

GP-425
REVISION G
Amend 1

FLUID FITTING ENGINEERING STANDARDS

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MAY 1, 2007

ENGINEERING DEVELOPMENT DIRECTORATE

National Aeronautics and
Space Administration

John F. Kennedy Space Center

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FLUID FITTING ENGINEERING STANDARDS

Prepared by:

H. Dave Wiedemuth 5/1/07
H.D. Wiedemuth
NE-F2

Approved by:

Eric A. Thaxton
Eric A. Thaxton, NE-D
Chief, Mechanical Engineer

Approved by:

Pa Simpkins
Patrick Simpkins, NE
Director, Engineering

May 1, 2007

JOHN F. KENNEDY SPACE CENTER, NASA

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RECORD OF REVISIONS/CHANGES

REV LTR	CHANGE NO.	DESCRIPTION	DATE
F		General Revision of entire document	August 1, 1990
	1	None	Not released
	2	Updated introduction, indexes, KC150, KC164	January 2, 1991
	3	Updated KC143, KC154, KC170, KC174, KC176	April 10, 1991
	4	Updated KC149, KC155 thru KC160, KC162, KC166 thru KC168, KC175	October 2, 1992
G		<ol style="list-style-type: none"> 1. Incorporated Amendments 1 thru 4 2. Added Nongovernmental Equivalent Standards to various KC Fluid Fitting Standards 3. Updated KC104, KC105, KC115, KC118, KC131, KC144, KC150, KC152, KC164, KC175, and KC176 	September 8, 1997
	1	Updated KC142, KC143, KC145, KC146, KC147, KC148, KC149, KC151 and KC152	May 1, 2007

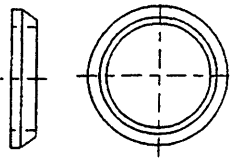
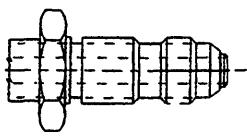
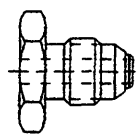
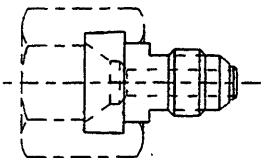
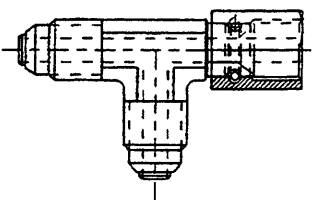
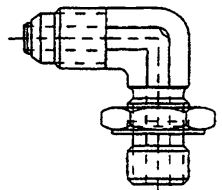
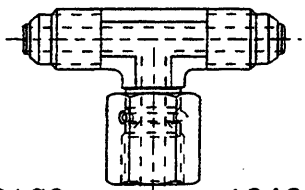
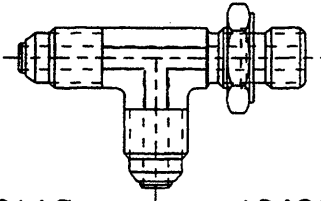
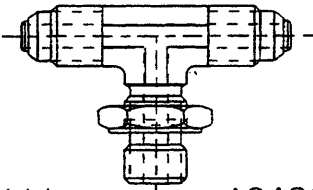
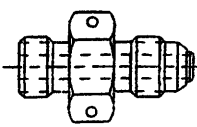
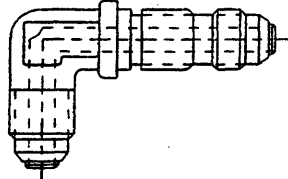
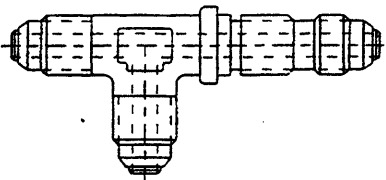
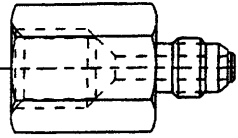
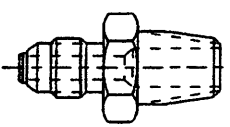
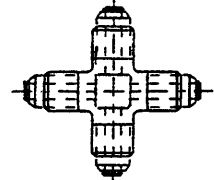
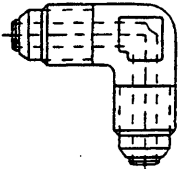
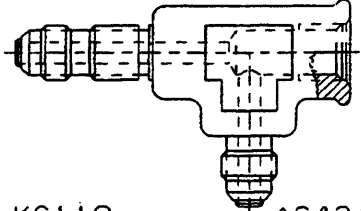
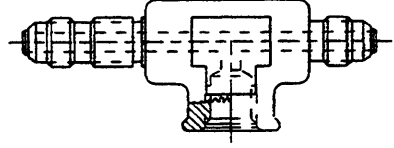
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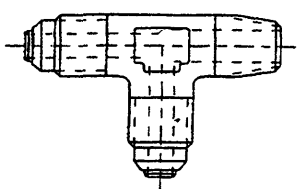
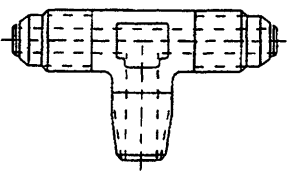
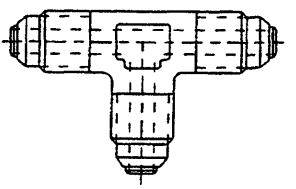
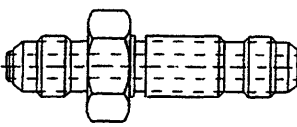
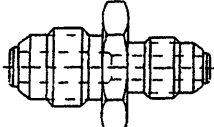
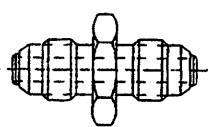
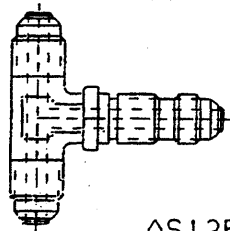
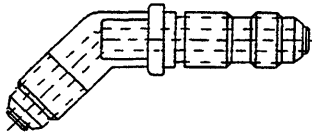
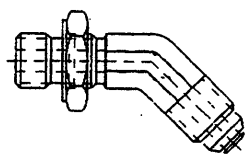
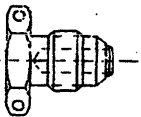
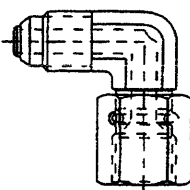
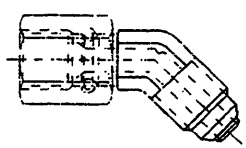
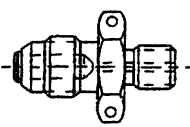
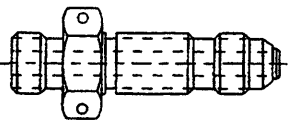
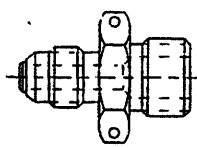
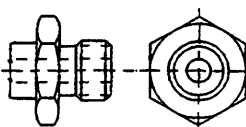
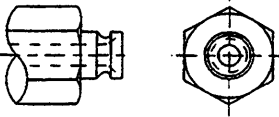
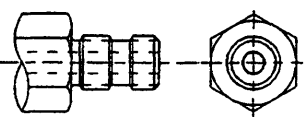
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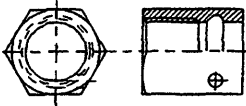
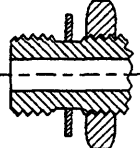
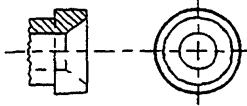
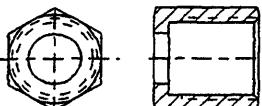
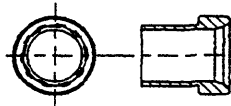
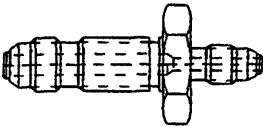
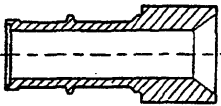
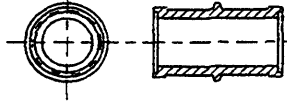
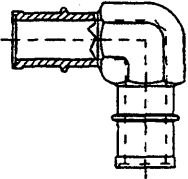
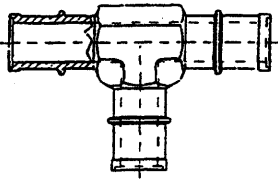
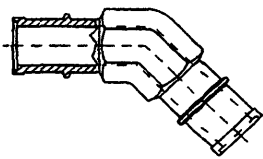
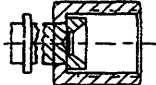
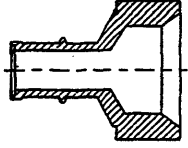
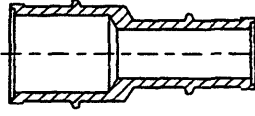
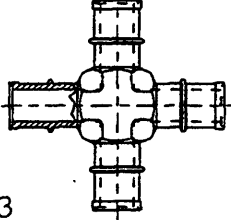
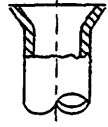
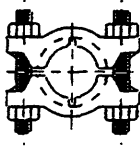
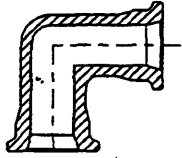
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<p>REDUCER - ADAPTER</p>  <p>KC106 AS4301</p>	<p>TEE - Ø FEMALE SWIVEL ON RUN</p>  <p>KC107 AS4302</p>	<p>ELBOW - 90° ADJ MALE END</p>  <p>KC108 AS4303</p>
<p>TEE - FEMALE SWIVEL ON LEG</p>  <p>KC109 AS4304</p>	<p>TEE - ADJ MALE END ON RUN</p>  <p>KC110 AS4305</p>	<p>TEE - ADJ MALE END ON LEG</p>  <p>KC111 AS4306</p>
<p>ADAPTER - BOSS TO TUBE</p>  <p>KC112 AS4307</p>	<p>ELBOW - 90° BULKHEAD</p>  <p>KC113 AS1366</p>	<p>TEE - BULKHEAD ON RUN</p>  <p>KC114 AS1365</p>
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<p>ELBOW - 90°</p>  <p>KC118 AS1250</p>	<p>TEE - INTERNAL THREAD ON RUN</p>  <p>KC119 AS4310</p>	<p>TEE - INTERNAL</p>  <p>KC120 AS4311</p>

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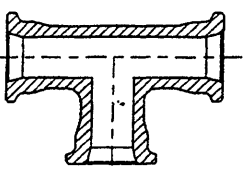
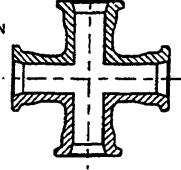
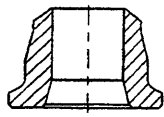
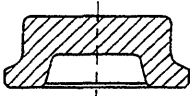
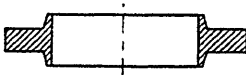
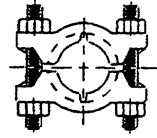
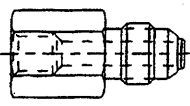
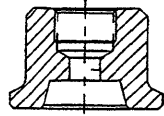
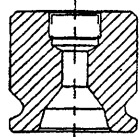
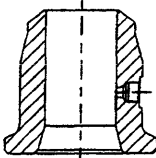
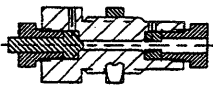
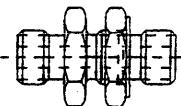
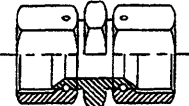
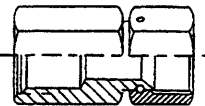
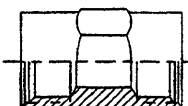
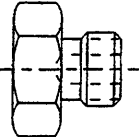
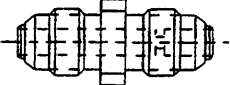
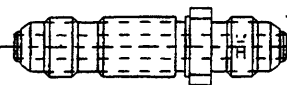
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<p>UNION - BULKHEAD</p>  <p>KC124 AS1100</p>	<p>REDUCER</p>  <p>KC125 AS1368</p>	<p>UNION</p>  <p>KC126 AS1251</p>
<p>TEE - BULKHEAD ON LEG</p>  <p>KC127 AS1253</p>	<p>ELBOW - 45° BULKHEAD</p>  <p>KC128 AS1249</p>	<p>ELBOW - 45° ADJ MALE END</p>  <p>KC129 AS4314</p>
<p>PLUG</p>  <p>KC130 AS1369</p>	<p>ELBOW - 90° SWIVEL END</p>  <p>KC131 AS4315</p>	<p>ELBOW - 45° SWIVEL END</p>  <p>KC132 AS4316</p>
<p>PLUGREDUCER - ADAPTER AND BOSS</p>  <p>KC133 AS4317</p>	<p>ADAPTER - BULKHEAD AND BOSS</p>  <p>KC134 AS4318</p>	<p>EXPANDER - ADAPTER; BOSS TO TUBE</p>  <p>KC135 AS4319</p>
<p>FITTING END</p>  <p>KC136 AS4320</p>	<p>FITTING END - SWIVEL FLARED TUBE</p>  <p>KC137 AS4321</p>	<p>FITTING END - ADJUSTABLE</p>  <p>KC138 AS4322</p>

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<p>NUT COUPLING</p>  <p>KC142 AS4326</p>	<p>SLEEVE - FLARED TUBE FITTING</p>  <p>KC143 AS4327</p>	<p>REDUCER - BULKHEAD</p>  <p>KC144 AS4328</p>
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<p>SPUD - BUTTWELD TUBE REDUCER</p>  <p>KC151</p>	<p>UNION - BUTTWELD REDUCER</p>  <p>KC152</p>	<p>CROSS - BUTTWELD TUBE</p>  <p>KC153</p>
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INTRODUCTION

1. PURPOSE

The purpose of this document is to establish uniform engineering practices and methods for fluid fittings and to:

- a. Increase component interchangeability and reliability.
- b. Simplify procurement, storage, inspections, and environmental limitations.
- c. Expedite design by eliminating time spent on routine items for which design has already been accomplished.

2. SCOPE

This document is a compilation of standard fluid fitting parts and design standards used in the design of hydraulic and pneumatic systems used at the John F. Kennedy Space Center, Florida.

3. RECOGNITION

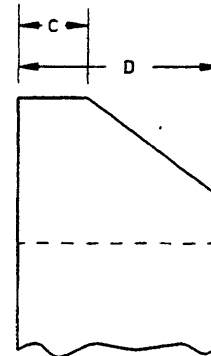
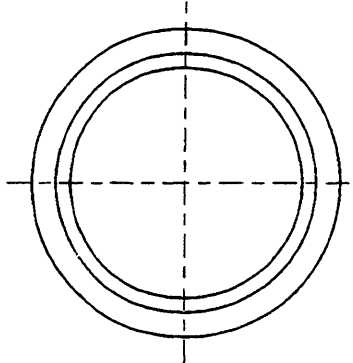
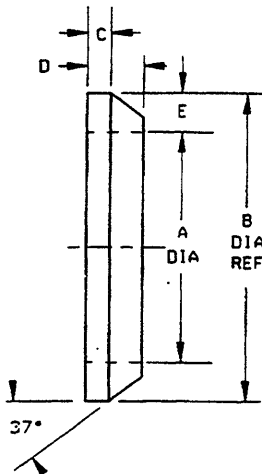
Standards originated for use at Kennedy Space Center are identified by a "KC" standard drawing number prefix. The coordination status for these standards is indicated at the lower left portion of the design standard sheet page. KC standards consist of both standard parts and design standards.

4. NONGOVERNMENTAL STANDARDS

Nongovernmental standards that are equivalent to KC standards are shown in this document as preferred standards for fluid fitting parts and design. These nongovernmental standards are published by the Society of Automotive Engineers (SAE). Application for copies of these standards should be addressed to the Society of Automotive Engineers, Inc., 400 Commonwealth Drive, Warrendale, PA 15096.

The nongovernment standards shown in this document are interchangeable with "KC" fittings and are preferred for new design. "KC" fittings shall be utilized until existing stocks are depleted. New procurements of fluid fittings equivalent to "KC" fittings shall use the preferred nongovernmental standards.

GP-425

FED SUP CLASS
5330

ENLARGED SECTION

DASH NO.	TUBE OD REF	NOTE 2				
		A DIA.	B DIA. REF	C DIM. ±.0015	D DIM. +.003 -.001	E DIM. ±.001
-4	1/4	.210	.251	.0364	.0523	.018
-6	3/8	.326	.391			
-8	1/2	.440	.505			
-10	5/8	.545	.610	.0335	.0673	.030
-12	3/4	.670	.735			
-16	1	.953	1.018			
-20	1 1/4	1.180	1.261	.0256	.070	.038
-24	1 1/2	1.430	1.511			
-28	1 3/4	1.660	1.765	.0319	.0890	.048
-32	2	1.910	2.015			

MATERIAL:-----TETRAFLUOROETHYLENE RESIN (TEFLON)
 FINISH:-----
 INSPECTION:-----
 PACKAGING & MARKING:-----

} PER MIL-R-8791

- NOTES:
1. DIMENSIONS ARE IN INCHES, TOLERANCES AS SPECIFIED, AND ANGLE $\pm 1/2^\circ$.
 2. DIMENSIONS ARE FREE STATE DIMENSIONS.
 3. REFERENCED DOCUMENTS SHALL BE OF THE ISSUE IN EFFECT ON THE DATE OF INVITATION FOR BID.
 4. THIS STANDARD TAKES PRECEDENCE OVER DOCUMENTS SPECIFIED HEREIN.

EXAMPLE OF
PART NO. KC103-4 SEAL RING FOR -4 (1/4") FITTING END

CUSTODIAN:		JOHN F. KENNEDY SPACE CENTER	
PROCUREMENT SPEC. SEE NOTES	SEAL RING		STANDARD PART
COORDINATION STATUS			KC103
KSC DE			SHEET 1 OF 1

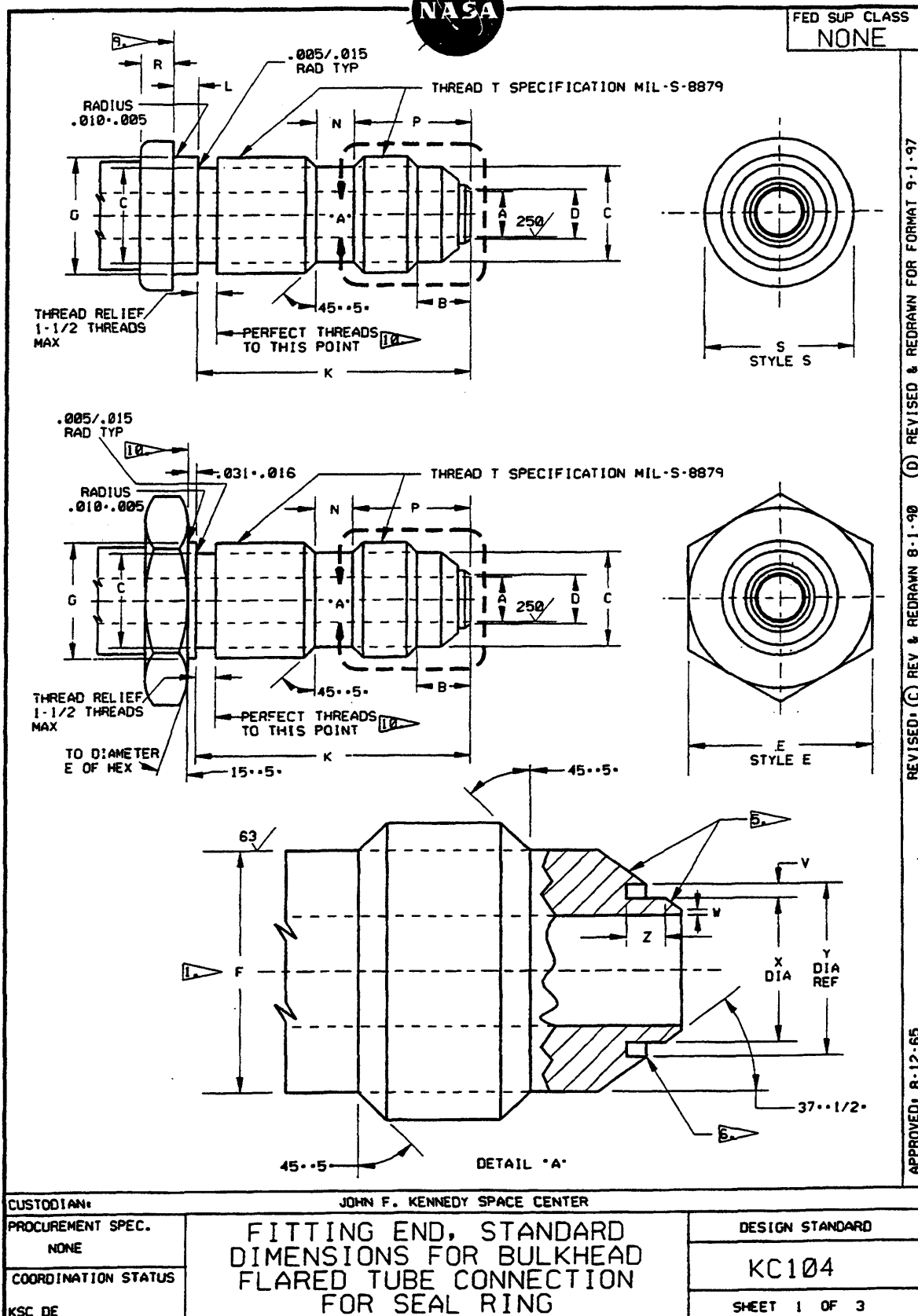
KSC FORM 32-85 (CG 4/92)

REVISED: (E) REV & REDRAWN 8-1-90

APPROVED: 5-10-65

NOTICE: WHEN GOVERNMENT DRAWINGS, SPECIFICATIONS OR OTHER DATA ARE USED FOR ANY PURPOSE OTHER THAN IN CONNECTION WITH A DEFINITELY RELATED GOVERNMENT PROCUREMENT OPERATION, THE UNITED STATES GOVERNMENT THEREBY INCURS NO RESPONSIBILITY NOR ANY OBLIGATION WHATSOEVER AND THE FACT THAT THE GOVERNMENT MAY HAVE FORMULATED, FURNISHED, OR IN ANY WAY SUPPLIED THE SAID DRAWINGS, SPECIFICATIONS, OR OTHER DATA IS NOT REGARDED BY IMPLICATION OR OTHERWISE AS IN ANY MANNER LICENSING THE HOLDER OR ANY OTHER PERSON OR CORPORATION, OR CONVEYING ANY RIGHTS OR PERMISSION TO MANUFACTURE, USE, OR SELL ANY PATENTED INVENTION THAT MAY IN ANY WAY BE RELATED THERETO.







