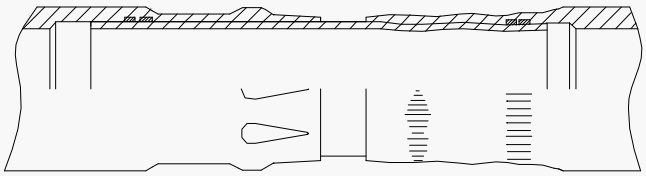
METRIC EXTERNALLY SWAGED PERMANENT FITTING



DESIGN CONCEPT

The Externally Swaged fitting was originally developed by McDonnell Douglas (prior to become Boeing) who granted the manufacturing authority to Airdrome Precision Components. Another supplier gave the same fitting a tradename Permaswage.

After the patent was expired in 1991, Airdrome Precision Components improved the fitting design concept by lower the fitting yield strength slightly to increase significantly broader fitting application for use on softer tubing materials and/or thinner tube wall. It has also enhanced swaging tool life.

The unique geometric of the fitting design has a body and tail connected by a thinner wall mid section. It creates a flexible tail to absorb vibration and bending in flight conditions while static sealing takes place in the body section.

Externally Swaged fittings were designed for permanently assembled onto tubing by crimping with swaging tool. Each fitting offers 7.6 mm for tube insertion tolerance that minimizes pre-stress caused by stack-up tolerances during hydraulic line installation. This advantage can also be utilized by installing an union for repair of small tube defects less than 7.6 mm.

Fitting materials are available in Aluminum Alloy, Cres and Titanium for use with various tubing materials. Each fitting tail I.D. is coated with Teflon for lubrication to enhance stress relief on fitting joints under bending or vibration conditions. The Teflon finish is also colored differently for fitting material identification and surface protection purposes. Green Teflon is coated on inside and outside of Aluminum Alloy and inside of Cres fittings only, black Teflon is coated on inside and outside of Titanium fittings.

Each fitting end has two internal grooves for baked on silicone seal. Double silicone seal is required on Aluminum Alloy fittings for use on Aluminum Alloy tubing. Single silicone seal is sufficient on Cres and Titanium fittings for use on Cres and Titanium Alloy tubing. It is however, recommended that optional double silicone seal (to add suffix code Y in part number) should be used on all fittings.

DESIGN ADVANTAGES:

- Sealing efficiency eliminates unnecessary down time and high repair cost.
- Large tube insertion tolerance minimizes pre-stress within hydraulic systems.
- Ext-Swage fittings are easy to install either in production or field repair.

STANDARD PROCUREMENT SPECIFICATION FOR EXTERNALLY SWAGED FITTINGS

SAE MA2005 or ISO7169 specifications define Form, Fit, Function and Procurement requirements for Ext-Swage fittings.

QUALIFICATION AND APPROVAL STATUS

Airdrome fittings were qualified to meet SAE MA2005 and ISO7169 specifications. The fittings are approved for use in various military and commercial programs at HAL.

FITTING MATERIAL SELECTION

The Adapters and Permanent Ext-Swage fittings are offered in the following materials for use with various tubing materials, fluid and operating temperature:

MATERIAL AND CODING

Titanium	Code	T	Indicates commercially pure Titanium per AMS4921.
Cres	Code	-	Indicates 21-6-9 per AMS5656 not to exceed 65,000 psi yield strength.
Aluminum Alloy	Code	D	Indicates 6061-T6 per QQ-A-225/8 except overaged to 23,000 and 33,000 psi yield strength.

COMPATIBILITY OF FITTING AND TUBING MATERIALS

(Fitting Code)	(Tubing material)
T	Titanium Alloy 3AL-2.5V per AMS4944 or similar.
-	Titanium Alloy 3AL-2.5V per AMS4944 or, Cres 21-6-9 per AMS5561 or, Cres 304 1/8 Hard per MIL-T-6845 or, Aluminum Alloy 6061-T6 per MIL-T-7081 or similar.
D	Aluminum Alloy 6061-T6 per MIL-T-7081 or similar.

