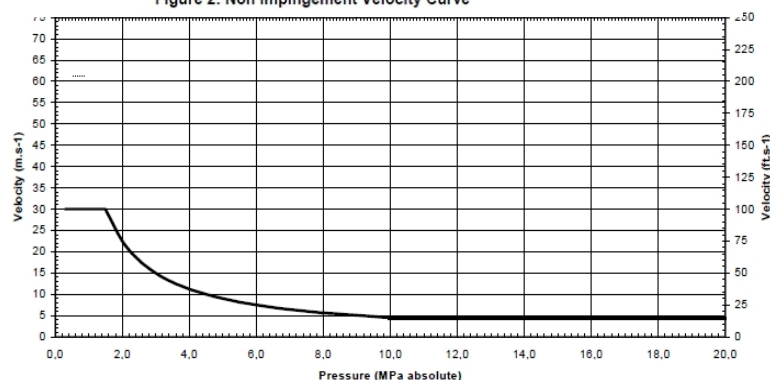


Figure 1: Impingement Velocity Curve

ENGINEERING ALLOYS	MINIMUM THICKNESS	EXEMPTION PRESSURE*
Brass Alloys**	None Specified	21 MPa (3000 psig)
Cobalt Alloys	None Specified	3.6 MPa (500 psig)
Stellite 6	None Specified	3.6 MPa (500 psig)
Stellite 5B	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)

旁通閥 – 均壓

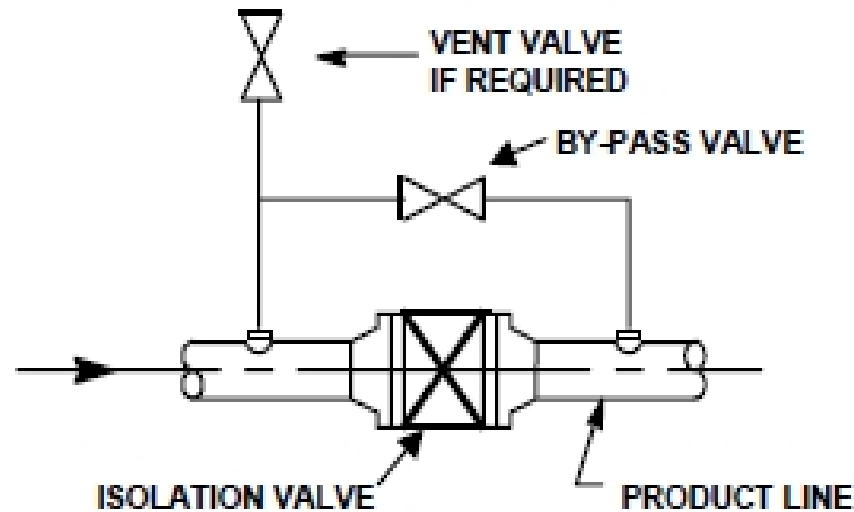
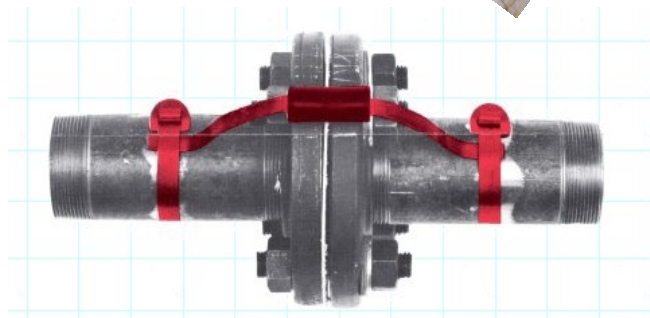


Figure 3: By-pass installation

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

法蘭跨接 – 地上轉入地下配管



Cleaning 氧氣清潔

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

政策與氣體工業共識

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 醫療

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

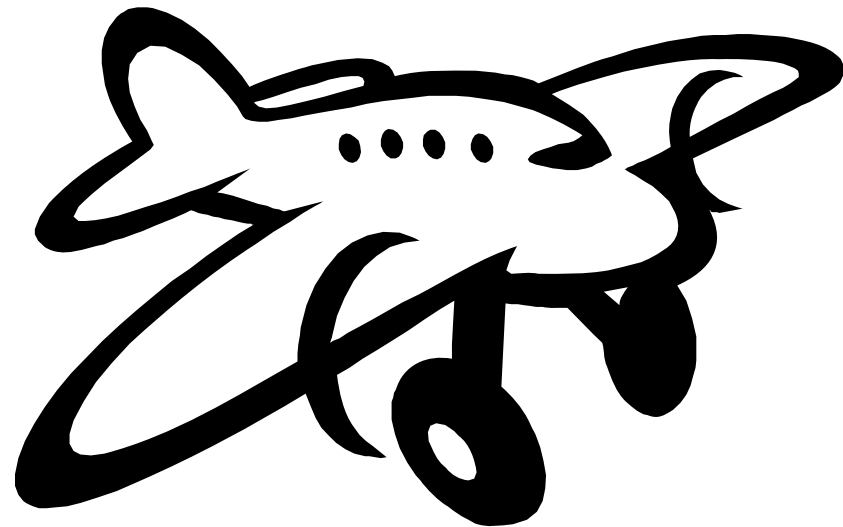
醫療 – EIGA #128 文件 - 例子



**Design & operation of vehicles for medical
oxygen homecare deliveries**

Aerospace (and space) 太空

SAE-AIR	1176A	SAE-AS	1065
SAE-AIR	171C	SAE-AS	1066A
SAE-AIR	505	SAE-AS	1214A
SAE-AIR	822A	SAE-AS	1224B
SAE-AIR	825B	SAE-AS	1225A
SAE-AIR	847	SAE-AS	1248A
SAE-AIR	1059A	SAE-AS	1303A
SAE-AIR	1069	SAE-AS	1304A
SAE-AIR	1176A	SAE-AS	8010B
SAE-AIR	1223	SAE-AS	8026A
SAE-AIR	1389	SAE-AS	8027
SAE-AIR	1390	SAE-AS	8047
SAE-AIR	1392	SAE-AS	1046B
SAE-ARP	433	CGA	P8.2
SAE-ARP	1109B	CGA	P31
SAE-ARP	1320A	CGA	P35
SAE-ARP	1398	CGA	SB9
SAE-ARP	1532A	ISO	8775
SAE-AMS	3012	ISO	14624-4
SAE-AS	452A	ISO	14951-1
SAE-AS	861	CNIS	GB 8983-88
SAE-AS	916B	CNIS	GB 16993-97
SAE-AS	1046B		



Thank you

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

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