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GP-425

FED SUP CLASS
NONE

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DASH NO.	TUBE OD REF	THREAD T MIL-S-8879 	A DIA		B -.000 -.045	C -.000 -.005 DIA  	D -.003 DIA 	E	F -.002 -.003  	G		
						MIN	MAX					
-4	¼	.4375-20-UNJF-3A	.172	.003 .004	.208	.359	.193	.688	.003 .004	.364	.429	.438
-6	⅜	.5625-18-UNJF-3A	.297	.004	.213	.476	.318	.813		.481	.554	.562
-8	½	.7500-16-UNJF-3A	.391		.268	.654	.426	1.000		.660	.741	.750
-10	⅝	.8750-14-UNJF-3A	.484		.281	.767	.539	1.125		.773	.865	.875
-12	¾	1.0625-12-UNJ-3A	.609	.005	.330	.938	.664	1.375	.016	.945	1.051	1.062
-16	1	1.3125-12-UNJ-3A	.844	.007 .005		1.188	.913	1.625		1.195	1.301	1.312
-20	1¼	1.6250-12-UNJ-3A	1.078	.008 .005	.382	1.501	1.147	1.875	.020	1.507	1.614	1.625
-24	1½	1.8750-12-UNJ-3A	1.312	.010 .005	.393	1.750	1.381	2.125		1.756	1.864	1.875
-28	1¾	2.2500-12-UNJ-3A	1.547		.466	2.125	1.646	2.500		2.131	2.239	2.250
-32	2	2.5000-12-UNJ-3A	1.781		.476	2.375	1.880	2.750		2.381	2.489	2.500

DASH NO.	TUBE OD REF	K -.000 -.045	L -.016	N -.010 -.000	P -.000 -.045	R -.016	S DIA -.016	V -.0015 -.0010	W MIN	X -.002 	Y REF	Z -.001
-4	¼	1.026	.094	.140	.448	.125	.562	.020	.0075	.220	.261	.0533
-6	⅜	1.104		.156	.481	.141	.688	.032	.007	.336	.401	.0683
-8	½	1.260		.187	.570	.156	.875		.014	.450	.515	
-10	⅝	1.401	.219	.628	.172	1.000	.024		.560	.625	.071	
-12	¾	1.572	.125	.234	.737	.188	1.188	.023	.685	.750		.090
-16	1						1.438	.968	1.033			
-20	1¼	1.619					.789	1.750	.029	1.200	1.281	
-24	1½	1.635					.800	2.000	.040	1.450	1.531	
-28	1¾	1.791					.873	2.375		1.690	1.790	
-32	2	1.916					.883	2.625	.050	.044	1.940	

REVISED: (C) REV & REDRAWN 8-1-90 (D) REVISED & REDRAWN FOR FORMAT 9-1-97

APPROVED: 8-12-65








CUSTODIAN: JOHN F. KENNEDY SPACE CENTER		
PROCUREMENT SPEC. NONE	FITTING END, STANDARD DIMENSIONS FOR BULKHEAD FLARED TUBE CONNECTION FOR SEAL RING	DESIGN STANDARD
COORDINATION STATUS		KC104
KSC DE		SHEET 2 OF 3

KSC FORM 32-85 (CG 4/92)

FED SUP CLASS
NONE

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NOTES:

1.  GROOVE FORMED SHALL BE SMOOTH AND FREE OF ALL THREAD MARKS.
2. ON STYLE S FITTING END THE L DIMENSION PROVIDES FOR A WASHER TO FORM BACKING FACE AGAINST BULKHEAD AND A .031 INCH LAND FOR POSITIONING IN BULKHEAD. ON STYLE E FITTING END NO WASHER IS REQUIRED.
3. REMOVE ALL BURRS AND SLIVERS. BREAK SHARP EDGES UNLESS OTHERWISE NOTED.
4. DIMENSIONS IN INCHES UNLESS OTHERWISE SPECIFIED.
5.  THIS SURFACE SHALL BE FREE OF BURRS, LONGITUDINAL AND SPIRAL TOOL MARKS AND SHALL BE SMOOTH. EXCEPT THAT ANNULAR TOOL MARKS WILL BE ALLOWED TO 64 MICROINCHES AA MAX.
6.  LEAVE GROOVE CORNERS AND EDGES .005 MAXIMUM RADIUS. FINISH GROOVE TO 64 MICROINCHES AA MAX.
7.  DIMENSIONS C, D, F, AND X SHALL BE CONCENTRIC WITH EACH OTHER AND WITH ALL ELEMENTS OF THE 37° ANGLE CONICAL SURFACE MEASURED AND CALCULATED AS INCLUDED ANGLES WITHIN .005 T.I.R.
8.  T (THREAD PITCH DIA.) SHALL BE CONCENTRIC TO DIMENSION "C" WITHIN .015 T.I.R.
9.  SQUARENESS BETWEEN THREAD PITCH DIAMETER AND FACE OF HEX ON STYLE E OR FACE OF SHOULDER ON STYLE S FITTING ENDS SHALL NOT EXCEED .005 FOR SIZES DASH 10 AND SMALLER OR .008 FOR LARGER SIZES. WHEN MEASURED AT THE OUTER DIAMETER OF THE FACE.
10.  CHAMFER 45° ± 5° OPTIONAL.
11. ROUGHNESS OF MACHINED SURFACES SHALL BE 125AA MAXIMUM PER ANSI B46.1 UNLESS OTHERWISE SPECIFIED.

REVISED & REDRAWN FOR FORMAT 9-1-97
REVISED (C) REV & REDRAWN 8-1-90
APPROVED: 8-12-65

CUSTODIAN:		JOHN F. KENNEDY SPACE CENTER	
PROCUREMENT SPEC.	FITTING END, STANDARD DIMENSIONS FOR BULKHEAD FLARED TUBE CONNECTION FOR SEAL RING	DESIGN STANDARD	
NONE		KC104	
COORDINATION STATUS		SHEET 3 OF 3	
KSC DE			

KSC FORM 32-85 (CG 4/92)



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DASH NO.		TUBE OD REF	THREAD I MIL-S-8879	A DIA	B .000 .045	C .000 .005 DIA	D .003 DIA	E	F .002 .003	J .000 .045	L .015 .000 .0015 .0010	V .0015 .0010	W MIN	X .002	Y REF	Z .001
-4	1/4		.4375-20-UNJF-3A	.172	.208	.359	.193	.688	.364	.565	.075	.020	.0075	.220	.261	.0533
-6	3/8		.5625-18-UNJF-3A	.297	.213	.476	.318	.813	.481	.571	.083		.007	.336	.401	
-8	1/2		.7500-16-UNJF-3A	.391	.268	.654	.426	1.000	.660	.672	.094		.014	.450	.515	
-10	5/8		.8750-14-UNJF-3A	.484	.281	.767	.539	1.125	.773	.773	.107	.032	.024	.560	.625	.0683
-12	3/4		1.0625-12-UNJF-3A	.609	.330	.938	.664	1.375	.945	.879			.023	.685	.750	
-16	1		1.3125-12-UNJF-3A	.844	.007	1.188	.913	1.625	1.195	.926				.968	1.033	
-20	1 1/4		1.6250-12-UNJF-3A	1.078	.008	.382	1.501	1.147	1.507	.973	.125	.040	.029	1.200	1.281	.071
-24	1 1/2		1.8750-12-UNJF-3A	1.312	.005	.393	1.750	1.381	1.756	1.098				1.450	1.531	
-28	1 3/4		2.2500-12-UNJF-3A	1.547	.010	.466	2.125	1.646	2.131	1.223				1.690	1.790	.090
-32	2		2.5000-12-UNJF-3A	1.781	.005	.476	2.375	1.880	2.381	1.348			.050	1.940	2.040	

NOTES:

1. SQUARENESS BETWEEN THREAD PITCH DIAMETER AND FACE OF HEX SHALL NOT EXCEED .005 FOR SIZES DASH 10 AND SMALLER OR .008 FOR LARGER SIZES, WHEN MEASURED AT THE OUTER DIAMETER OF THE FACE.
2. BREAK SHARP EDGES UNLESS OTHERWISE NOTED. REMOVE BURRS AND SLIVERS.
3. DIMENSIONS IN INCHES, UNLESS OTHERWISE SPECIFIED.
4. THIS SURFACE SHALL BE FREE OF BURRS. LONGITUDINAL AND SPIRAL TOOL MARKS SHALL BE SMOOTH EXCEPT THAT ANNULAR TOOL MARKS WILL BE ALLOWED TO 64 MICROINCHES AA MAX.
5. LEAVE GROOVE CORNERS AND EDGES .005 MAX RADIUS. FINISH GROOVE TO 64 MICROINCHES AA MAX.
6. DIMENSIONS C, D, F, AND X SHALL BE CONCENTRIC WITH EACH OTHER AND WITH ALL ELEMENTS OF THE 37° ANGLE CONICAL SURFACE MEASURED AND CALCULATED AS INCLUDED ANGLES WITHIN .005 T.I.R.
7. T (THREAD PITCH DIA.) SHALL BE CONCENTRIC TO DIMENSION 'C' WITHIN .015 T.I.R.
8. ROUGHNESS OF MACHINED SURFACES SHALL BE 125AA MAXIMUM PER ANSI B46.1 UNLESS OTHERWISE SPECIFIED.

FED SUP CLASS
NONE

APPROVED: 5-10-65 REVISED: 8-1-90 REVISED & REDRAWN FOR FORMAT 9-1-97

CUSTODIAN:

JOHN F. KENNEDY SPACE CENTER

PROCUREMENT SPEC.
NONE

COORDINATION STATUS

KSC DE

FITTING END, STANDARD
DIMENSIONS FOR FLARED TUBE
CONNECTION FOR SEAL RING

DESIGN STANDARD

KC105

SHEET 2 OF 2

KSC FORM 32-85 (CG 4/92)

GP-425

NOTICE: WHEN GOVERNMENT DRAWINGS, SPECIFICATIONS OR OTHER DATA ARE USED FOR ANY PURPOSE OTHER THAN IN CONNECTION WITH A DEFINITELY RELATED GOVERNMENT PROCUREMENT OPERATION, THE UNITED STATES GOVERNMENT THEREBY INCURS NO RESPONSIBILITY NOR ANY OBLIGATION WHATSOEVER AND THE FACT THAT THE GOVERNMENT MAY HAVE FORMULATED, FURNISHED, OR IN ANY WAY SUPPLIED THE SAID DRAWINGS, SPECIFICATIONS, OR OTHER DATA IS NOT REGARDED BY IMPLICATION OR OTHERWISE AS IN ANY MANNER LICENSING THE HOLDER OR ANY OTHER PERSON OR CORPORATION, OR CONVEYING ANY RIGHTS OR PERMISSION TO MANUFACTURE, USE, OR SELL ANY PATENTED INVENTION THAT MAY IN ANY WAY BE RELATED THERETO.

DASH NO.		CONICAL END MATES WITH FITTING FOR	TUBE END		A	C	D
CRE STEEL	AL ALLOY	TUBE OD	TUBE OD	THREAD T REF	+ .000 - .075	REF	REF
K6-4	D6-4	3/8	1/4	7/16-20	.974	.172	.219
K8-4	D8-4	1/2	3/8	9/16-18	1.005	.219	.313
K8-6	D8-6	3/8	1/2	3/4-16	1.036	.234	.281
K10-6	D10-6	1	3/4	1-1/16-12	1.099	.266	.313
K12-4	D12-4	1-1/4	1	1-5/16-12	1.193	.281	.344
K12-6	D12-6	1-1/2	1-1/4	1-5/8-12	1.271	.313	.375
K12-8	D12-8	2	1-1/2	1-7/8-12	1.474	.344	.406
K16-8	D16-8	1-1/4	1-1/4	1-5/8-12	1.411	.406	.469
K16-12	D16-12	1-1/2	1-1/2	1-7/8-12	1.536	.469	.531
K20-8	D20-8	1-1/4	1-1/4	1-5/8-12	1.599	.500	.562
K20-12	D20-12	1-1/2	1-1/2	1-7/8-12	1.630	.531	.593
K20-16	D20-16	1-1/2	1-1/2	1-7/8-12	1.693	.562	.625
K24-12	D24-12	1-1/2	1-1/2	1-7/8-12	1.786	.593	.656
K24-16	D24-16	1-1/2	1-1/2	1-7/8-12	1.911	.625	.688
K24-20	D24-20	1-1/2	1-1/2	1-7/8-12	2.036	.656	.719
K32-16	D32-16	1-1/2	1-1/2	1-7/8-12	2.036	.656	.719
K32-20	D32-20	1-1/2	1-1/2	1-7/8-12	2.036	.656	.719
K32-24	D32-24	1-1/2	1-1/2	1-7/8-12	2.036	.656	.719

CUSTODIAN:

JOHN F. KENNEDY SPACE CENTER

PROCUREMENT SPEC.

KSC-F-124

COORDINATION STATUS

KSC DE

REDUCER-ADAPTER, CONICAL
END FITTING AND FLARED
TUBE FOR SEAL RING

STANDARD PART

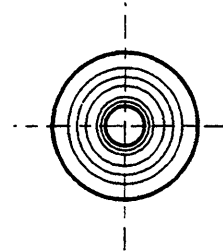
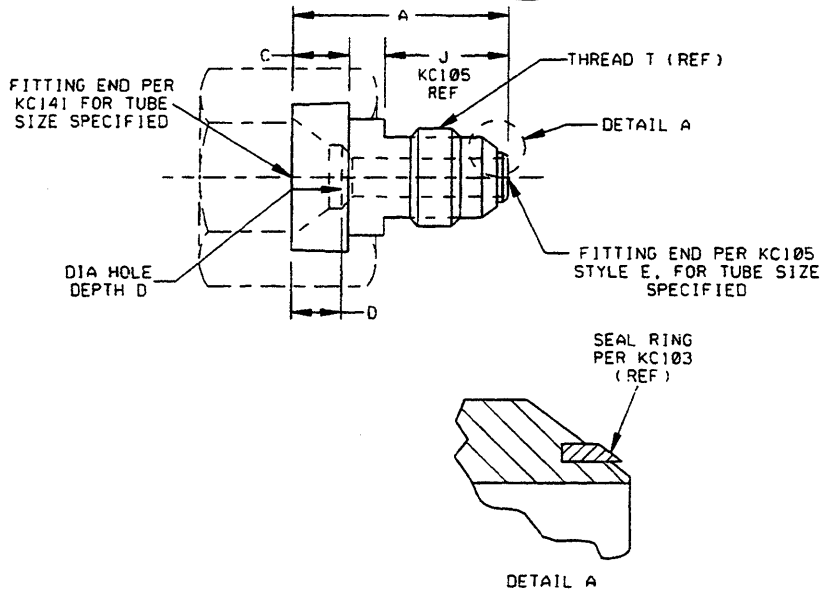
KC106

SHEET 1 OF 2

KSC FORM 32-85 (CG 4/92)

REVISED: (E) REVISED AND REDRAWN 8-1-90

APPROVED: 5-10-65

FED SUP CLASS
4730

FED SUP CLASS
4730

NOTICE: WHEN GOVERNMENT DRAWINGS, SPECIFICATIONS OR OTHER DATA ARE USED FOR ANY PURPOSE OTHER THAN IN CONNECTION WITH A DEFINITELY RELATED GOVERNMENT PROCUREMENT OPERATION, THE UNITED STATES GOVERNMENT THEREBY INCURS NO RESPONSIBILITY NOR ANY OBLIGATION WHATSOEVER AND THE FACT THAT THE GOVERNMENT MAY HAVE FORMULATED, FURNISHED, OR IN ANY WAY SUPPLIED THE SAID DRAWINGS, SPECIFICATIONS, OR OTHER DATA IS NOT REGARDED BY IMPLICATION OR OTHERWISE AS IN ANY MANNER LICENSING THE HOLDER OR ANY OTHER PERSON OR CORPORATION, OR CONVEYING ANY RIGHTS OR PERMISSION TO MANUFACTURE, USE, OR SELL ANY PATENTED INVENTION THAT MAY IN ANY WAY BE RELATED THERE TO.

MATERIAL: SEE PROCUREMENT SPECIFICATION: ALUMINUM ALLOY, 2024-T6, CODE "D"; CORROSION RESISTANT STEEL (CLASS 316), CODE "K" (WAS CODE "C")

FINISH: SEE PROCUREMENT SPECIFICATION

SCREW THREAD: SEE PROCUREMENT SPECIFICATION.

NOTES:

1. REMOVE BURRS AND SLIVERS. BREAK SHARP EDGES UNLESS OTHERWISE NOTED.
2. DIMENSIONS IN INCHES UNLESS OTHERWISE SPECIFIED.
3. FOR DESIGN FEATURE PURPOSES, THIS DRAWING TAKES PRECEDENCE OVER PROCUREMENT DOCUMENTS REFERENCED HEREIN.
4. REFERENCED DOCUMENTS SHALL BE OF THE ISSUE IN EFFECT ON THE DATE OF INVITATION FOR BID.
5. MARKING OF FITTINGS SHALL BE CONSISTANT WITH PROCUREMENT SPECIFICATION USING APPLICABLE KC STANDARD AND PART NUMBER DESIGNATIONS AS SHOWN ON THIS DRAWING.

EXAMPLE OF PART NOS.