TOOLING

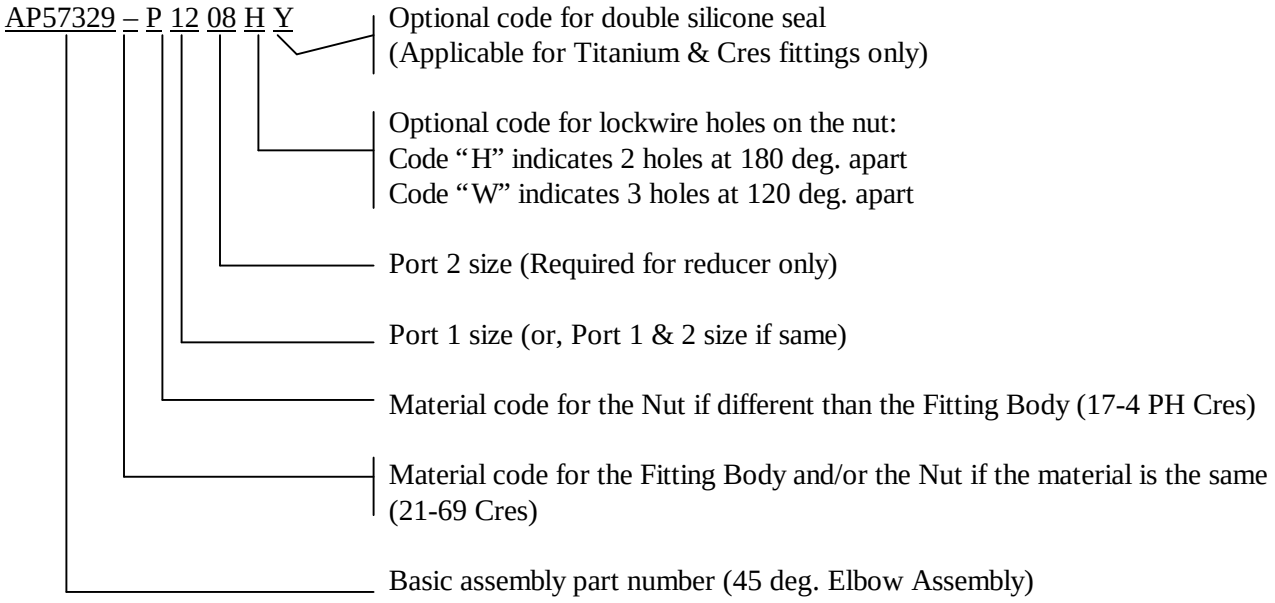
Deutsch D12xxx or DLT tooling designed for swaging fittings to meet as qualified fitting performance swages all fittings. Established Form, Fit and Function of all suppliers' fittings are fully defined and controlled by major worldwide OEM specifications.

SIZE AND MATERIAL VERSUS OPERATING PRESSURE

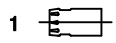
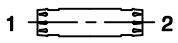
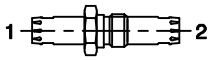
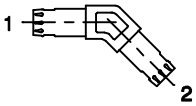
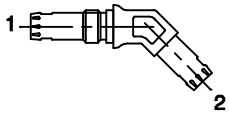
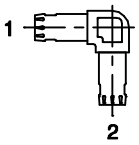
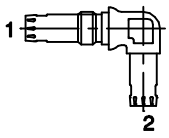
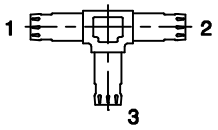
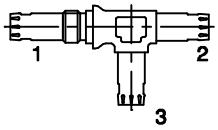
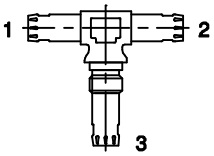
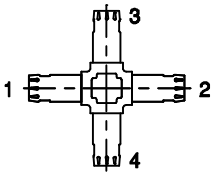
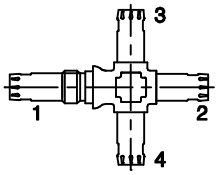
Fitting/tubing operating pressures vary according to size and material. The following shows standard size range and corresponding operating pressures:

FITTING SIZE	DN	OPERATING PRESSURE (kPa) PER FITTING MATERIAL	
		Titanium & Cres	Alum Alloy
04	4.0	28000	6900
05	5.0	28000	6900
06	6.0	28000	6900
08	8.0	28000	6900
10	10.0	28000	6900
12	12.0	28000	6900
14	14.0	28000	6900
16	16.0	28000	6900
18	18.0	28000	6900
20	20.0	28000	6900
22	22.0	28000	6900
25	25.0	28000	6900
28	28.0	28000	6900
32	32.0	28000	6900
40	40.0	14000	6900

EXAMPLE OF PART NUMBER FOR ORDERING FITTINGS



Note: Contact Airdrome Precision Components for special fitting configuration, material and/or size not listed in this catalog.

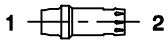
 AP56101	 AP56100	 AP56102	 AP56326	 AP56337	 AP56325
 AP56339	 AP56550	 AP56574	 AP56575	 AP56775	 AP56777

28Mpa rated Metric Ext-Swage Fittings

Fitting Shape	Port Sequence for Airdrome Part No. (See Example of Part No.)				Airdrome Standard
	1	2	3	4	
Cap	S				AP56101
Straight	S	S			AP56100
	S	B			AP56102
45 deg. Elbow	S	S			AP56326
	B	S			AP56337
90 deg. Elbow	S	S			AP56325
	B	S			AP56339
Tee	S	S	S		AP56550
	B	S	S		AP56574
	S	S	B		AP56575
Cross	S	S	S	S	AP56775
	B	S	S	S	AP56777

Note: 1. S = Metric Ext-Swage port,
B = Metric Bulkhead Ext-Swage port.

AP56000



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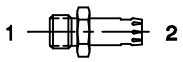

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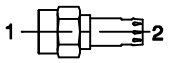

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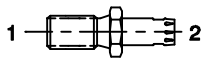

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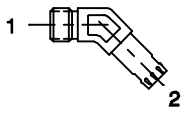

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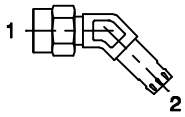

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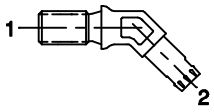

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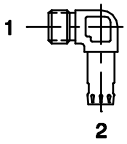

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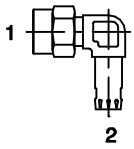

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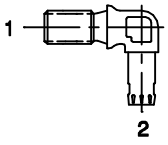

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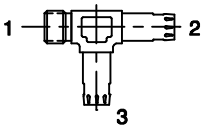

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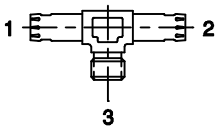

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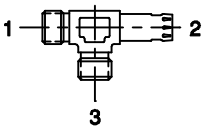

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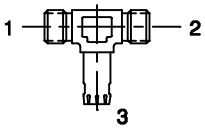

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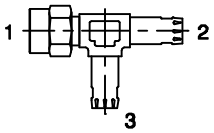

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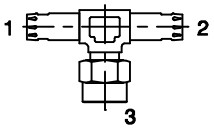

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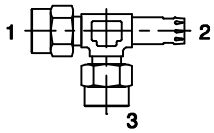

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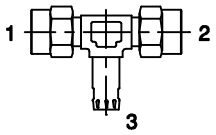

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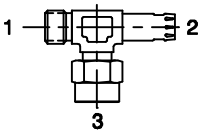