KC106K8-6 = REDUCER-ADAPTER - FOR 1/2 OD TUBE CONICAL FITTING
END TO 3/8 OD TUBE, CORROSION RESISTANT STEEL

KC106D12-4 = REDUCER-ADAPTER - FOR 3/4 OD TUBE CONICAL FITTING
END TO 1/4 OD TUBE, ALUMINUM ALLOY

REVISED: (C) REVISED AND REDRAWN 8-1-90

APPROVED: 5-10-65

CUSTODIAN: JOHN F. KENNEDY SPACE CENTER

PROCUREMENT SPEC.
KSC-F-124

COORDINATION STATUS

KSC DE

REDUCER-ADAPTER, CONICAL
END FITTING AND FLARED
TUBE FOR SEAL RING

STANDARD PART


KC106

SHEET 2 OF 2

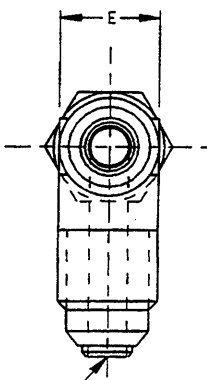
KSC FORM 32-85 (CG 4/92)

GP-425

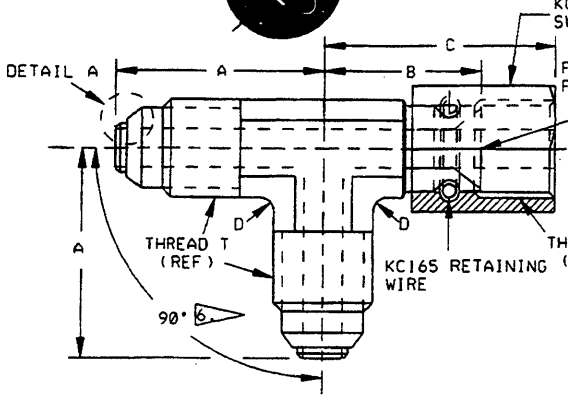
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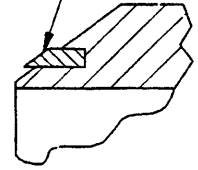
FED SUP CLASS
4730



FITTING END PER KC105
STYLE G FOR APPLICABLE
TUBE SIZE. TWO ENDS



DETAIL A



DETAIL A

DASH NO.		TUBE OD REF	THREAD T REF	A DIM. +.000 -.063	B DIM. +.000 -.063	C DIM REF	D RAD ±.03	E PAD DIM.	SWIVEL NUT KC139		RETAIN ING WIRE
CRE STEEL	AL ALLOY								CRE STEEL	AL ALLOY	
K4	D4	1/4	7/16-20	.906	.704	1.000	.063	.438	K4	D4	KC165-4
K6	D6	3/8	9/16-18	1.078	.891	1.250	.094	.563	K6	D6	KC165-6
K8	D8	1/2	3/4-16	1.266	.969	1.375		.750	K8	D8	KC165-8
K10	D10	5/8	7/8-14	1.469	1.141	1.625		.875	K10	D10	KC165-10
K12	D12	3/4	1-1/16-12	1.672	1.204	1.750	.125	1.063	K12	D12	KC165-12
K16	D16	1	1-5/16-12	1.828	1.422	2.000		1.313	K16	D16	KC165-16
K20	D20	1 1/4	1-5/8-12	2.078	1.704	2.313		1.625	K20	D20	KC165-20
K24	D24	1 1/2	1-7/8-12	2.344	1.875	2.594	.188	1.875	K24	D24	KC165-24
K28	D28	1 3/4	2-1/4-12	2.928	2.063	2.900		2.250	K28	D28	KC165-28
K32	D32	2	2-1/2-12	3.078	2.454	3.375		2.500	K32	D32	KC165-32


MATERIAL: SEE PROCUREMENT SPECIFICATION, ALUMINUM ALLOY, 2014-T6, CODE "D" CORROSION RESISTANT STEEL (CLASS 316), CODE "K" (WAS CODE "C")

FINISH: SEE PROCUREMENT SPECIFICATION.

SCREW THREAD: SEE PROCUREMENT SPECIFICATION.

NOTES:

- REMOVE BURRS AND SLIVERS. BREAK SHARP EDGES UNLESS OTHERWISE NOTED.
- DIMENSIONS IN INCHES. UNLESS OTHERWISE SPECIFIED, TOLERANCE DECIMALS ±.016.
- FOR DESIGN FEATURE PURPOSES, THIS DRAWING TAKES PRECEDENCE OVER PROCUREMENT DOCUMENTS REFERENCED HEREIN.
- REFERENCED DOCUMENTS SHALL BE OF THE ISSUE IN EFFECT ON THE DATE OF INVITATION FOR BID.
- MARKING OF FITTINGS SHALL BE CONSISTENT WITH PROCUREMENT SPECIFICATION USING APPLICABLE KC STANDARD AND PART NUMBER DESIGNATIONS AS SHOWN ON THIS DRAWING.

 TOLERANCE UP TO AND INCLUDING -.6 SIZE ±2-1/2° ABOVE -.6 SIZE ±1-1/2°.

EXAMPLE OF PART NOS. KC107K8 = TEE WITH SWIVEL END ON RUN, 1/4" OD TUBING, CORROSION RESISTANT STEEL
KC107D12 = TEE WITH SWIVEL END ON RUN, 3/4" OD TUBING, ALUMINUM ALLOY

CUSTODIAN: JOHN F. KENNEDY SPACE CENTER

PROCUREMENT SPEC.
KSC-F-124

COORDINATION STATUS
KSC DE

**TEE-ASSY, FLARED TUBE
FEMALE SWIVEL END ON
RUN, FOR SEAL RING**

STANDARD PART

KC107

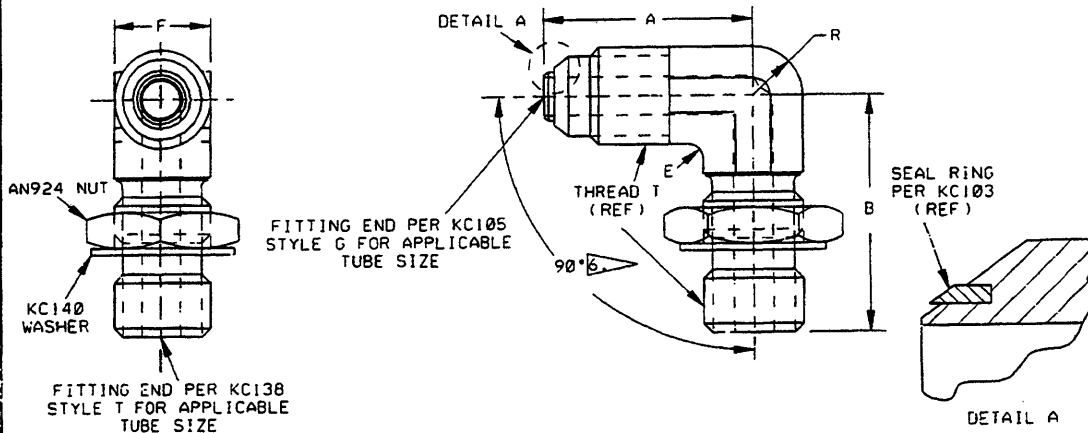
SHEET 1 OF 1

KSC FORM 32-85 (CG 4/92)

REVISED: (E) REV & REDRAWN 8-1-90

 APPROVED: 5-10-65

NASA

FED SUP CLASS
4730

DASH NO.		TUBE OD REF	THREAD T REF	A DIM. +.000 -.063	B DIM. +.000 -.063	E RAD +.03 -.03	R RAD +.03 -.03	F PAD DIM. +.016 -.016	BULKHEAD NUT		WASHER	
CRE STEEL	AL ALLOY								FOR CRE STEEL ASSY *	FOR AL ALLOY ASSY	FOR CRE STEEL ASSY	FOR AL ALLOY ASSY
K4	D4	1/4	7/16-20	.906	1.063	.063	.242	.438	AN924-K4	AN924-D4	KC140C4	KC140D4
K6	D6	3/8	9/16-18	1.078	1.281	.094	.317	.563	AN924-K6	AN924-D6	KC140C6	KC140D6
K8	D8	1/2	3/4-16	1.266	1.485		.414	.750	AN924-K8	AN924-D8	KC140C8	KC140D8
K10	D10	5/8	7/8-14	1.469	1.735		.484	.875	AN924-K10	AN924-D10	KC140C10	KC140D10
K12	D12	3/4	1-1/16-12	1.672	1.969		.586	1.063	AN924-K12	AN924-D12	KC140C12	KC140D12
K16	D16	1	1-5/16-12	1.828	2.078	.125	.719	1.313	AN924-K16	AN924-D16	KC140C16	KC140D16
K20	D20	1 1/4	1-5/8-12	2.078	2.281		.875	1.625	AN924-K20	AN924-D20	KC140C20	KC140D20
K24	D24	1 1/2	1-7/8-12	2.344	2.422		1.031	1.875	AN924-K24	AN924-D24	KC140C24	KC140D24
K28	D28	1 3/4	2-1/4-12	2.828	2.913		1.125	2.250	AN924-K28	AN924-D28	KC140C28	KC140D28
K32	D32	2	2-1/2-12	3.078	2.922	.188	1.383	2.500	AN924-K32	AN924-D32	KC140C32	KC140D32

MATERIAL:

SEE PROCUREMENT SPECIFICATION.
ALUMINUM ALLOY, 2014-T6, CODE "D"
CORROSION RESISTANT STEEL (CLASS 316), CODE "K" (WAS CODE "C")
*AN924 CRES NUTS MAY BE EITHER 304, CODE "J" OR 316, CODE "K".

FINISH:

SEE PROCUREMENT SPECIFICATION.

SCREW THREAD:

SEE PROCUREMENT SPECIFICATION.

NOTES:

1. REMOVE BURRS AND SLIVERS. BREAK SHARP EDGES UNLESS OTHERWISE NOTED.
2. DIMENSIONS IN INCHES. UNLESS OTHERWISE SPECIFIED, TOLERANCE DECIMALS $\pm .016$.
3. FOR DESIGN FEATURE PURPOSES, THIS DRAWING TAKES PRECEDENCE OVER PROCUREMENT DOCUMENTS REFERENCED HEREIN.
4. REFERENCED DOCUMENTS SHALL BE OF THE ISSUE IN EFFECT ON THE DATE OF INVITATION FOR BID.
5. MARKING OF FITTINGS SHALL BE CONSISTENT WITH PROCUREMENT SPECIFICATION USING APPLICABLE KC STANDARD AND PART NUMBER DESIGNATIONS AS SHOWN ON THIS DRAWING.

TOLERANCE UP TO AND INCLUDING $\frac{1}{16}$ SIZE $\pm 2 \frac{1}{2}^\circ$ ABOVE $\frac{1}{16}$ SIZE $\pm 1 \frac{1}{2}^\circ$.EXAMPLE OF
PART NOS.

KC108K8 = ELBOW, $\frac{1}{4}$ " OD TUBING, CORROSION RESISTANT STEEL
KC108D12 = ELBOW, $\frac{3}{4}$ " OD TUBING, ALUMINUM ALLOY

CUSTODIAN:

JOHN F. KENNEDY SPACE CENTER

PROCUREMENT SPEC.
KSC-F-124

COORDINATION STATUS

KSC DE

ELBOW ASSY, 90°, FLARED
TUBE & MALE ADJUSTABLE
END, FOR SEAL RING

STANDARD PART

KC108

SHEET 1 OF 1

KSC FORM 32-85 (CG 4/92)


REVISED: 5-10-65

APPROVED: 5-10-65

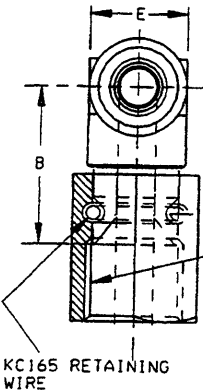
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GP-425

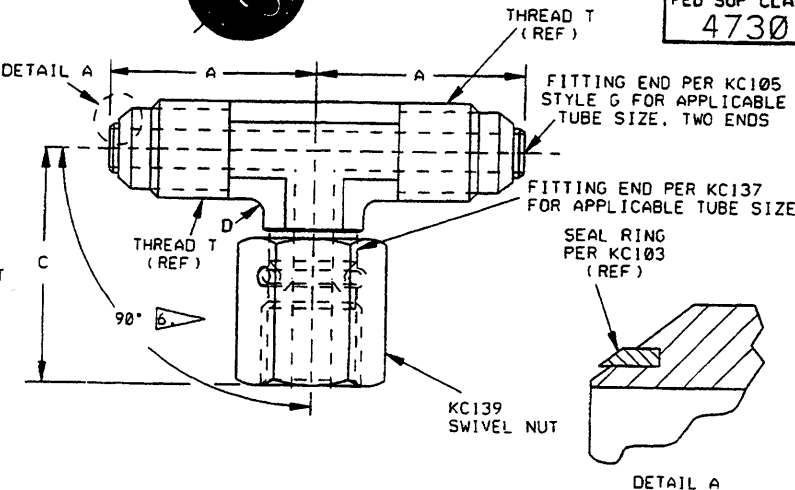
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FED SUP CLASS
4730



KC165 RETAINING WIRE



DETAIL A

DASH NO.		TUBE OD REF	THREAD T REF	A DIM. +.000 -.063	B DIM. +.000 -.031	C DIM REF	D RAD ±.03	E PAD DIM.	SWIVEL NUT KC139		RETAIN ING WIRE
CRE STEEL	AL ALLOY								CRE STEEL	AL ALLOY	
K4	D4	1/4	7/16-20	.906	.704	1.000	.063	.438	K4	D4	KC165-4
K6	D6	3/8	9/16-18	1.078	.891	1.250	.094	.563	K6	D6	KC165-6
K8	D8	1/2	3/4-16	1.266	.969	1.375		.750	K8	D8	KC165-8
K10	D10	5/8	7/8-14	1.469	1.141	1.625		.875	K10	D10	KC165-10
K12	D12	3/4	1-1/16-12	1.672	1.204	1.750		1.063	K12	D12	KC165-12
K16	D16	1	1-5/16-12	1.828	1.422	2.000	.125	1.313	K16	D16	KC165-16
K20	D20	1 1/4	1-5/8-12	2.078	1.704	2.313		1.625	K20	D20	KC165-20
K24	D24	1 1/2	1-7/8-12	2.344	1.875	2.594	.188	1.875	K24	D24	KC165-24
K28	D28	1 3/4	2-1/4-12	2.828	2.063	2.900		2.250	K28	D28	KC165-28
K32	D32	2	2-1/2-12	3.078	2.454	3.375	.250	2.500	K32	D32	KC165-32


MATERIAL: SEE PROCUREMENT SPECIFICATION.
ALUMINUM ALLOY, 2014-T6, CODE "D"
CORROSION RESISTANT STEEL (CLASS 316), CODE "K" (WAS CODE "C")

FINISH: SEE PROCUREMENT SPECIFICATION.

SCREW THREAD: SEE PROCUREMENT SPECIFICATION.

NOTES:

- REMOVE BURRS AND SLIVERS. BREAK SHARP EDGES UNLESS OTHERWISE NOTED.
- DIMENSIONS IN INCHES. UNLESS OTHERWISE SPECIFIED, TOLERANCE DECIMALS ±.016.
- FOR DESIGN FEATURE PURPOSES, THIS DRAWING TAKES PRECEDENCE OVER PROCUREMENT DOCUMENTS REFERENCED HEREIN.
- REFERENCED DOCUMENTS SHALL BE OF THE ISSUE IN EFFECT ON THE DATE OF INVITATION FOR BID.
- MARKING OF FITTINGS SHALL BE CONSISTENT WITH PROCUREMENT SPECIFICATION USING APPLICABLE KC STANDARD AND PART NUMBER DESIGNATIONS AS SHOWN ON THIS DRAWING.

 TOLERANCE UP TO AND INCLUDING -6 SIZE ±2-1/2° ABOVE -6 SIZE ±1-1/2°.

EXAMPLE OF PART NOS. KC109K8 = TEE WITH SWIVEL END ON OUTLET, 1/2" OD TUBING, CORROSION RESISTANT STEEL
KC109D12 = TEE WITH SWIVEL END ON OUTLET, 3/4" OD TUBING, ALUMINUM ALLOY

CUSTODIAN: JOHN F. KENNEDY SPACE CENTER

PROCUREMENT SPEC.
KSC-F-124

COORDINATION STATUS

KSC DE

**TEE ASSY, FLARED TUBE,
FEMALE SWIVEL END ON
OUTLET, FOR SEAL RING**

STANDARD PART

KC109


SHEET 1 OF 1

KSC FORM 32-85 (CG 4/92)

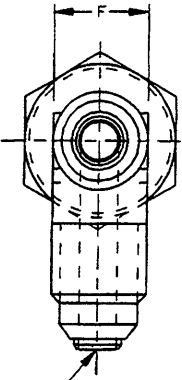
REVISED: (E) REV & REDRAWN 8-1-90

 APPROVED: 5-10-65

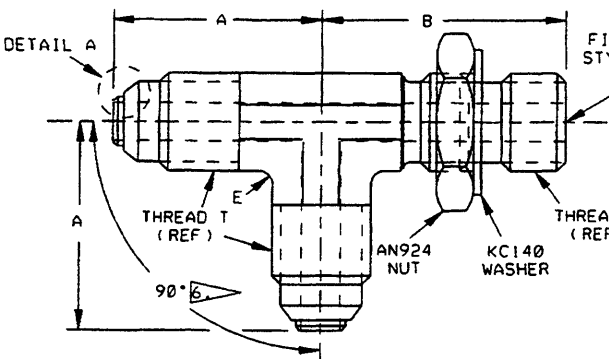
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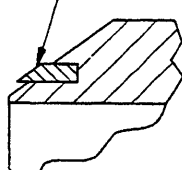
FED SUP CLASS
4730



FITTING END PER KC105
STYLE G FOR APPLICABLE
TUBE SIZE, TWO ENDS



DETAIL A



DETAIL A

DASH NO.		TUBE OD REF	THREAD T REF	A DIM. +.000 -.063	B DIM. +.000 -.063	E RAD +.03 -.03	F PAD DIM. +.016 -.016	BULKHEAD NUT		WASHER	
CRE STEEL	AL ALLOY							FOR CRE STEEL ASSY +	FOR AL ALLOY ASSY	FOR CRE STEEL ASSY	FOR AL ALLOY ASSY
K4	D4	1/4	7/16-20	.906	1.063	.063	.438	AN924-K4	AN924-D4	KC140C4	KC140D4
K6	D6	3/8	9/16-18	1.078	1.281	.094	.563	AN924-K6	AN924-D6	KC140C6	KC140D6
K8	D8	1/2	3/4-16	1.266	1.485		.750	AN924-K8	AN924-D8	KC140C8	KC140D8
K10	D10	5/8	7/8-14	1.469	1.735		.875	AN924-K10	AN924-D10	KC140C10	KC140D10
K12	D12	3/4	1-1/16-12	1.672	1.969		1.063	AN924-K12	AN924-D12	KC140C12	KC140D12
K16	D16	1	1-5/16-12	1.828	2.078	.125	1.313	AN924-K16	AN924-D16	KC140C16	KC140D16
K20	D20	1 1/4	1-5/8-12	2.078	2.281		1.625	AN924-K20	AN924-D20	KC140C20	KC140D20
K24	D24	1 1/2	1-7/8-12	2.344	2.422		1.875	AN924-K24	AN924-D24	KC140C24	KC140D24
K28	D28	1 3/4	2-1/4-12	2.828	2.813		2.250	AN924-K28	AN924-D28	KC140C28	KC140D28
K32	D32	2	2-1/2-12	3.078	2.922	.188	2.500	AN924-K32	AN924-D32	KC140C32	KC140D32


MATERIAL: SEE PROCUREMENT SPECIFICATION.
ALUMINUM ALLOY, 2014-T6, CODE "D"
CORROSION RESISTANT STEEL (CLASS 316), CODE "X" (WAS CODE "C")
*AN924 CRES NUTS MAY BE EITHER 304, CODE "J" OR 316, CODE "X".

FINISH: SEE PROCUREMENT SPECIFICATION.

SCREW THREAD: SEE PROCUREMENT SPECIFICATION.

NOTES:

- REMOVE BURRS AND SLIVERS. BREAK SHARP EDGES UNLESS OTHERWISE NOTED.
- DIMENSIONS IN INCHES. UNLESS OTHERWISE SPECIFIED, TOLERANCE DECIMALS $\pm .016$.
- FOR DESIGN FEATURE PURPOSES, THIS DRAWING TAKES PRECEDENCE OVER PROCUREMENT DOCUMENTS REFERENCED HEREIN.
- REFERENCED DOCUMENTS SHALL BE OF THE ISSUE IN EFFECT ON THE DATE OF INVITATION FOR BID.
- MARKING OF FITTINGS SHALL BE CONSISTENT WITH PROCUREMENT SPECIFICATION USING APPLICABLE KC STANDARD AND PART NUMBER DESIGNATIONS AS SHOWN ON THIS DRAWING.

 TOLERANCE UP TO AND INCLUDING -6 SIZE $\pm 2-1/2^\circ$ ABOVE -6 SIZE $\pm 1-1/2^\circ$.

EXAMPLE OF PART NOS. KC110K8 = TEE, ADJ. END ON RUN, 1/2" OD TUBING, CORROSION RESISTANT STEEL
KC110D12 = TEE, ADJ. END ON RUN, 3/4" OD TUBING, ALUMINUM ALLOY

CUSTODIAN: JOHN F. KENNEDY SPACE CENTER

PROCUREMENT SPEC. KSC-F-124

COORDINATION STATUS

KSC DE

**TEE ASSY, FLARED TUBE,
MALE ADJUSTABLE END ON
RUN, FOR SEAL RING**

STANDARD PART

KC110

SHEET 1 OF 1


KSC FORM 32-85 (CG 4/92)

REVISED: (C) REV & REDRAWN 8-1-90

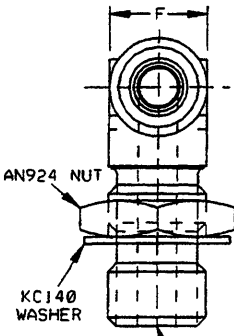
APPROVED: 5-10-65

GP-425

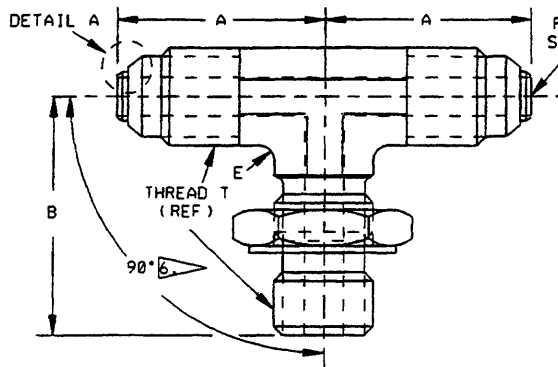
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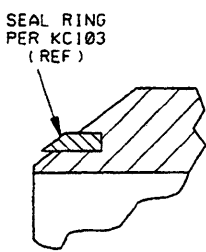
FED SUP CLASS
4730



AN924 NUT
KC140 WASHER
FITTING END PER KC138
STYLE T FOR APPLICABLE
TUBE SIZE



DETAIL A
A
A
A
B
E
THREAD T (REF)
90°
FITTING END PER KC105
STYLE G FOR APPLICABLE
TUBE SIZE, TWO ENDS



SEAL RING
PER KC103
(REF)
DETAIL A

DASH NO.		TUBE OD REF	THREAD T REF	A DIM. +.000 -.063	B DIM. +.000 -.063	E RAD +.03 -.03	F PAD DIM. +.016 -.016	BULKHEAD NUT		WASHER	
CRE STEEL	AL ALLOY							FOR CRE STEEL ASSY *	FOR AL ALLOY ASSY	FOR CRE STEEL ASSY	FOR AL ALLOY ASSY
K4	D4	1/4	7/16-20	.906	1.063	.063	.438	AN924-K4	AN924-D4	KC140C4	KC140D4
K6	D6	3/8	9/16-18	1.078	1.281	.094	.563	AN924-K6	AN924-D6	KC140C6	KC140D6
K8	D8	1/2	3/4-16	1.266	1.485		.750	AN924-K8	AN924-D8	KC140C8	KC140D8
K10	D10	5/8	7/8-14	1.469	1.735		.875	AN924-K10	AN924-D10	KC140C10	KC140D10
K12	D12	3/4	1-1/16-12	1.672	1.969		1.063	AN924-K12	AN924-D12	KC140C12	KC140D12
K16	D16	1	1-5/16-12	1.828	2.078	.125	1.313	AN924-K16	AN924-D16	KC140C16	KC140D16
K20	D20	1 1/4	1-5/8-12	2.078	2.281		1.625	AN924-K20	AN924-D20	KC140C20	KC140D20
K24	D24	1 1/2	1-7/8-12	2.344	2.422		1.875	AN924-K24	AN924-D24	KC140C24	KC140D24
K28	D28	1 3/4	2-1/4-12	2.828	2.813		2.250	AN924-K28	AN924-D28	KC140C28	KC140D28
K32	D32	2	2-1/2-12	3.078	2.922	.188	2.500	AN924-K32	AN924-D32	KC140C32	KC140D32


MATERIAL: SEE PROCUREMENT SPECIFICATION.
ALUMINUM ALLOY, 2014-T6, CODE "D"
CORROSION RESISTANT STEEL (CLASS 316), CODE "K" (WAS CODE "C")
*AN924 CRES NUTS MAY BE EITHER 304, CODE "J" OR 316, CODE "K".

FINISH: SEE PROCUREMENT SPECIFICATION.

SCREW THREAD: SEE PROCUREMENT SPECIFICATION.

NOTES:

- REMOVE BURRS AND SLIVERS. BREAK SHARP EDGES UNLESS OTHERWISE NOTED.
- DIMENSIONS IN INCHES. UNLESS OTHERWISE SPECIFIED, TOLERANCE DECIMALS $\pm .016$.
- FOR DESIGN FEATURE PURPOSES, THIS DRAWING TAKES PRECEDENCE OVER PROCUREMENT DOCUMENTS REFERENCED HEREIN.
- REFERENCED DOCUMENTS SHALL BE OF THE ISSUE IN EFFECT ON THE DATE OF INVITATION FOR BID.
- MARKING OF FITTINGS SHALL BE CONSISTENT WITH PROCUREMENT SPECIFICATION USING APPLICABLE KC STANDARD AND PART NUMBER DESIGNATIONS AS SHOWN ON THIS DRAWING.

 TOLERANCE UP TO AND INCLUDING -.6 SIZE $\pm 2-1/2^\circ$ ABOVE -.6 SIZE $\pm 1-1/2^\circ$.

EXAMPLE OF PART NOS. KC111K8 = TEE, ADJ. END ON OUTLET, 1/2" OD TUBING, CORROSION RESISTANT STEEL
KC111D12 = TEE, ADJ. END ON OUTLET, 3/4" OD TUBING, ALUMINUM ALLOY

CUSTODIAN: JOHN F. KENNEDY SPACE CENTER

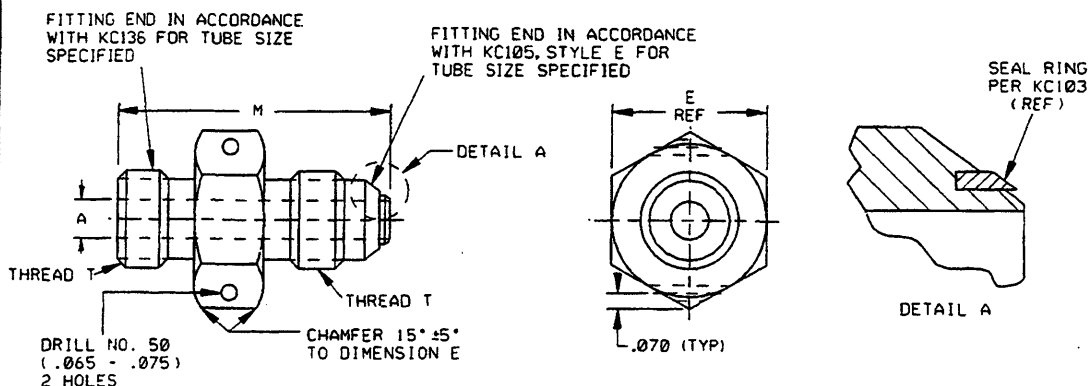
PROCUREMENT SPEC. KSC-F-124	TEE ASSY, FLARED TUBE MALE ADJUSTABLE END ON OUTLET, FOR SEAL RING	STANDARD PART
COORDINATION STATUS		KC111
KSC DE		SHEET 1 OF 1

REVISED: ⑥ REV & REDRAWN 8-1-90

APPROVED: 5-10-65

KSC FORM 32-85 (CG 4/92)

GP-425

FED SUP CLASS
4730

DASH NO.	TUBE OD REF	THREAD T REF	A (REF)	E (REF)	M
K4	D4	1/4	.172	.688	1.234
K6	D6	3/8	.297	.813	1.328
K8	D8	1/2	.391	1.000	1.516
K10	D10	5/8	.484	1.125	1.687
K12	D12	3/4	.609	1.375	1.922
K16	D16	1	.844	1.625	1.969
K20	D20	1 1/4	1.078	1.875	2.094
K24	D24	1 1/2	1.312	2.125	2.266
KK8	D28	1 3/4	1.546	2.500	2.547
K32	D32	2	1.780	2.750	2.766

MATERIAL: SEE PROCUREMENT SPECIFICATION.
ALUMINUM ALLOY, 2024-T6, CODE "D"
CORROSION RESISTANT STEEL (CLASS 316), CODE "X" (WAS CODE "C")

FINISH: SEE PROCUREMENT SPECIFICATION.

SCREW THREAD: SEE PROCUREMENT SPECIFICATION.

- NOTES:
1. REMOVE BURRS AND SLIVERS. BREAK SHARP EDGES UNLESS OTHERWISE NOTED.
 2. DIMENSIONS IN INCHES. UNLESS OTHERWISE SPECIFIED, TOLERANCE DECIMALS $\pm .016$.
 3. FOR DESIGN FEATURE PURPOSES, THIS DRAWING TAKES PRECEDENCE OVER PROCUREMENT DOCUMENTS REFERENCED HEREIN.
 4. REFERENCED DOCUMENTS SHALL BE OF THE ISSUE IN EFFECT ON THE DATE OF INVITATION FOR BID.
 5. MARKING OF FITTINGS SHALL BE CONSISTENT WITH PROCUREMENT SPECIFICATION USING APPLICABLE KC STANDARD AND PART NUMBER DESIGNATIONS AS SHOWN ON THIS DRAWING.

EXAMPLE OF PART NOS.
KC112K4 = ADAPTER, 1/4 OD TUBING, CORROSION RESISTANT STEEL
KC112D8 = ADAPTER, 1/2 OD TUBING, ALUMINUM ALLOY

NOTICE: WHEN GOVERNMENT DRAWINGS, SPECIFICATIONS OR OTHER DATA ARE USED FOR ANY PURPOSE OTHER THAN IN CONNECTION WITH A DEFINITELY RELATED GOVERNMENT PROCUREMENT OPERATION, THE UNITED STATES GOVERNMENT THEREBY INCURS NO RESPONSIBILITY NOR ANY OBLIGATION WHATSOEVER AND THE FACT THAT THE GOVERNMENT MAY HAVE FORMULATED, FURNISHED, OR IN ANY WAY SUPPLIED THE SAID DRAWINGS, SPECIFICATIONS, OR OTHER DATA IS NOT REGARDED BY IMPLICATION OR OTHERWISE AS IN ANY MANNER LICENSING THE HOLDER OR ANY OTHER PERSON OR CORPORATION, OR CONVEYING ANY RIGHTS OR PERMISSION TO MANUFACTURE, USE, OR SELL ANY PATENTED INVENTION THAT MAY IN ANY WAY BE RELATED THERETO.

CUSTODIAN: JOHN F. KENNEDY SPACE CENTER

PROCUREMENT SPEC.
KSC-F-124

COORDINATION STATUS

KSC DE

ADAPTER, FLARED TUBE
& BOSS FOR SEAL RING

STANDARD PART

KC112

SHEET 1 OF 1


KSC FORM 32-85 (CG 4/92)

REVISED: (E) REV 8 REDRAWN 8-1-90

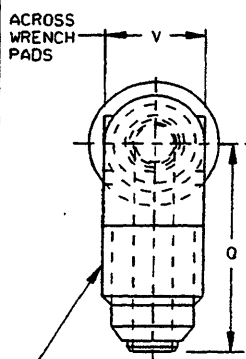
APPROVED: 5-10-65

GP-425

NOTICE: WHEN GOVERNMENT DRAWINGS, SPECIFICATIONS OR OTHER DATA ARE USED FOR ANY PURPOSE OTHER THAN IN CONNECTION WITH A DEFINITELY RELATED GOVERNMENT PROCUREMENT OPERATION, THE UNITED STATES GOVERNMENT THEREBY INCURS NO RESPONSIBILITY NOR ANY OBLIGATION WHATSOEVER AND THE FACT THAT THE GOVERNMENT MAY HAVE FORMULATED, FURNISHED, OR IN ANY WAY SUPPLIED THE SAID DRAWINGS, SPECIFICATIONS, OR OTHER DATA IS NOT REGARDED BY IMPLICATION OR OTHERWISE AS IN ANY MANNER LICENSING THE HOLDER OR ANY OTHER PERSON OR CORPORATION, OR CONVEYING ANY RIGHTS OR PERMISSION TO MANUFACTURE, USE, OR SELL ANY PATENTED INVENTION THAT MAY IN ANY WAY BE RELATED THERETO.

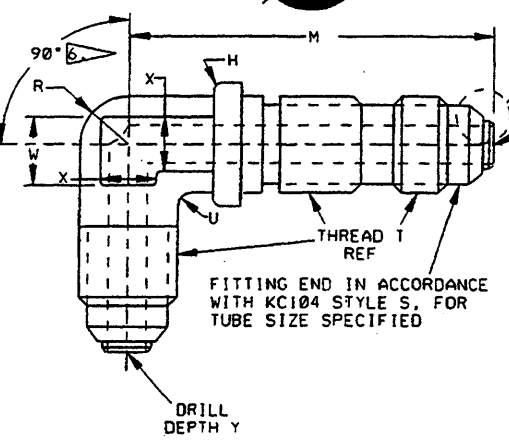


FED SUP CLASS
4730



ACROSS WRENCH PADS

FITTING END IN ACCORDANCE WITH KC105, STYLE G, FOR APPLICABLE TUBE SIZE



90°

DRILL DEPTH Y

DRILL DEPTH Z

DETAIL A

SEAL RING PER KC103 (REF)

DETAIL A

THREAD T REF

FITTING END IN ACCORDANCE WITH KC104 STYLE S, FOR TUBE SIZE SPECIFIED

DASH NO.		TUBE OD REF	THREAD T REF	H RAD	M +.000 -.047	O +.000 -.047	R RAD	U RAD	V	W APPROX	X APPROX	Y +.047 -.000	Z +.047 -.000
CRE STEEL	AL ALLOY												
K4	D4	1/4	7/16-20	.063	1.625	1.000	.219	.063	.438	.375	.250	.984	1.609
K6	D6	3/8	9/16-18	.094	1.844	1.125	.261	.094	.563	.500	.313	1.109	1.828
K8	D8	1/2	3/4-16		2.141	1.391	.375		.750	.625	.438	1.375	2.125
K10	D10	5/8	7/8-14		2.422	1.594	.438		.875	.750	.438	1.641	2.469
K12	D12	3/4	1-1/16-12		2.703	1.813	.531	.125	1.063	.875	.500	1.859	2.750
K16	D16	1	1-5/16-12		2.828	1.969	.656		1.313	1.063	.625	2.016	2.875
K20	D20	1 1/4	1-5/8-12		3.156	2.203	.813		1.625	1.250	.750	2.281	3.234
K24	D24	1 1/2	1-7/8-12		3.453	2.375	.938	.188	1.875	1.438	.875	2.484	3.609
K28	D28	1 3/4	2-1/4-12		3.828	2.641	1.125		2.250	1.750	1.063	2.781	4.063
K32	D32	2	2-1/2-12		4.141	2.922	1.250		2.563	1.938	1.188	2.938	4.453


MATERIAL: SEE PROCUREMENT SPECIFICATION.
ALUMINUM ALLOY, 2014-T6, CODE "D"
CORROSION RESISTANT STEEL (CLASS 316), CODE "K" (WAS CODE "C")

FINISH: SEE PROCUREMENT SPECIFICATION.

SCREW THREAD: SEE PROCUREMENT SPECIFICATION.

NOTES:

- REMOVE BURRS AND SLIVERS. BREAK SHARP EDGES UNLESS OTHERWISE NOTED.
- DIMENSIONS IN INCHES: UNLESS OTHERWISE SPECIFIED, TOLERANCE DECIMALS $\pm .016$.
- FOR DESIGN FEATURE PURPOSES, THIS DRAWING TAKES PRECEDENCE OVER PROCUREMENT DOCUMENTS REFERENCED HEREIN.
- REFERENCED DOCUMENTS SHALL BE OF THE ISSUE IN EFFECT ON THE DATE OF INVITATION FOR BID.
- MARKING OF FITTINGS SHALL BE CONSISTENT WITH PROCUREMENT SPECIFICATION USING APPLICABLE KC STANDARD AND PART NUMBER DESIGNATIONS AS SHOWN ON THIS DRAWING.

 TOLERANCE UP TO AND INCLUDING -6 SIZE $\pm 2-1/2^\circ$ ABOVE -6 SIZE $\pm 1-1/2^\circ$.

EXAMPLE OF PART NOS. KC113K8 = ELBOW, 1/2" OD TUBING, CORROSION RESISTANT STEEL
KC113D12 = ELBOW, 3/4" OD TUBING, ALUMINUM ALLOY

CUSTODIAN: JOHN F. KENNEDY SPACE CENTER

PROCUREMENT SPEC. KSC-F-124

COORDINATION STATUS

KSC DE

ELBOW - FLARED TUBE
BULKHEAD UNIVERSAL 90°
FOR SEAL RING

STANDARD PART

KC113

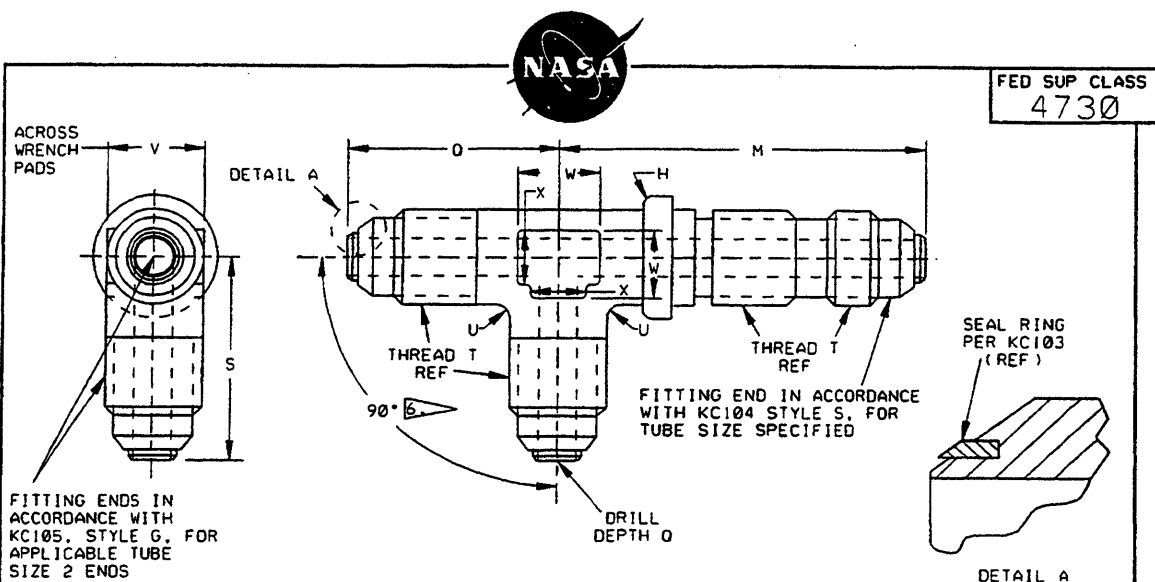
SHEET 1 OF 1

KSC FORM 32-85 (CG 4/92)

REVISED: (F) REV & REDRAWN 8-1-90

 APPROVED: 5-10-65

NOTICE: WHEN GOVERNMENT DRAWINGS, SPECIFICATIONS OR OTHER DATA ARE USED FOR ANY PURPOSE OTHER THAN IN CONNECTION WITH A DEFINITELY RELATED GOVERNMENT PROCUREMENT OPERATION, THE UNITED STATES GOVERNMENT THEREBY INCURS NO RESPONSIBILITY NOR ANY OBLIGATION WHATSOEVER AND THE FACT THAT THE GOVERNMENT MAY HAVE FORMULATED, FURNISHED, OR IN ANY WAY SUPPLIED THE SAID DRAWINGS, SPECIFICATIONS, OR OTHER DATA IS NOT REGARDED BY IMPLICATION OR OTHERWISE AS IN ANY MANNER LICENSING THE HOLDER OR ANY OTHER PERSON OR CORPORATION, OR CONVEYING ANY RIGHTS OR PERMISSION TO MANUFACTURE, USE, OR SELL ANY PATENTED INVENTION THAT MAY IN ANY WAY BE RELATED THERETO.



DASH NO.		TUBE OD REF	THREAD T REF	H RAD	M +.000 -.047	D +.000 -.047	S +.047 -.000	U RAD	V	W APPROX	X APPROX
CRE STEEL	AL ALLOY										
K4	D4	¼	7/16-20	.063	1.625	.938	.953	.063	.438	.375	.250
K6	D6	⅜	9/16-18	.094	1.844	1.109	1.078	.094	.563	.500	.313
K8	D8	½	3/4-16		2.141	1.297	1.344		.750	.688	.438
K10	D10	⅝	7/8-14		2.422	1.500	1.547	.125	.875	.781	.438
K12	D12	¾	1-1/16-12		2.703	1.703	1.766		1.063	.906	.500
K16	D16	1	1-5/16-12		2.828	1.859	1.922		1.313	1.094	.625
K20	D20	1¼	1-5/8-12		3.156	2.109	2.156	.188	1.625	1.313	.750
K24	D24	1½	1-7/8-12		3.453	2.375	2.328		1.875	1.500	.875
K28	D28	1¾	2-1/4-12		3.828	2.859	2.594		2.250	1.781	1.063
K32	D32	2	2-1/2-12	4.141	3.109	2.875	2.563		2.031	1.188	

MATERIAL: SEE PROCUREMENT SPECIFICATION.
ALUMINUM ALLOY, 2014-T6, CODE "D"
CORROSION RESISTANT STEEL (CLASS 316), CODE "K" (WAS CODE "C")

FINISH: SEE PROCUREMENT SPECIFICATION.