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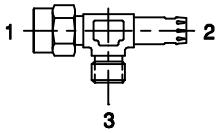

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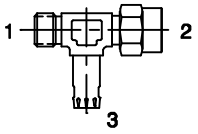

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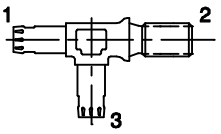

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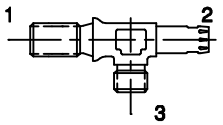

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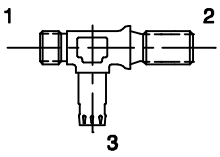

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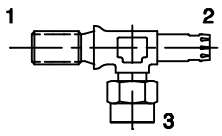

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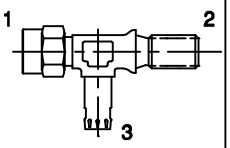

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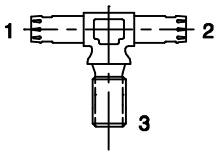

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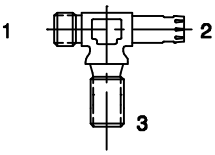

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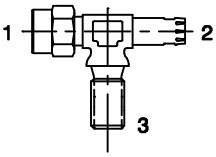

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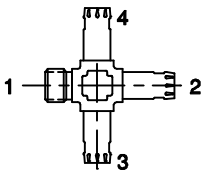

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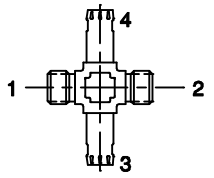
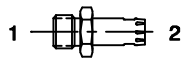


AP56779

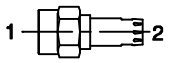
Adapters for 28 Mpa rated Metric Ext-Swage to Metric 24 deg. Flareless Fittings

Fittng Shape	Port Sequence for Airdrome Part No. (See Example of Part No.)				Airdrome Standard
	1	2	3	4	
Coupling Nut					AP56000
Sleeve	F	S			AP56123-2
Straight	M	S			AP56110
	F	S			AP56123
	B	S			AP56105
45 deg. Elbow	M	S			AP56354
	F	S			AP56353
	B	S			AP56335
90 deg. Elbow	M	S			AP56329
	F	S			AP56327
	B	S			AP56331
Tee	M	S	S		AP56559
	S	S	M		AP56552
	M	S	M		AP56580
	M	M	S		AP56571
	F	S	S		AP56567
	S	S	F		AP56566
	F	S	F		AP56576
	F	F	S		AP56577
	M	S	F		AP56573
	F	S	M		AP56572
	M	F	S		AP56562
	S	B	S		AP56554
	B	S	M		AP56570
	M	B	S		AP56569
	B	S	F		AP56578
	F	B	S		AP56579
	S	S	B		AP56553
	M	S	B		AP56568
	F	S	B		AP56583
Cross	M	S	S	S	AP56778
	M	M	S	S	AP56779

Note: 1. F = Female Metric 24 deg. Flareless port,
M = Male Metric 24 deg. Flareless port,
B = Bulkhead Metric 24 deg. Flareless port,
S = Metric Ext-Swage port.



AP57103



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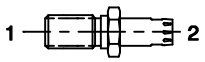

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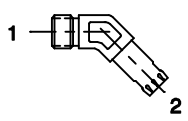
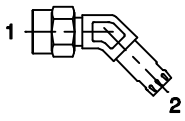


AP57330



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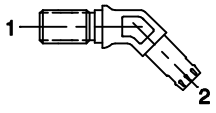

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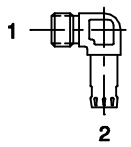

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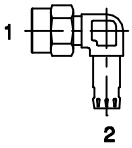

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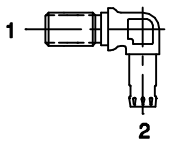