SCREW THREAD: SEE PROCUREMENT SPECIFICATION.

- NOTES:
1. REMOVE BURRS AND SLIVERS. BREAK SHARP EDGES UNLESS OTHERWISE NOTED.
 2. DIMENSIONS IN INCHES. UNLESS OTHERWISE SPECIFIED, TOLERANCE DECIMALS $\pm .016$.
 3. FOR DESIGN FEATURE PURPOSES, THIS DRAWING TAKES PRECEDENCE OVER PROCUREMENT DOCUMENTS REFERENCED HEREIN.
 4. REFERENCED DOCUMENTS SHALL BE OF THE ISSUE IN EFFECT ON THE DATE OF INVITATION FOR BID.
 5. MARKING OF FITTINGS SHALL BE CONSISTENT WITH PROCUREMENT SPECIFICATION USING APPLICABLE KC STANDARD AND PART NUMBER DESIGNATIONS AS SHOWN ON THIS DRAWING.

6. TOLERANCE UP TO AND INCLUDING -6 SIZE $\pm 2-1/2^{\circ}$ ABOVE -6 SIZE $\pm 1-1/2^{\circ}$.

EXAMPLE OF
PART NOS. KC114K8 = TEE, 1/2" OD TUBING, CORROSION RESISTANT STEEL
KC114D12 = TEE, 3/4" OD TUBING, ALUMINUM ALLOY

CUSTODIAN: JOHN F. KENNEDY SPACE CENTER		
PROCUREMENT SPEC. KSC-F-124	TEE - FLARED TUBE BULKHEAD ON RUN, FOR SEAL RING	STANDARD PART
COORDINATION STATUS		KC114
KSC DE		SHEET 1 OF 1


KSC FORM 32-85 (CG 4/92)

REVISED: (E) REV & REDRAWN 8-1-90

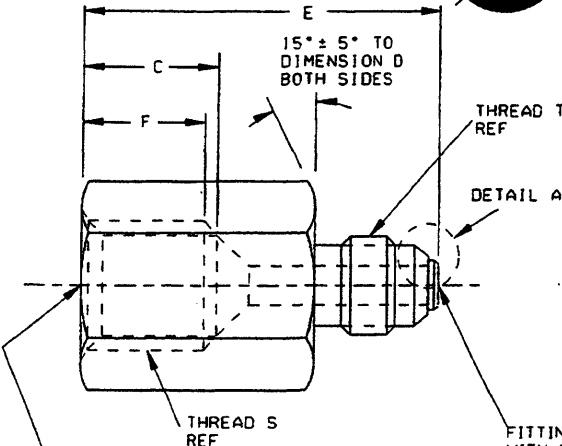
APPROVED: 5-10-65

GP-425

NOTICE: WHEN GOVERNMENT DRAWINGS, SPECIFICATIONS OR OTHER DATA ARE USED FOR ANY PURPOSE OTHER THAN IN CONNECTION WITH A DEFINITELY RELATED GOVERNMENT PROCUREMENT OPERATION, THE UNITED STATES GOVERNMENT THEREBY INCURS NO RESPONSIBILITY NOR ANY OBLIGATION WHATSOEVER AND THE FACT THAT THE GOVERNMENT MAY HAVE FORMULATED, FURNISHED, OR IN ANY WAY SUPPLIED THE SAID DRAWINGS, SPECIFICATIONS, OR OTHER DATA IS NOT REGARDED BY IMPLICATION OR OTHERWISE AS IN ANY MANNER LICENSING THE HOLDER OR ANY OTHER PERSON OR CORPORATION, OR CONVEYING ANY RIGHTS OR PERMISSION TO MANUFACTURE, USE, OR SELL ANY PATENTED INVENTION THAT MAY IN ANY WAY BE RELATED THERETO.



FED SUP CLASS
4730

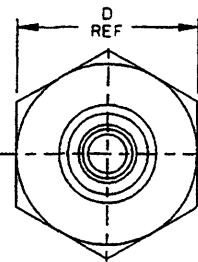


15° ± 5° TO DIMENSION D BOTH SIDES

THREAD S REF

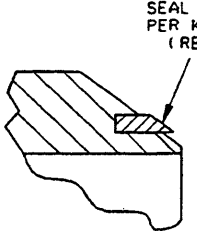
THREAD T REF

DETAIL A



D REF

DETAIL A



SEAL RING PER KC103 (REF)

DETAIL A

INTERNALLY THREADED END IN ACCORDANCE WITH MS33649 FOR TUBE SIZE SPECIFIED EXCEPT AS OTHERWISE NOTED. SPOTFACE NOT A REQUIREMENT

FITTING END IN ACCORDANCE WITH KC105, STYLE E FOR TUBE SIZE SPECIFIED EXCEPT HEX AS NOTED

DASH NO.		INTERNALLY THREADED END				EXTERNALLY THREADED END			
CRES STEEL	AL ALLOY	TUBE OD	THREAD S REF	C	F MIN 6	TUBE OD	THREAD T REF	D REF	E +.000 -.076
K6-4	D6-4	3/8	9/16-18	.609	.482	1/4	7/16-20	.813	1.406
K8-4	D8-4	1/2	3/4-16	.734	.593	1/4	7/16-20	1.000	1.594
K8-6	D8-6				3/8	9/16-18	1.562		
K10-4	D10-4	3/8	7/8-14	.797	.638	1/4	7/16-20	1.125	1.687
K10-6	D10-6				3/8	9/16-18	1.656		
K10-8	D10-8				1/2	3/4-16	1.766		
K12-6	D12-6	3/4	1-1/16-12	.922	.656	3/8	9/16-18	1.375	1.828
K12-8	D12-8				1/2	3/4-16	1.937		
K12-10	D12-10				3/8	7/8-14	2.031		
K16-6	D16-6	1	1-5/16-12	.953	.687	3/8	9/16-18	1.625	1.937
K16-8	D16-8				1/2	3/4-16	2.047		
K16-10	D16-10				3/8	7/8-14	2.125		
K16-12	D16-12				3/4	1-1/16-12	2.219		
K20-8	D20-8	1 1/4	1-5/8-12	1.000	.734	1/2	3/4-16	1.875	2.187
K20-10	D20-10				3/8	7/8-14	2.266		
K20-12	D20-12				3/4	1-1/16-12	2.344		
K20-16	D20-16				1	1-5/16-12	2.312		

CUSTOMIDIAN:
JOHN F. KENNEDY SPACE CENTER

**BUSHING - SCREW THREAD
EXPANDER FOR SEAL RING**

STANDARD PART

KC115

SHEET 1 OF 2

PROCUREMENT SPEC.
KSC-F-124

COORDINATION STATUS

KSC DE

KSC FORM 32-85 (CG 4/92)

REVISED: (D) REV & REDRAWN 8-1-90 (E) ADDED DIMENSION F 9-1-97

APPROVED: 5-10-65

GP-425

FED SUP CLASS
4730

NOTICE: WHEN GOVERNMENT DRAWINGS, SPECIFICATIONS OR OTHER DATA ARE USED FOR ANY PURPOSE OTHER THAN IN CONNECTION WITH A DEFINITELY RELATED GOVERNMENT PROCUREMENT OPERATION, THE UNITED STATES GOVERNMENT THEREBY INCURS NO RESPONSIBILITY NOR ANY OBLIGATION WHATSOEVER AND THE FACT THAT THE GOVERNMENT MAY HAVE FORMULATED, FURNISHED, OR IN ANY WAY SUPPLIED THE SAID DRAWINGS, SPECIFICATIONS, OR OTHER DATA IS NOT REGARDED BY IMPLICATION OR OTHERWISE AS IN ANY MANNER LICENSING THE HOLDER OR ANY OTHER PERSON OR CORPORATION, OR CONVEYING ANY RIGHTS OR PERMISSION TO MANUFACTURE, USE, OR SELL ANY PATENTED INVENTION THAT MAY IN ANY WAY BE RELATED THERETO.

- MATERIAL:** SEE PROCUREMENT SPECIFICATION.
ALUMINUM ALLOY, 2024-T6, CODE "D"
CORROSION RESISTANT STEEL (CLASS 316), CODE "K" (WAS CODE "C")
- FINISH:** SEE PROCUREMENT SPECIFICATION.
- SCREW THREAD:** SEE PROCUREMENT SPECIFICATION.
- NOTES:**
1. REMOVE BURRS AND SLIVERS. BREAK SHARP EDGES UNLESS OTHERWISE NOTED.
 2. DIMENSIONS IN INCHES. UNLESS OTHERWISE SPECIFIED, TOLERANCE DECIMALS $\pm .016$.
 3. FOR DESIGN FEATURE PURPOSES, THIS DRAWING TAKES PRECEDENCE OVER PROCUREMENT DOCUMENTS REFERENCED HEREIN.
 4. REFERENCED DOCUMENTS SHALL BE OF THE ISSUE IN EFFECT ON THE DATE OF INVITATION FOR BID.
 5. MARKING OF FITTINGS SHALL BE CONSISTENT WITH PROCUREMENT SPECIFICATION USING APPLICABLE KC STANDARD AND PART NUMBER DESIGNATIONS AS SHOWN ON THIS DRAWING.
- 6 MIN IS THE FULL THREAD DEPTH REQUIREMENT.

EXAMPLE OF
PART NOS.

KC115K8-6 = BUSHING, $\frac{1}{2}$ " BOSS TO $\frac{3}{8}$ " TUBE, CORROSION RESISTANT STEEL.
KC115D8-6 = BUSHING, $\frac{1}{2}$ " BOSS TO $\frac{3}{8}$ " TUBE, ALUMINUM ALLOY.

REVISED: (D) REV & REDRAWN 8-1-90 (E) ADDED FLAG NOTE 6 9-1-97

APPROVED: 5-10-65

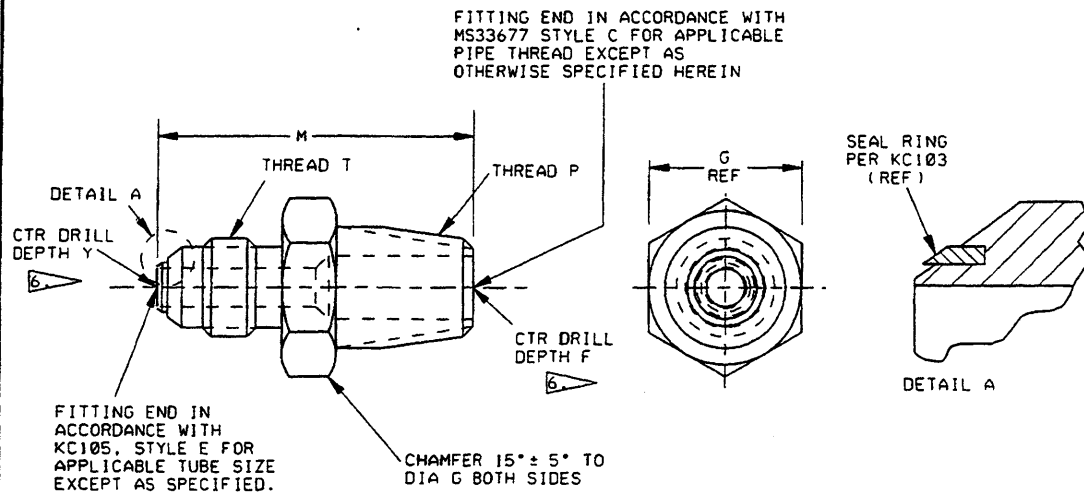
CUSTODIAN:		JOHN F. KENNEDY SPACE CENTER	
PROCUREMENT SPEC. KSC-F-124	BUSHING - SCREW THREAD EXPANDER FOR SEAL RING	STANDARD PART	
COORDINATION STATUS KSC DE		KC115	
		SHEET 2 OF 2	

KSC FORM 32-85 (CG 4/92)

GP-425

FED SUP CLASS
4730

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MATERIAL: SEE PROCUREMENT SPECIFICATION.
ALUMINUM ALLOY, 2024-T6, CODE "D"
CORROSION RESISTANT STEEL (CLASS 316), CODE "K" (WAS CODE "C")

FINISH: SEE PROCUREMENT SPECIFICATION.

SCREW THREAD: SEE PROCUREMENT SPECIFICATION.

- NOTES:
1. REMOVE BURRS AND SLIVERS. BREAK SHARP EDGES UNLESS OTHERWISE NOTED.
 2. DIMENSIONS IN INCHES. UNLESS OTHERWISE SPECIFIED, TOLERANCE DECIMALS $\pm .016$.
 3. FOR DESIGN FEATURE PURPOSES, THIS DRAWING TAKES PRECEDENCE OVER PROCUREMENT DOCUMENTS REFERENCED HEREIN.
 4. REFERENCED DOCUMENTS SHALL BE OF THE ISSUE IN EFFECT ON THE DATE OF INVITATION FOR BID.
 5. MARKING OF FITTINGS SHALL BE CONSISTENT WITH PROCUREMENT SPECIFICATION USING APPLICABLE KC STANDARD AND PART NUMBER DESIGNATIONS AS SHOWN ON THIS DRAWING.

AT THE OPTION OF THE MANUFACTURER, THE SMALLER INSIDE DIAMETER MAY BE DRILLED FROM PORT TO PORT.

EXAMPLE OF PART NOS. KC116K8-4 = NIPPLE, $\frac{1}{2}$ " OD TUBING TO $\frac{1}{4}$ " OD PIPE, CORROSION RESISTANT STEEL
KC116D8-4 = NIPPLE, $\frac{1}{2}$ " OD TUBING TO $\frac{1}{4}$ " OD PIPE, ALUMINUM ALLOY

REVISED: (E) REV & REDRAWN 8-1-90

APPROVED: 5-10-65

CUSTODIAN: JOHN F. KENNEDY SPACE CENTER

PROCUREMENT SPEC.
KSC-F-124

COORDINATION STATUS

KSC DE

NIPPLE - FLARED TUBE
& PIPE THREAD
FOR SEAL RING

STANDARD PART

KC116



SHEET 1 OF 2

KSC FORM 32-85 (CG 4/92)

NASA

FED SUP CLASS
4730

NOTICE: WHEN GOVERNMENT DRAWINGS, SPECIFICATIONS OR OTHER DATA ARE USED FOR ANY PURPOSE OTHER THAN IN CONNECTION WITH A DEFINITELY RELATED GOVERNMENT PROCUREMENT OPERATION, THE UNITED STATES GOVERNMENT THEREBY INCURS NO RESPONSIBILITY NOR ANY OBLIGATION WHATSOEVER AND THE FACT THAT THE GOVERNMENT MAY HAVE FORMULATED, FURNISHED, OR IN ANY WAY SUPPLIED THE SAID DRAWINGS, SPECIFICATIONS, OR OTHER DATA IS NOT REGARDED BY IMPLICATION OR OTHERWISE AS IN ANY MANNER LICENSING THE HOLDER OR ANY OTHER PERSON OR CORPORATION, OR CONVEYING ANY RIGHTS OR PERMISSION TO MANUFACTURE, USE, OR SELL ANY PATENTED INVENTION THAT MAY IN ANY WAY BE RELATED THERETO.

DASH NO.		TUBE OD REF	THREAD T REF	THREAD P ANPT	M +.000 -.075	F 	Y 	G			
CRES STEEL	AL ALLOY										
K4-2	D4-2	1/4	7/16-20	1/8-27	1.125	.469		.500	±.004		
K4-4	D4-4			1/4-18	1.391	.688		.563			
K6-2	D6-2	3/8	9/16-18	1/8-27	1.203		.688	.625			
K6-4	D6-4			1/4-18	1.391	.688		.625			
K6-6	D6-6			3/8-18	1.422	.688		.750			
K6-8	D6-8			1/2-14	1.641	.875		.875			
K8-4	D8-4	1/2	3/4-16	1/4-18	1.516		.844	.813			
K8-6	D8-6			3/8-18	1.516	.688		.813			
K8-8	D8-8			1/2-14	1.735	.875		.875			
K10-4	D10-4	5/8	7/8-14	1/4-18	1.722		.844	.938	±.005		
K10-6	D10-6			3/8-18	1.656	.812					
K10-8	D10-8			1/2-14	1.844	.906					
K10-12	D10-12			3/4-14	1.859	.906					
K12-4	D12-4	3/4	1-1/16-12	1/4-18	1.843		1.046	1.125			
K12-6	D12-6			3/8-18	1.859		1.000				
K12-8	D12-8			1/2-14	1.969		1.063				
K12-12	D12-12			3/4-14	1.969	.906				±.005	
K12-16	D12-16			1-11 1/2	2.203	1.063					
K16-8	D16-8	1	1-5/16-12	1/2-14	2.015		.906	1.375	±.016		
K16-12	D16-12			3/4-14	2.047		1.094				
K16-16	D16-16			1-11 1/2	2.234	1.125					
K20-12	D20-12	1 1/4	1-5/8-12	3/4-14	2.140		1.031	1.688			
K20-16	D20-16			1-11 1/2	2.344		1.250				
K20-20	D20-20			1 1/4-11 1/2	2.375	1.188		1.750			
K24-12	D24-12	1 1/2	1-7/8-12	3/4-14	2.203		1.031	2.000			
K24-16	D24-16			1-11 1/2	2.453		1.156				
K24-20	D24-20			1 1/4-11 1/2	2.562		1.344				
K24-24	D24-24			1 1/2-11 1/2	2.593	1.031					
K28-16	D28-16	1 3/4	2-1/4-12	1-11 1/2	2.797		1.125	2.375	±.020		
K28-20	D28-20			1 1/4-11 1/2	2.812		1.500				
K28-24	D28-24			1 1/2-11 1/2	2.844		1.438				
K32-20	D32-20	2	2-1/2-12	1 1/4-11 1/2	3.079		1.500	2.625			
K32-24	D32-24			1 1/2-11 1/2	3.094		1.438				
K32-32	D32-32			2-11 1/2	3.125	1.438					

CUSTODIAN:

JOHN F. KENNEDY SPACE CENTER

PROCUREMENT SPEC.

KSC-F-124

COORDINATION STATUS

KSC DE

NIPPLE - FLARED TUBE
& PIPE THREAD
FOR SEAL RING

STANDARD PART

KC116

SHEET 2 OF 2


KSC FORM 32-85 (CG 4/92)

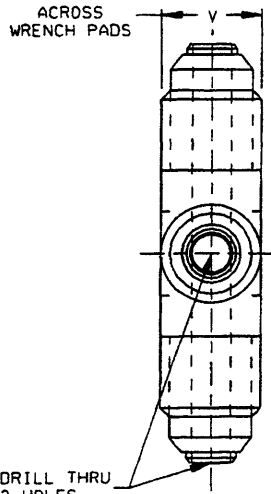
REVISED: (E) REV & REDRAWN 8-1-90

APPROVED: 5-10-65

GP-425

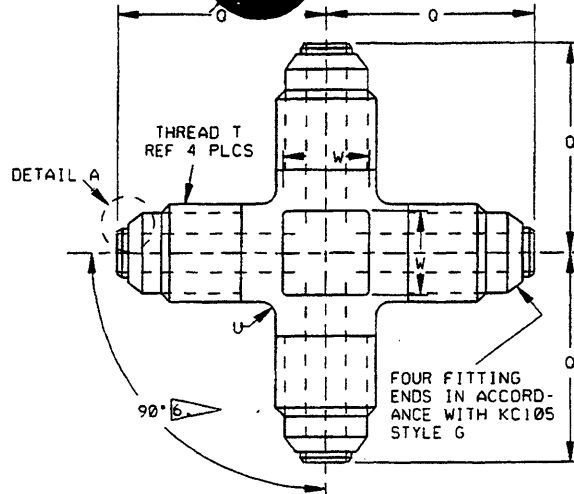
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ACROSS WRENCH PADS

DRILL THRU 2 HOLES



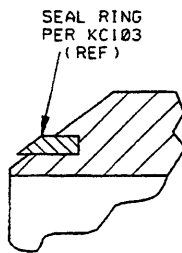
THREAD T REF 4 PLCS

DETAIL A

90°

FOUR FITTING ENDS IN ACCORDANCE WITH KC105 STYLE G

FED SUP CLASS
4730



SEAL RING PER KC103 (REF)

DETAIL A

DASH NO.		TUBE OD REF	THREAD T REF	O +.000 -.047	U RAD	V	W APPROX
CRE STEEL	AL ALLOY						
K4	D4	1/4	7/16-20	.906	.063	.438	.375
K6	D6	3/8	9/16-18	1.078	.094	.563	.500
K8	D8	1/2	3/4-16	1.266	.125	.750	.688
K10	D10	5/8	7/8-14	1.469	.125	.875	.781
K12	D12	3/4	1-1/16-12	1.672	.125	1.063	.906
K16	D16	1	1-5/16-12	1.828	.125	1.313	1.094
K20	D20	1 1/4	1-5/8-12	2.078	.125	1.625	1.313
K24	D24	1 1/2	1-7/8-12	2.344	.125	1.875	1.500
K28	D28	1 3/4	2-1/4-12	2.828	.125	2.250	1.781
K32	D32	2	2-1/2-12	3.078	.188	2.563	2.563


MATERIAL: SEE PROCUREMENT SPECIFICATION.
ALUMINUM ALLOY, 2014-T6, CODE "D"
CORROSION RESISTANT STEEL (CLASS 316), CODE "K" (WAS CODE "C")

FINISH: SEE PROCUREMENT SPECIFICATION.

SCREW THREAD: SEE PROCUREMENT SPECIFICATION.

NOTES:

- REMOVE BURRS AND SLIVERS. BREAK SHARP EDGES UNLESS OTHERWISE NOTED.
- DIMENSIONS IN INCHES. UNLESS OTHERWISE SPECIFIED, TOLERANCE DECIMALS ±.016.
- FOR DESIGN FEATURE PURPOSES, THIS DRAWING TAKES PRECEDENCE OVER PROCUREMENT DOCUMENTS REFERENCED HEREIN.
- REFERENCED DOCUMENTS SHALL BE OF THE ISSUE IN EFFECT ON THE DATE OF INVITATION FOR BID.
- MARKING OF FITTINGS SHALL BE CONSISTENT WITH PROCUREMENT SPECIFICATION USING APPLICABLE KC STANDARD AND PART NUMBER DESIGNATIONS AS SHOWN ON THIS DRAWING.

 TOLERANCE UP TO AND INCLUDING -.6 SIZE ±2-1/2" ABOVE -.6 SIZE ±1-1/2".

EXAMPLE OF PART NOS. KC117K8 = CROSS, 1/2" OD TUBING, CORROSION RESISTANT STEEL
KC117D12 = CROSS, 3/4" OD TUBING, ALUMINUM ALLOY

CUSTODIAN: JOHN F. KENNEDY SPACE CENTER

PROCUREMENT SPEC.
KSC-F-124

COORDINATION STATUS
KSC DE

**CROSS - FLARED TUBE
FOR SEAL RING**

STANDARD PART

KC117


SHEET 1 OF 1

KSC FORM 32-85 (CG 4/92)

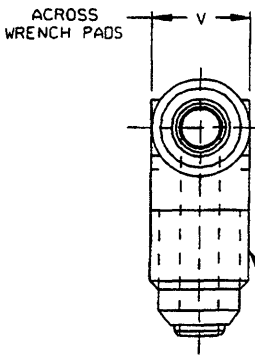
REVISED: (E) REV & REDRAWN 8-1-90

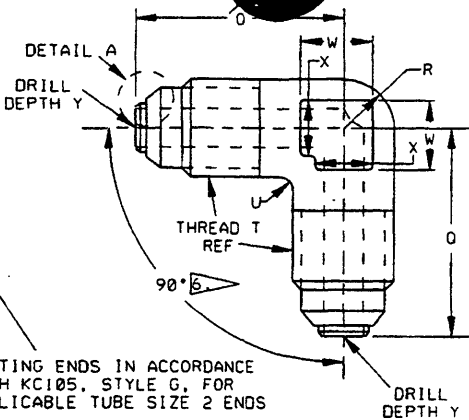
APPROVED: 5-10-65

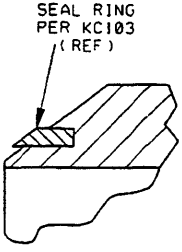
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FED SUP CLASS
4730







FITTING ENDS IN ACCORDANCE WITH KC105, STYLE G, FOR APPLICABLE TUBE SIZE 2 ENDS

90°

DRILL DEPTH Y

DASH NO.		TUBE OD REF	THREAD T REF	O +.000 -.047	R RAD	U RAD	V 7	W APPROX	X APPROX	Y +.047 -.000
CRE STEEL	AL ALLOY									
K4	D4	1/4	7/16-20	.936	.219	.063	.438	.375	.250	.937
K6	D6	3/8	9/16-18	1.108	.281		.563	.500	.313	1.125
K8	D8	1/2	3/4-16	1.296	.375		.750	.625	.438	1.312
K10	D10	5/8	7/8-14	1.499	.438	.094	.875	.750	.438	1.515
K12	D12	3/4	1-1/16-12	1.702	.531		1.063	.875	.500	1.718
K16	D16	1	1-5/16-12	1.858	.656		1.313	1.063	.625	1.937
K20	D20	1 1/4	1-5/8-12	2.108	.813	.125	1.625	1.250	.750	2.187
K24	D24	1 1/2	1-7/8-12	2.374	.938		1.875	1.438	.875	2.484
K28	D28	1 3/4	2-1/4-12	2.858	1.125	.188	2.250	1.750	1.063	2.937
K32	D32	2	2-1/2-12	3.108	1.250	.250	2.563	2.000	1.188	3.250



MATERIAL: SEE PROCUREMENT SPECIFICATION.
ALUMINUM ALLOY, 2014-T6, CODE "D"
CORROSION RESISTANT STEEL (CLASS 316), CODE "K" (WAS CODE "C")

FINISH: SEE PROCUREMENT SPECIFICATION.

SCREW THREAD: SEE PROCUREMENT SPECIFICATION.

NOTES:

- REMOVE BURRS AND SLIVERS. BREAK SHARP EDGES UNLESS OTHERWISE NOTED.
- DIMENSIONS IN INCHES. UNLESS OTHERWISE SPECIFIED, TOLERANCE DECIMALS $\pm .016$.
- FOR DESIGN FEATURE PURPOSES, THIS DRAWING TAKES PRECEDENCE OVER PROCUREMENT DOCUMENTS REFERENCED HEREIN.
- REFERENCED DOCUMENTS SHALL BE OF THE ISSUE IN EFFECT ON THE DATE OF INVITATION FOR BID.
- MARKING OF FITTINGS SHALL BE CONSISTENT WITH PROCUREMENT SPECIFICATION USING APPLICABLE KC STANDARD AND PART NUMBER DESIGNATIONS AS SHOWN ON THIS DRAWING.

 TOLERANCE UP TO AND INCLUDING -6 SIZE $\pm 2-1/2^\circ$ ABOVE -6 SIZE $\pm 1-1/2^\circ$.
 V DIMENSION FOR -32 SIZE EQUAL TO 2.500" IS ACCEPTABLE BUT 2.563" IS PREFERRED.

EXAMPLE OF PART NOS.

KC118K8 = ELBOW, 1/2" OD TUBING, CORROSION RESISTANT STEEL
 KC118D12 = ELBOW, 3/4" OD TUBING, ALUMINUM ALLOY

CUSTODIAN: JOHN F. KENNEDY SPACE CENTER

PROCUREMENT SPEC.
KSC-F-124

COORDINATION STATUS
KSC DE

**ELBOW - FLARED TUBE 90°,
FOR SEAL RING**

STANDARD PART
KC118


SHEET 1 OF 1

KSC FORM 32-85 (CG 4/92)

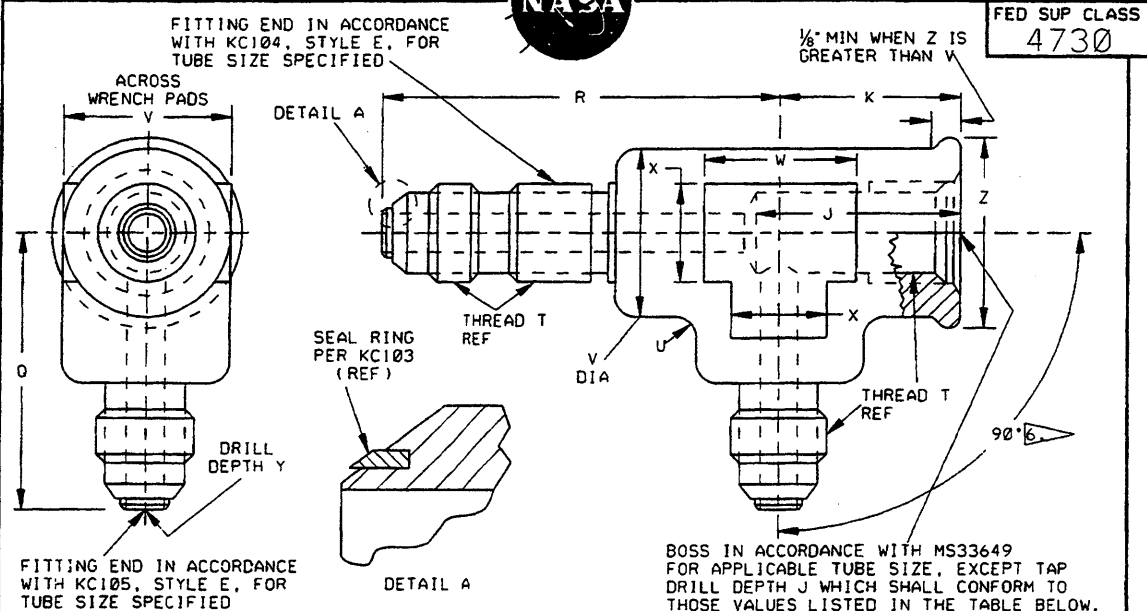
REVISED: (D) REV & REDRAWN 8-1-90 (E) ADDED NOTE 7, 7-24-97
 APPROVED: 5-10-65

GP-425

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FED SUP CLASS
4730



BOSS IN ACCORDANCE WITH MS33649 FOR APPLICABLE TUBE SIZE, EXCEPT TAP DRILL DEPTH J WHICH SHALL CONFORM TO THOSE VALUES LISTED IN THE TABLE BELOW.

DASH NO.		TUBE OD REF	THREAD T REF	J	K	O	R	U RAD	V	W APPROX	X APPROX	Y	Z
CRE STEEL	AL ALLOY			+.047 -.000	+.000 -.047	+.000 -.047	+.000 -.047					+.047 -.000	DIA
K4	D4	1/4	7/16-20	.906	.797	1.235	1.797	.094	.750	.688		1.188	.750
K6	D6	3/8	9/16-18	1.031	.860	1.297	2.047		.875	.781	.438	1.281	.875
K8	D8	1/2	3/4-16	1.250	1.047	1.485	2.203		1.063	.906	.500	1.469	1.063
K10	D10	5/8	7/8-14	1.469	1.203	1.672	2.422	.125				1.750	1.188
K12	D12	3/4	1-1/16-12	1.750	1.391	1.860	2.672		1.313	1.094	.625	1.875	1.438
K16	D16	1	1-5/16-12	2.063	1.578	2.110	2.891		1.625	1.313	.750	2.094	1.688
K20	D20	1 1/4	1-5/8-12	2.313	1.766	2.297	3.078		1.875	1.500	.875	2.250	2.000


MATERIAL: SEE PROCUREMENT SPECIFICATION.
ALUMINUM ALLOY, 2014-T6, CODE "D"
CORROSION RESISTANT STEEL (CLASS 316), CODE "K" (WAS CODE "C")

FINISH: SEE PROCUREMENT SPECIFICATION.

SCREW THREAD: SEE PROCUREMENT SPECIFICATION.

NOTES:

- REMOVE BURRS AND SLIVERS. BREAK SHARP EDGES UNLESS OTHERWISE NOTED.
- DIMENSIONS IN INCHES. UNLESS OTHERWISE SPECIFIED, TOLERANCE DECIMALS $\pm .016$.
- FOR DESIGN FEATURE PURPOSES, THIS DRAWING TAKES PRECEDENCE OVER PROCUREMENT DOCUMENTS REFERENCED HEREIN.
- REFERENCED DOCUMENTS SHALL BE OF THE ISSUE IN EFFECT ON THE DATE OF INVITATION FOR BID.
- MARKING OF FITTINGS SHALL BE CONSISTENT WITH PROCUREMENT SPECIFICATION USING APPLICABLE KC STANDARD AND PART NUMBER DESIGNATIONS AS SHOWN ON THIS DRAWING.

 TOLERANCE UP TO AND INCLUDING -6 SIZE $\pm 2-1/2^{\circ}$ ABOVE -6 SIZE $\pm 1-1/2^{\circ}$.

EXAMPLE OF PART NOS. KC119K8 = TEE, INTERNAL THREAD ON RUN, 1/2" OD TUBING, CORROSION RESISTANT STEEL
KC119D12 = TEE, INTERNAL THREAD ON RUN, 3/4" OD TUBING, ALUMINUM ALLOY

CUSTODIAN: JOHN F. KENNEDY SPACE CENTER

PROCUREMENT SPEC.
KSC-F-124

COORDINATION STATUS
KSC DE

**TEE - FLARED TUBE,
INTERNAL THREAD ON RUN,
FOR SEAL RING**

STANDARD PART
KC119


SHEET 1 OF 1

KSC FORM 32-85 (CG 4/92)

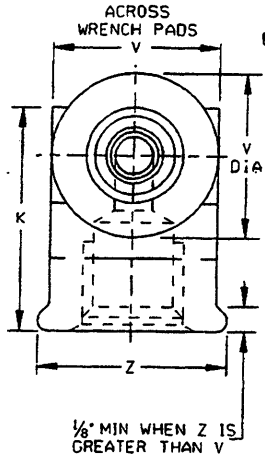
REVISED: (E) REV & REDRAWN 8-1-90

 APPROVED: 5-10-65

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FITTING END IN ACCORDANCE WITH KC104, STYLE E, FOR TUBE SIZE SPECIFIED



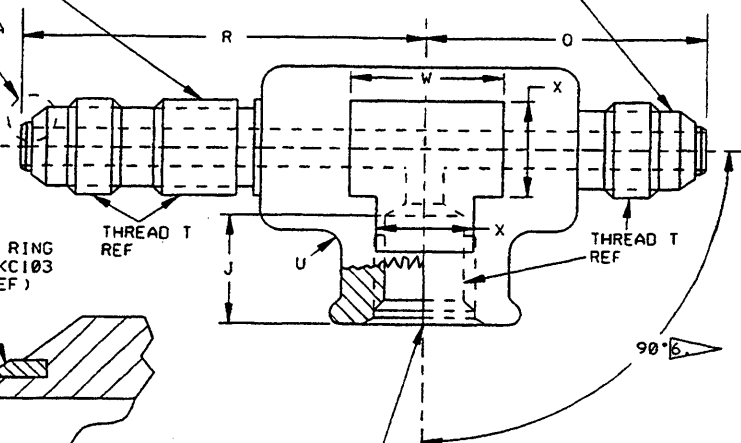
ACROSS WRENCH PADS

DETAIL A

SEAL RING PER KC103 (REF)

1/8" MIN WHEN Z IS GREATER THAN V

FITTING END IN ACCORDANCE WITH KC105, STYLE E, FOR TUBE SIZE SPECIFIED



BOSS IN ACCORDANCE WITH MS33649 FOR APPLICABLE TUBE SIZE, EXCEPT TAP DRILL DEPTH J WHICH SHALL CONFORM TO THOSE VALUES LISTED IN THE TABLE BELOW.

DASH NO.		TUBE OD REF	THREAD T REF	J +.047 -.000	K +.000 -.047	O +.000 -.047	R +.000 -.047	U RAD	V	W APPROX	X APPROX	Z DIA
CRE STEEL	AL ALLOY											
K4	D4	1/4	7/16-20	.750	.797	1.235	1.797	.094	.750	.688	.438	.750
K6	D6	3/8	9/16-18	.813	.860	1.297	2.047		.875	.781		.875
K8	D8	1/2	3/4-16	1.000	1.047	1.485	2.203		1.063	.906	.500	1.063
K10	D10	5/8	7/8-14	1.156	1.203	1.672	2.422	.125	1.313	1.094	.625	1.438
K12	D12	3/4	1-1/16-12	1.344	1.391	1.860	2.672		1.625	1.313	.750	1.688
K16	D16	1	1-5/16-12	1.531	1.578	2.110	2.891		1.875	1.500	.875	2.000
K20	D20	1 1/4	1-5/8-12	1.719	1.766	2.297	3.078					


MATERIAL: SEE PROCUREMENT SPECIFICATION.
ALUMINUM ALLOY, 2014-T6, CODE "D"
CORROSION RESISTANT STEEL (CLASS 316), CODE "X" (WAS CODE "C")

FINISH: SEE PROCUREMENT SPECIFICATION.

SCREW THREAD: SEE PROCUREMENT SPECIFICATION.

NOTES:

- REMOVE BURRS AND SLIVERS. BREAK SHARP EDGES UNLESS OTHERWISE NOTED.
- DIMENSIONS IN INCHES. UNLESS OTHERWISE SPECIFIED, TOLERANCE DECIMALS $\pm .016$.
- FOR DESIGN FEATURE PURPOSES, THIS DRAWING TAKES PRECEDENCE OVER PROCUREMENT DOCUMENTS REFERENCED HEREIN.
- REFERENCED DOCUMENTS SHALL BE OF THE ISSUE IN EFFECT ON THE DATE OF INVITATION FOR BID.
- MARKING OF FITTINGS SHALL BE CONSISTENT WITH PROCUREMENT SPECIFICATION USING APPLICABLE KC STANDARD AND PART NUMBER DESIGNATIONS AS SHOWN ON THIS DRAWING.

 TOLERANCE UP TO AND INCLUDING -.6 SIZE $\pm 2-1/2^\circ$ ABOVE -.6 SIZE $\pm 1-1/2^\circ$.

EXAMPLE OF PART NOS. KC120K8 = TEE, INTERNAL THREAD ON SIDE, 1/2" OD TUBING, CORROSION RESISTANT STEEL
KC120D12 = TEE, INTERNAL THREAD ON SIDE, 3/4" OD TUBING, ALUMINUM ALLOY

CUSTODIAN:

JOHN F. KENNEDY SPACE CENTER


PROCUREMENT SPEC. KSC-F-124	TEE - FLARED TUBE, INTERNAL THREAD ON SIDE, FOR SEAL RING	STANDARD PART KC120
COORDINATION STATUS KSC DE		SHEET 1 OF 1

REVISED: (E) REV & REDRAWN 8-1-90

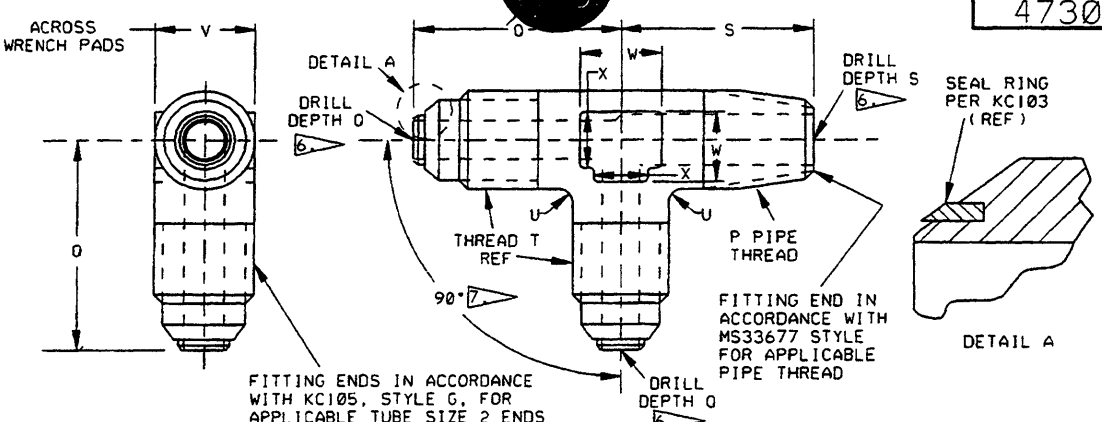
APPROVED: 5-10-65

GP-425

NOTICE: WHEN GOVERNMENT DRAWINGS, SPECIFICATIONS OR OTHER DATA ARE USED FOR ANY PURPOSE OTHER THAN IN CONNECTION WITH A DEFINITELY RELATED GOVERNMENT PROCUREMENT OPERATION, THE UNITED STATES GOVERNMENT THEREBY INCURS NO RESPONSIBILITY NOR ANY OBLIGATION WHATSOEVER AND THE FACT THAT THE GOVERNMENT MAY HAVE FORMULATED, FURNISHED, OR IN ANY WAY SUPPLIED THE SAID DRAWINGS, SPECIFICATIONS, OR OTHER DATA IS NOT REGARDED BY IMPLICATION OR OTHERWISE AS IN ANY MANNER LICENSING THE HOLDER OR ANY OTHER PERSON OR CORPORATION, OR CONVEYING ANY RIGHTS OR PERMISSION TO MANUFACTURE, USE, OR SELL ANY PATENTED INVENTION THAT MAY IN ANY WAY BE RELATED THERETO.