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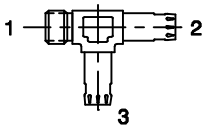
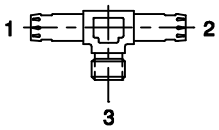
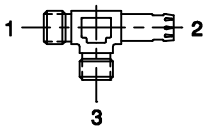


AP57556



AP57552



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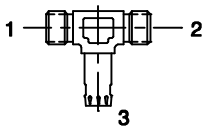

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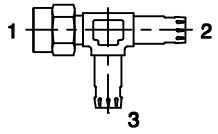

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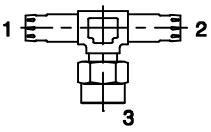

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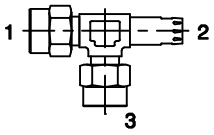

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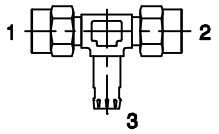
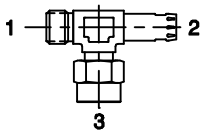
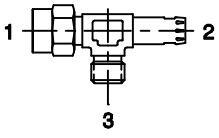


AP57562



AP57563



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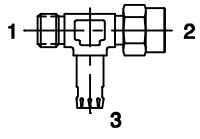

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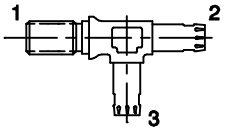
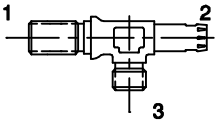


AP57565



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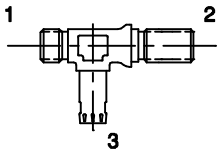

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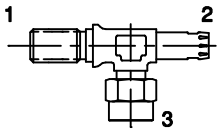

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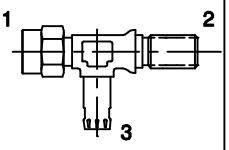

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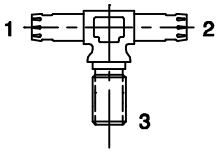

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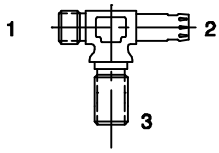

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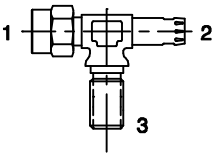

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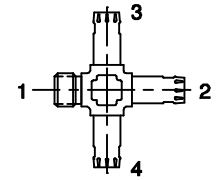

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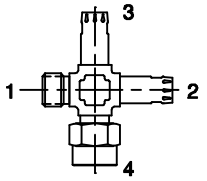

AP57776

Adapters for 28 Mpa rated
Metric Ext-Swage to Metric Beam Seal Fittings

Fitting Shape	Port Sequence for Airdrome Part No. (See Example of Part No.)				Airdrome Standard
	1	2	3	4	
Straight	M	S			AP57103
	F	S			AP57102
	B	S			AP57101
45 deg. Elbow	M	S			AP57330
	F	S			AP57329
	B	S			AP57333
90 deg. Elbow	M	S			AP57331
	F	S			AP57332
	B	S			AP57334
Tee	M	S	S		AP57556
	S	S	M		AP57552
	M	S	M		AP57557
	M	M	S		AP57558
	F	S	S		AP57559
	S	S	F		AP57555
	F	S	F		AP57560
	F	F	S		AP57562
	M	S	F		AP57563
	F	S	M		AP57561
	M	F	S		AP57564
	B	S	S		AP57565
	B	S	M		AP57566
	M	B	S		AP57567
	B	S	F		AP57568
	F	B	S		AP57569
	S	S	B		AP57553
	M	S	B		AP57570
	F	S	B		AP57571
Cross	M	S	S	S	AP57775
	M	S	S	F	AP57776

Note: 1. F = Female Metric Beam Seal port,
M = Male Metric Beam Seal port,
B = Metric Bulkhead Beam Seal port,
S = Metric Ext-Swage port.