FED SUP CLASS
4730



ACROSS WRENCH PADS

DETAIL A

DRILL DEPTH O

DRILL DEPTH S

SEAL RING PER KC103 (REF)

DETAIL A

THREAD T REF

P PIPE THREAD

90°

FITTING ENDS IN ACCORDANCE WITH KC105, STYLE G, FOR APPLICABLE TUBE SIZE 2 ENDS

FITTING END IN ACCORDANCE WITH MS33677 STYLE FOR APPLICABLE PIPE THREAD

DRILL DEPTH O

DASH NO.		TUBE OD REF	THREAD T REF	PIPE THREAD END		O +0.000 -0.047	S +0.000 -0.047	U RAD	V	W APPROX	X APPROX				
CRES STEEL	AL ALLOY			THREAD P ANPT	MS33677 STYLE										
K4-2	D4-2	1/4	7/16-20	1/8-27	A	.906	.797	.063	.438	.375	.250				
K6-4	D6-4	3/8	9/16-18	1/4-18		1.078	1.109		.563	.562	.313				
K8-6	D8-6	1/2	3/4-16	3/8-18		1.266	1.234		.750	.688	.313				
K10-8	D10-8	5/8	7/8-14	1/2-14		1.469	1.484	.094	.875	.750	.438				
K12-12	D12-12	3/4	1-1/16-12	3/4-14		1.672	1.609		1.063	.875					
K16-12	D16-12	1	1-5/16-12	3/4-14	B	1.828	1.734		1.313	1.063	.500				
K16-16	D16-16			1-11/2		1.984	1.125			.625					
K20-16	D20-16	1 1/4	1-5/8-12	1-11/2	A	2.078	2.391	.125	1.625	1.313	.750				
K20-20	D20-20			1 1/4-11/2		B	2.141								
K24-20	D24-20	1 1/2	1-7/8-12	1 1/4-11/2	A	2.344	2.516		1.875	1.438	.875				
K28-24	D28-24	1 3/4	2-1/4-12	1 1/2-11/2		2.828	2.799					.188	2.250	1.625	1.063
K32-32	D32-32	2	2-1/2-12	2-11/2		3.078	3.016					.250	2.563	1.875	1.188

MATERIAL: SEE PROCUREMENT SPECIFICATION.
ALUMINUM ALLOY, 2014-T6, CODE "D"
CORROSION RESISTANT STEEL (CLASS 316), CODE "X" (WAS CODE "C")

FINISH: SEE PROCUREMENT SPECIFICATION.

SCREW THREAD: SEE PROCUREMENT SPECIFICATION.

NOTES:

- REMOVE BURRS AND SLIVERS. BREAK SHARP EDGES UNLESS OTHERWISE NOTED.
- DIMENSIONS IN INCHES. UNLESS OTHERWISE SPECIFIED, TOLERANCE DECIMALS $\pm .016$.
- FOR DESIGN FEATURE PURPOSES, THIS DRAWING TAKES PRECEDENCE OVER PROCUREMENT DOCUMENTS REFERENCED HEREIN.
- REFERENCED DOCUMENTS SHALL BE OF THE ISSUE IN EFFECT ON THE DATE OF INVITATION FOR BID.
- MARKING OF FITTINGS SHALL BE CONSISTENT WITH PROCUREMENT SPECIFICATION USING APPLICABLE KC STANDARD AND PART NUMBER DESIGNATIONS AS SHOWN ON THIS DRAWING.

AT THE OPTION OF THE MANUFACTURER, THE SMALLER DIAMETER MAY BE DRILLED THROUGH THE FITTING FROM PORT TO PORT OR CENTERLINE OF RUN.

TOLERANCE UP TO AND INCLUDING -6 SIZE $\pm 1/2^\circ$ ABOVE -6 SIZE $\pm 1/2^\circ$.

EXAMPLE OF PART NOS.
KC12IK8-6 = TEE, 1/2" OD TUBING AND 3/8" PIPE THREAD, CORROSION RESISTANT STEEL
KC12ID8-6 = TEE, 1/2" OD TUBING AND 3/8" PIPE THREAD, ALUMINUM ALLOY

CUSTODIAN: JOHN F. KENNEDY SPACE CENTER

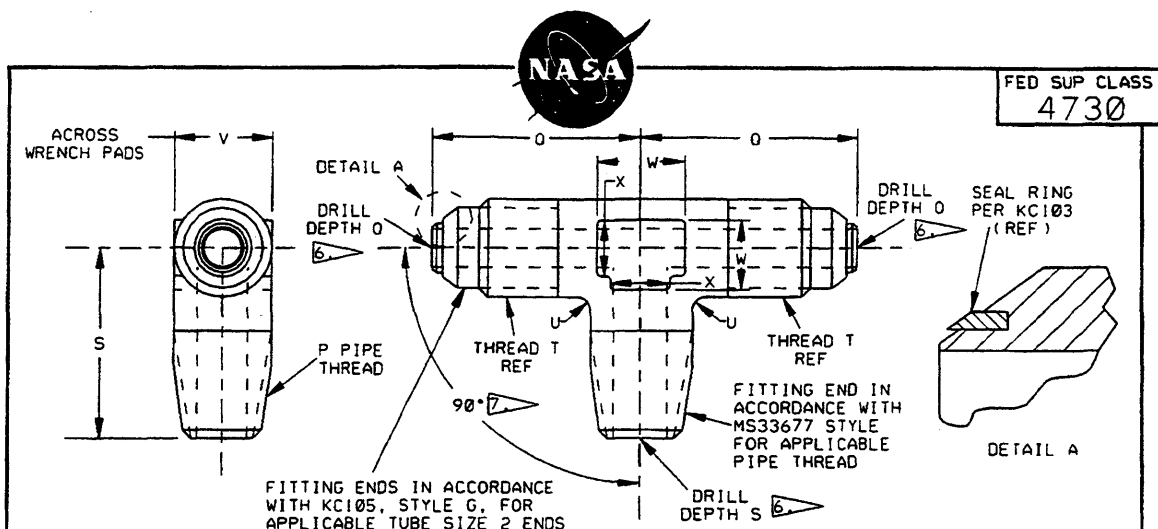
PROCUREMENT SPEC. KSC-F-124	TEE - FLARED TUBE WITH PIPE THREAD ON RUN, FOR SEAL RING	STANDARD PART
COORDINATION STATUS		KC121
KSC DE		SHEET 1 OF 1

KSC FORM 32-85 (CG 4/92)

REVISED: (E) REV & REDRAWN 8-1-90
APPROVED: 5-10-65

GP-425

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DASH NO.		TUBE OD REF	THREAD T REF	PIPE THREAD END		U RAD	V	W APPROX	X APPROX
CRES STEEL	AL ALLOY			THREAD P ANPT	MS33677 STYLE				
K4-2	D4-2	1/4	7/16-20	1/8-27	A	.906	.797	.063	.438
K6-4	D6-4	3/8	9/16-18	1/4-18		1.078	1.109		.563
K8-6	D8-6	1/2	3/4-16	3/8-18		1.266	1.234		.750
K10-8	D10-8	3/4	7/8-14	1/2-14		1.469	1.484	.094	.875
K12-12	D12-12	1	1-1/16-12	3/4-14		1.672	1.609		1.063
K16-12	D16-12	1	1-5/16-12	3/4-14	B	1.828	1.734		1.313
K16-16	D16-16			1-11/2	B	1.984			1.125
K20-16	D20-16	1 1/4	1-5/8-12	1-11/2	A	2.078	2.391	.125	1.625
K20-20	D20-20			1 1/4-11/2	B	2.141			1.313
K24-20	D24-20	1 1/2	1-7/8-12	1 1/4-11/2	A	2.344	2.516		1.875
K28-24	D28-24	1 3/4	2-1/4-12	1 1/2-11/2		2.828	2.799	.188	2.250
K32-32	D32-32	2	2-1/2-12	2-11/2		3.078	3.016	.250	2.563

MATERIAL: SEE PROCUREMENT SPECIFICATION.
ALUMINUM ALLOY, 2014-T6, CODE "D"
CORROSION RESISTANT STEEL (CLASS 316), CODE "K" (WAS CODE "C")

FINISH: SEE PROCUREMENT SPECIFICATION.

SCREW THREAD: SEE PROCUREMENT SPECIFICATION.

- NOTES:
1. REMOVE BURRS AND SLIVERS. BREAK SHARP EDGES UNLESS OTHERWISE NOTED.
 2. DIMENSIONS IN INCHES. UNLESS OTHERWISE SPECIFIED, TOLERANCE DECIMALS $\pm .016$.
 3. FOR DESIGN FEATURE PURPOSES, THIS DRAWING TAKES PRECEDENCE OVER PROCUREMENT DOCUMENTS REFERENCED HEREIN.
 4. REFERENCED DOCUMENTS SHALL BE OF THE ISSUE IN EFFECT ON THE DATE OF INVITATION FOR BID.
 5. MARKING OF FITTINGS SHALL BE CONSISTENT WITH PROCUREMENT SPECIFICATION USING APPLICABLE KC STANDARD AND PART NUMBER DESIGNATIONS AS SHOWN ON THIS DRAWING.



AT THE OPTION OF THE MANUFACTURER, THE SMALLER DIAMETER MAY BE DRILLED THROUGH THE FITTING FROM PORT TO PORT OR CENTERLINE OF RUN.



TOLERANCE UP TO AND INCLUDING -6 SIZE $\pm 2-1/2^\circ$ ABOVE -6 SIZE $\pm 1-1/2^\circ$.

EXAMPLE OF PART NOS. KC122K8-6 = TEE, 1/2" OD TUBING AND 3/8" PIPE THREAD, CORROSION RESISTANT STEEL
KC122D8-6 = TEE, 1/2" OD TUBING AND 3/8" PIPE THREAD, ALUMINUM ALLOY

CUSTODIAN: JOHN F. KENNEDY SPACE CENTER

PROCUREMENT SPEC.
KSC-F-124

COORDINATION STATUS

KSC DE

TEE - FLARED TUBE WITH
PIPE THREAD ON SIDE,
FOR SEAL RING

STANDARD PART

KC122

SHEET 1 OF 1


KSC FORM 32-85 (CG 4/92)

REVISED: ① REV & REDRAWN 8-1-90

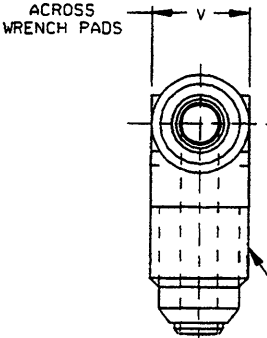
APPROVED: 15-10-65

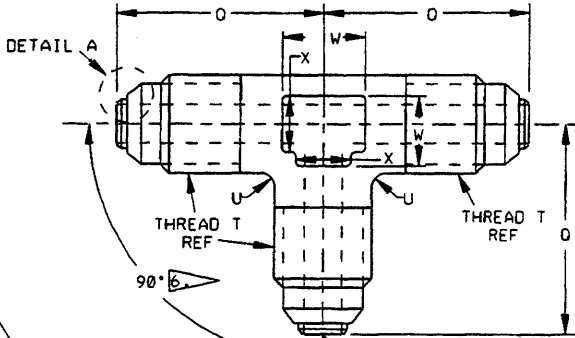
GP-425

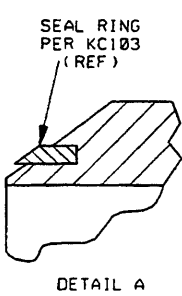
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FED SUP CLASS
4730







FITTING ENDS IN ACCORDANCE WITH KC105, STYLE G, FOR APPLICABLE TUBE SIZE 3 ENDS

90° ± .6°

THREAD T REF

DRILL DEPTH O

DASH NO.		TUBE OD REF	THREAD T REF	O +.000 -.047	U RAD	V	W APPROX	X APPROX
CRE STEEL	AL ALLOY							
K4	D4	1/4	7/16-20	.906	.063	.438	.375	.250
K6	D6	3/8	9/16-18	1.078	.094	.563	.500	.313
K8	D8	1/2	3/4-16	1.266	.125	.750	.688	.438
K10	D10	5/8	7/8-14	1.469	.125	.875	.781	.438
K12	D12	3/4	1-1/16-12	1.672	.125	1.063	.906	.500
K16	D16	1	1-5/16-12	1.828	.125	1.313	1.094	.625
K20	D20	1 1/4	1-5/8-12	2.078	.125	1.625	1.313	.750
K24	D24	1 1/2	1-7/8-12	2.344	.125	1.875	1.500	.875
K28	D28	1 3/4	2-1/4-12	2.828	.125	2.250	1.781	1.063
K32	D32	2	2-1/2-12	3.078	.188	2.563	2.031	1.188


MATERIAL: SEE PROCUREMENT SPECIFICATION.
ALUMINUM ALLOY, 2014-T6, CODE "D"
CORROSION RESISTANT STEEL (CLASS 316), CODE "X" (WAS CODE "C")

FINISH: SEE PROCUREMENT SPECIFICATION.

SCREW THREAD: SEE PROCUREMENT SPECIFICATION.

NOTES:

- REMOVE BURRS AND SLIVERS. BREAK SHARP EDGES UNLESS OTHERWISE NOTED.
- DIMENSIONS IN INCHES. UNLESS OTHERWISE SPECIFIED, TOLERANCE DECIMALS ±.016.
- FOR DESIGN FEATURE PURPOSES, THIS DRAWING TAKES PRECEDENCE OVER PROCUREMENT DOCUMENTS REFERENCED HEREIN.
- REFERENCED DOCUMENTS SHALL BE OF THE ISSUE IN EFFECT ON THE DATE OF INVITATION FOR BID.
- MARKING OF FITTINGS SHALL BE CONSISTENT WITH PROCUREMENT SPECIFICATION USING APPLICABLE KC STANDARD AND PART NUMBER DESIGNATIONS AS SHOWN ON THIS DRAWING.

 TOLERANCE UP TO AND INCLUDING -6 SIZE ±2-1/2° ABOVE -6 SIZE ±1-1/2°.

EXAMPLE OF PART NOS.

KC123K8 = TEE, 1/2" OD TUBING, CORROSION RESISTANT STEEL
KC123D12 = TEE, 3/4" OD TUBING, ALUMINUM ALLOY

CUSTODIAN: JOHN F. KENNEDY SPACE CENTER

PROCUREMENT SPEC.
KSC-F-124

COORDINATION STATUS
KSC DE

**TEE - FLARED TUBE
FOR SEAL RING**

STANDARD PART
KC123
SHEET 1 OF 1

KSC FORM 32-85 (CG 4/92)

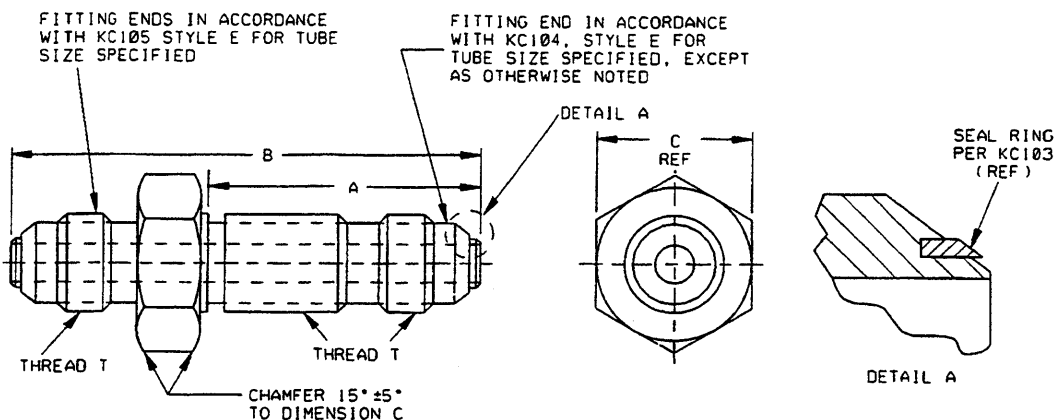
REVISED: (D) REV & REDRAWN 8-1-90

 APPROVED: 5-10-65

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FED SUP CLASS
4730



DASH NO.		TUBE OD REF	THREAD T REF	A +.000 -.045	B +.000 -.090	C REF
CRE STEEL	AL ALLOY					
K4	D4	1/4	7/16-20	1.219	2.062	.688
K6	D6	3/8	9/16-18	1.297	2.234	.813
K8	D8	1/2	3/4-16	1.453	2.469	1.000
K10	D10	5/8	7/8-14	1.594	2.734	1.125
K12	D12	3/4	1-1/16-12	1.766	3.047	1.375
K16	D16	1	1-5/16-12	1.766	3.094	1.625
K20	D20	1 1/4	1-5/8-12	1.812	3.172	1.875
K24	D24	1 1/2	1-7/8-12	1.828	3.328	2.125
K28	D28	1 3/4	2-1/4-12	1.984	3.594	2.500
K32	D32	2	2-1/2-12	2.110	3.844	2.750

MATERIAL: SEE PROCUREMENT SPECIFICATION.
ALUMINUM ALLOY, 2024-T6, CODE "D"
CORROSION RESISTANT STEEL (CLASS 316), CODE "K" (WAS CODE "C")

FINISH: SEE PROCUREMENT SPECIFICATION.

SCREW THREAD: SEE PROCUREMENT SPECIFICATION.

- NOTES:
1. REMOVE BURRS AND SLIVERS. BREAK SHARP EDGES UNLESS OTHERWISE NOTED.
 2. DIMENSIONS IN INCHES. UNLESS OTHERWISE SPECIFIED, TOLERANCE DECIMALS $\pm .016$.
 3. FOR DESIGN FEATURE PURPOSES, THIS DRAWING TAKES PRECEDENCE OVER PROCUREMENT DOCUMENTS REFERENCED HEREIN.
 4. REFERENCED DOCUMENTS SHALL BE OF THE ISSUE IN EFFECT ON THE DATE OF INVITATION FOR BID.
 5. MARKING OF FITTINGS SHALL BE CONSISTENT WITH PROCUREMENT SPECIFICATION USING APPLICABLE KC STANDARD AND PART NUMBER DESIGNATIONS AS SHOWN ON THIS DRAWING.

EXAMPLE OF PART NOS. KC124K4 = UNION, 3/8" BULKHEAD, 1/4" OD TUBING, CORROSION RESISTANT STEEL
KC124D8 = UNION, 3/8" BULKHEAD, 1/2" OD TUBING, ALUMINUM ALLOY

CUSTODIAN: JOHN F. KENNEDY SPACE CENTER

PROCUREMENT SPEC.
KSC-F-124

COORDINATION STATUS

KSC DE

UNION, FLARED TUBE
3/8" BULKHEAD AND UNIVERSAL
FOR SEAL RING

STANDARD PART

KC124

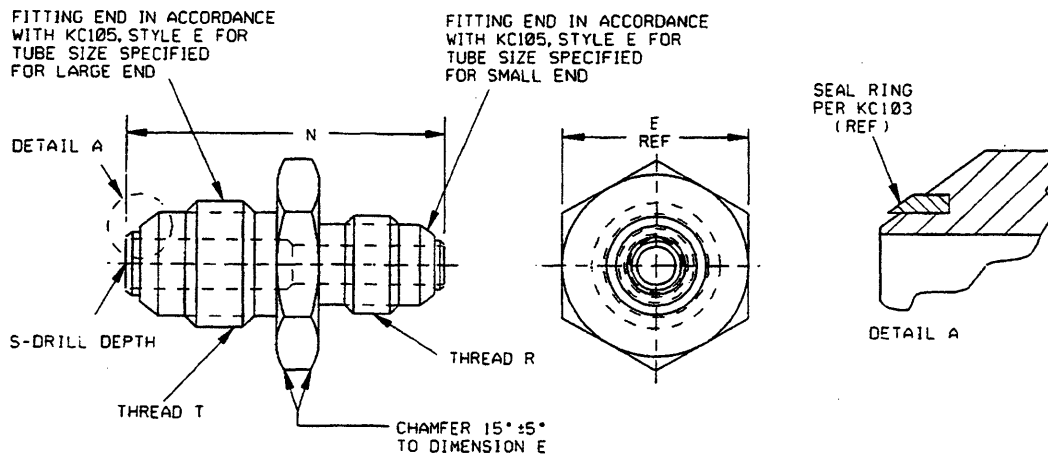
SHEET 1 OF 1

KSC FORM 32-85 (CG 4/92)

REVISED: © REV & REDRAWN 8-1-90

APPROVED: 5-10-65

GP-425

FED SUP CLASS
4730

MATERIAL: SEE PROCUREMENT SPECIFICATION.
ALUMINUM ALLOY, 2024-T6, CODE "D"
CORROSION RESISTANT STEEL (CLASS 316), CODE "X" (WAS CODE "C")

FINISH: SEE PROCUREMENT SPECIFICATION.

SCREW THREAD: SEE PROCUREMENT SPECIFICATION.

- NOTES:
1. REMOVE BURRS AND SLIVERS. BREAK SHARP EDGES UNLESS OTHERWISE NOTED.
 2. DIMENSIONS IN INCHES. UNLESS OTHERWISE SPECIFIED, TOLERANCE DECIMALS $\pm .016$.
 3. FOR DESIGN FEATURE PURPOSES, THIS DRAWING TAKES PRECEDENCE OVER PROCUREMENT DOCUMENTS REFERENCED HEREIN.
 4. REFERENCED DOCUMENTS SHALL BE OF THE ISSUE IN EFFECT ON THE DATE OF INVITATION FOR BID.
 5. MARKING OF FITTINGS SHALL BE CONSISTENT WITH PROCUREMENT SPECIFICATION USING APPLICABLE KC STANDARD AND PART NUMBER DESIGNATIONS AS SHOWN ON THIS DRAWING.
 6. AT THE OPTION OF THE MANUFACTURER, THE SMALLER INSIDE DIAMETER DIMENSION MAY BE DRILLED FROM PORT TO PORT.

EXAMPLE OF PART NOS. KC125K8-4 = REDUCER, $\frac{1}{2}$ OD TO $\frac{1}{4}$ OD TUBING, CORROSION RESISTANT STEEL
KC125D8-4 = REDUCER, $\frac{1}{2}$ OD TO $\frac{1}{4}$ OD TUBING, ALUMINUM ALLOY

CUSTODIAN:

JOHN F. KENNEDY SPACE CENTER

PROCUREMENT SPEC.

KSC-F-124

COORDINATION STATUS

KSC DE

REDUCER - EXTERNAL
THREAD FLARED TUBE
FOR SEAL RING

STANDARD PART

KC125

SHEET 1 OF 2

REVISED: (F) REV & REDRAWN 8-1-90

APPROVED: 8-12-65

KSC FORM 32-85 (CG 4/92)

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GP-425

FED SUP CLASS
4730

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DASH NO.		LARGE END		SMALL END		S MAX 6°	N +.000 -.090	E REF	
CRES STEEL	AL ALLOY	TUBE OD REF	THREAD T REF	TUBE OD REF	THREAD R REF				
K6-4	D6-4	3/8	9/16-18	1/4	7/16-20	.457	1.422	.813	
K8-4	D8-4	1/2	3/4-16	1/4	7/16-20	.538	1.547	1.000	
K8-6	D8-6			3/8	9/16-18				
K10-4	D10-4	5/8	7/8-14	1/4	7/16-20	.618	1.672	1.125	
K10-6	D10-6			3/8	9/16-18		1.766		
K10-8	D10-8			1/2	3/4-16				
K12-4	D12-4	3/4	1-1/16-12	1/4	7/16-20	.703	1.813	1.375	
K12-6	D12-6			3/8	9/16-18		1.907		
K12-8	D12-8			1/2	3/4-16		2.016		
K12-10	D12-10			5/8	7/8-14		1.860	1.625	
K16-4	D16-4	1	1-5/16-12	1/4	7/16-20	.741	2.172		
K16-8	D16-8			1/2	3/4-16		2.063		
K16-10	D16-10			5/8	7/8-14		2.172		
K16-12	D16-12			3/4	1-1/16-12		1.907	1.875	
K20-4	D20-4	1 1/4	1-5/8-12	1/4	7/16-20	.778	2.266		
K20-12	D20-12			3/4	1-1/16-12		.878	2.125	
K20-16	D20-16	1 1/2	1-7/8-12	1	1-5/16-12	.878	2.375		
K24-16	D24-16			1-1/4	1-5/8-12		2.422	2.500	
K28-20	D28-20	1 3/4	2-1/4-12	1-1/2	1-7/8-12	.978	2.598		
K28-24	D28-24			1-1/2	1-7/8-12		2.723	2.750	
K32-24	D32-24	2	2-1/2-12	1-3/4	2-1/4-12	1.078	2.848		
K32-28	D32-28			1-3/4	2-1/4-12		2.973		

CUSTODIAN:

JOHN F. KENNEDY SPACE CENTER

PROCUREMENT SPEC.
KSC-F-124

COORDINATION STATUS

KSC DE

REDUCER - EXTERNAL
THREAD FLARED TUBE
FOR SEAL RING

STANDARD PART

KC125

SHEET 2 OF 2

KSC FORM 32-85 (CG 4/92)

REVISED: (E) PEY & REDRAWN 8-1-90

APPROVED: 8-12-65

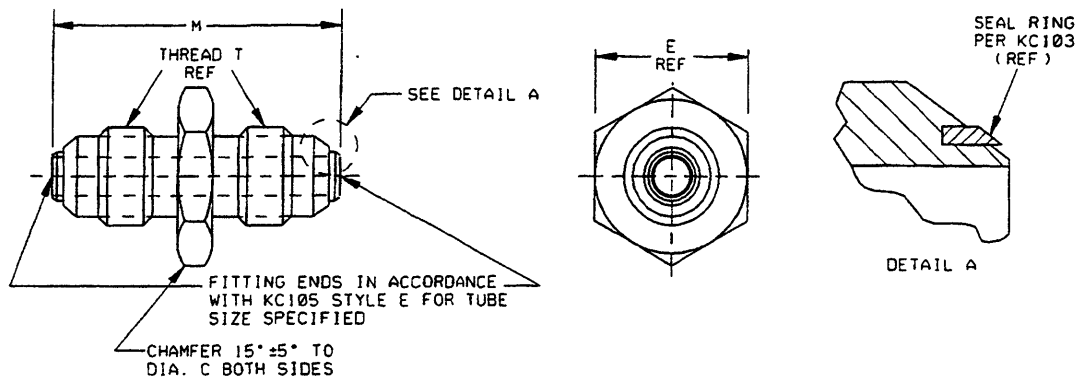
GP-425

NOTICE: WHEN GOVERNMENT DRAWINGS, SPECIFICATIONS OR OTHER DATA ARE USED FOR ANY PURPOSE OTHER THAN IN CONNECTION WITH A DEFINITELY RELATED GOVERNMENT PROCUREMENT OPERATION, THE UNITED STATES GOVERNMENT THEREBY INCURS NO RESPONSIBILITY NOR ANY OBLIGATION WHATSOEVER AND THE FACT THAT THE GOVERNMENT MAY HAVE FORMULATED, FURNISHED, OR IN ANY WAY SUPPLIED THE SAID DRAWINGS, SPECIFICATIONS, OR OTHER DATA IS NOT REGARDED BY IMPLICATION OR OTHERWISE AS IN ANY MANNER LICENSING THE HOLDER OR ANY OTHER PERSON OR CORPORATION, OR CONVEYING ANY RIGHTS OR PERMISSION TO MANUFACTURE, USE, OR SELL ANY PATENTED INVENTION THAT MAY IN ANY WAY BE RELATED THERE TO.

NASA

FED SUP CLASS

4730



DASH NO.		TUBE OD REF	THREAD T REF	M +.000 -.090	E REF
CRE STEEL	AL ALLOY				
K4	D4	1/4	7/16-20	1.266	.688
K6	D6	3/8	9/16-18	1.391	.813
K8	D8	1/2	3/4-16	1.578	1.000
K10	D10	5/8	7/8-14	1.844	1.125
K12	D12	3/4	1-1/16-12	2.125	1.375
K16	D16	1	1-5/16-12	2.203	1.625
K20	D20	1 1/4	1-5/8-12	2.297	1.875
K24	D24	1 1/2	1-7/8-12	2.547	2.125
K28	D28	1 3/4	2-1/4-12	2.828	2.500
K32	D32	2	2-1/2-12	3.078	2.750

MATERIAL: SEE PROCUREMENT SPECIFICATION.
ALUMINUM ALLOY, 2024-T6, CODE "D"
CORROSION RESISTANT STEEL (CLASS 316), CODE "K" (WAS CODE "C")

FINISH: SEE PROCUREMENT SPECIFICATION.

SCREW THREAD: SEE PROCUREMENT SPECIFICATION.

- NOTES:
1. REMOVE BURRS AND SLIVERS. BREAK SHARP EDGES UNLESS OTHERWISE NOTED.
 2. DIMENSIONS IN INCHES. UNLESS OTHERWISE SPECIFIED, TOLERANCE DECIMALS ±.016.
 3. FOR DESIGN FEATURE PURPOSES, THIS DRAWING TAKES PRECEDENCE OVER PROCUREMENT DOCUMENTS REFERENCED HEREIN.
 4. REFERENCED DOCUMENTS SHALL BE OF THE ISSUE IN EFFECT ON THE DATE OF INVITATION FOR BID.
 5. MARKING OF FITTINGS SHALL BE CONSISTENT WITH PROCUREMENT SPECIFICATION USING APPLICABLE KC STANDARD AND PART NUMBER DESIGNATIONS AS SHOWN ON THIS DRAWING.

EXAMPLE OF PART NOS. KC126K8 = UNION, 1/2" OD TUBING, CORROSION RESISTANT STEEL
KC126D12 = UNION, 3/4" OD TUBING, ALUMINUM ALLOY


REVISED: (D) REV & REDRAWN 8-1-90

APPROVED: 5-10-65

CUSTODIAN:		JOHN F. KENNEDY SPACE CENTER	
PROCUREMENT SPEC.	UNION, FLARED TUBE FOR SEAL RING	STANDARD PART	
KSC-F-124		KC126	
COORDINATION STATUS		SHEET 1 OF 1	
KSC DE			

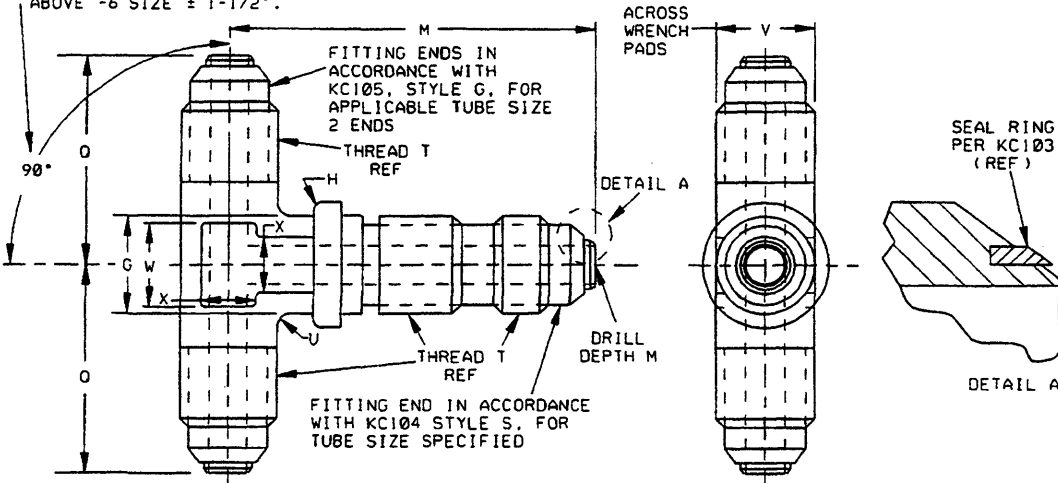
KSC FORM 32-85 (CG 4/92)

NOTICE: WHEN GOVERNMENT DRAWINGS, SPECIFICATIONS OR OTHER DATA ARE USED FOR ANY PURPOSE OTHER THAN IN CONNECTION WITH A DEFINITELY RELATED GOVERNMENT PROCUREMENT OPERATION, THE UNITED STATES GOVERNMENT THEREBY INCURS NO RESPONSIBILITY NOR ANY OBLIGATION WHATSOEVER AND THE FACT THAT THE GOVERNMENT MAY HAVE FORMULATED, FURNISHED, OR IN ANY WAY SUPPLIED THE SAID DRAWINGS, SPECIFICATIONS, OR OTHER DATA IS NOT REGARDED BY IMPLICATION OR OTHERWISE AS IN ANY MANNER LICENSING THE HOLDER OR ANY OTHER PERSON OR CORPORATION, OR CONVEYING ANY RIGHTS OR PERMISSION TO MANUFACTURE, USE, OR SELL ANY PATENTED INVENTION THAT MAY IN ANY WAY BE RELATED THERE TO.



FED SUP CLASS
4730

TOLERANCE UP TO AND INCLUDING -6 SIZE $\pm 2-1/2^\circ$
 ABOVE -6 SIZE $\pm 1-1/2^\circ$.



DASH NO.		TUBE OD REF	THREAD T REF	G DIA	H RAD	M +0.000 -0.047	O +0.000 -0.047	U RAD	V	W APPROX	X APPROX
CRE STEEL	AL ALLOY										
K4	D4	1/4	7/16-20	.438	.063	1.625	1.000	.063	.438	.375	.250
K6	D6	3/8	9/16-18	.563		1.844	1.125	.094	.563	.500	.313
K8	D8	1/2	3/4-16	.750		2.141	1.391		.750	.625	.438
K10	D10	5/8	7/8-14	.875		2.422	1.594		.875	.750	.438
K12	D12	3/4	1-1/16-12	1.063		2.703	1.813	.125	1.063	.875	.500
K16	D16	1	1-5/16-12	1.313	.094	2.828	1.969		1.313	1.063	.625
K20	D20	1 1/4	1-5/8-12	1.625		3.156	2.203		1.625	1.250	.750
K24	D24	1 1/2	1-7/8-12	1.875		3.453	2.375	.188	1.875	1.438	.875
K28	D28	1 3/4	2-1/4-12	2.250		3.828	2.641		2.250	1.750	1.063
K32	D32	2	2-1/2-12	2.563		4.141	2.922		2.563	1.938	1.188

MATERIAL: SEE PROCUREMENT SPECIFICATION.
 ALUMINUM ALLOY, 2014-T6, CODE "D"
 CORROSION RESISTANT STEEL (CLASS 316), CODE "K" (WAS CODE "C")

FINISH: SEE PROCUREMENT SPECIFICATION.

SCREW THREAD: SEE PROCUREMENT SPECIFICATION.

NOTES:

1. REMOVE BURRS AND SLIVERS. BREAK SHARP EDGES UNLESS OTHERWISE NOTED.
2. DIMENSIONS IN INCHES. UNLESS OTHERWISE SPECIFIED, TOLERANCE DECIMALS $\pm .016$.
3. FOR DESIGN FEATURE PURPOSES, THIS DRAWING TAKES PRECEDENCE OVER PROCUREMENT DOCUMENTS REFERENCED HEREIN.
4. REFERENCED DOCUMENTS SHALL BE OF THE ISSUE IN EFFECT ON THE DATE OF INVITATION FOR BID.
5. MARKING OF FITTINGS SHALL BE CONSISTENT WITH PROCUREMENT SPECIFICATION USING APPLICABLE KC STANDARD AND PART NUMBER DESIGNATIONS AS SHOWN ON THIS DRAWING.
6. WHEN USED AGAINST BULKHEAD USE WASHER AN960 TO FORM BACKING FACE.

EXAMPLE OF PART NOS. KC127K8 = TEE, BULKHEAD ON LEG, 1/2" OD TUBING, CORROSION RESISTANT STEEL
 KC127D12 = TEE, BULKHEAD ON LEG, 3/4" OD TUBING, ALUMINUM ALLOY

CUSTODIAN: JOHN F. KENNEDY SPACE CENTER

PROCUREMENT SPEC. KSC-F-124

COORDINATION STATUS

KSC DE

**TEE - FLARED TUBE &
BULKHEAD UNIVERSAL ON SIDE
FOR SEAL RING**

STANDARD PART

KC127


SHEET 1 OF 1

REVISED: (E) REF & REDRAWN 8-1-90

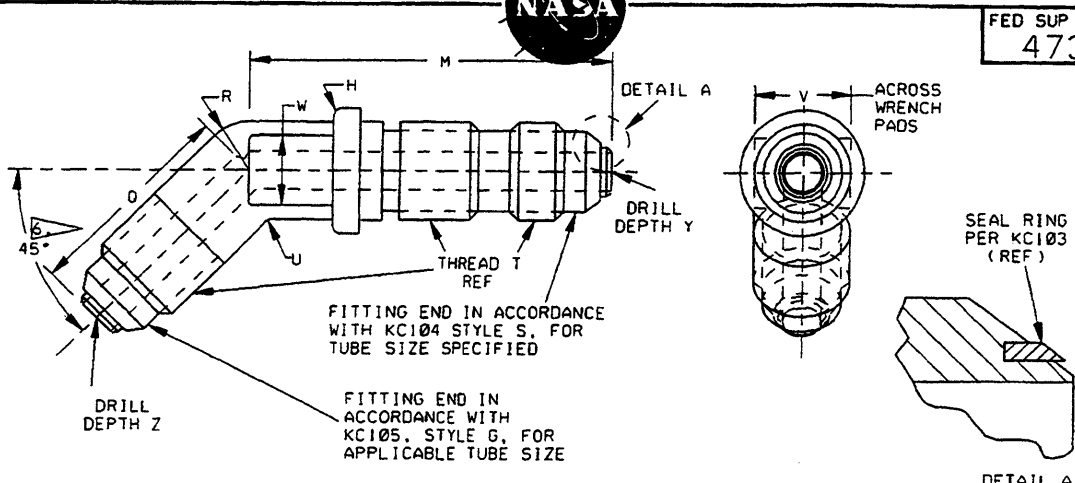
APPROVED: 5-10-65

GP-425

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FED SUP CLASS
4730



DASH NO.	TUBE	THREAD T	H	M	D	R	U	V	W	Y	Z	
CRE STEEL	AL ALLOY	DD REF	REF	RAD	+0.000 -0.063	+0.000 -0.063	RAD	RAD	APPROX	+0.047 -0.000	+0.047 -0.000	
K4	D4	1/4	7/16-20	.063	1.578	.750	.219	.063	.438	.313	1.594	.766
K6	D6	3/8	9/16-18		1.719	.860	.261		.563	.375	1.750	.891
K8	D8	1/2	3/4-16		1.985	1.016	.375	.094	.750	.500	2.031	1.063
K10	D10	5/8	7/8-14		2.219	1.141	.438		.875	.625	2.281	1.203
K12	D12	3/4	1-1/16-12		2.485	1.313	.531		1.063	.813	2.563	1.391
K16	D16	1	1-5/16-12	.094	2.610	1.500	.656	.125	1.313	1.000	2.734	1.625
K20	D20	1 1/4	1-5/8-12		2.703	1.625	.813		1.625	1.250	2.875	1.797
K24	D24	1 1/2	1-7/8-12		2.719	1.813	.938		1.875	1.500	2.938	2.031
K28	D28	1 3/4	2-1/4-12		2.797	2.000	1.125	.188	2.250	1.750	3.078	2.266
K32	D32	2	2-1/2-12		2.953	2.250	1.250	.250	2.563	2.000	3.031	2.578


MATERIAL: SEE PROCUREMENT SPECIFICATION.
ALUMINUM ALLOY, 2014-T6, CODE "D"
CORROSION RESISTANT STEEL (CLASS 316), CODE "K" (WAS CODE "C")

FINISH: SEE PROCUREMENT SPECIFICATION.

SCREW THREAD: SEE PROCUREMENT SPECIFICATION.

NOTES:

- REMOVE BURRS AND SLIVERS. BREAK SHARP EDGES UNLESS OTHERWISE NOTED.
- DIMENSIONS IN INCHES. UNLESS OTHERWISE SPECIFIED, TOLERANCE DECIMALS ± 0.016 .
- FOR DESIGN FEATURE PURPOSES, THIS DRAWING TAKES PRECEDENCE OVER PROCUREMENT DOCUMENTS REFERENCED HEREIN.
- REFERENCED DOCUMENTS SHALL BE OF THE ISSUE IN EFFECT ON THE DATE OF INVITATION FOR BID.
- MARKING OF FITTINGS SHALL BE CONSISTENT WITH PROCUREMENT SPECIFICATION USING APPLICABLE KC STANDARD AND PART NUMBER DESIGNATIONS AS SHOWN ON THIS DRAWING.

 TOLERANCE UP TO AND INCLUDING -6 SIZE $\pm 2-1/2^\circ$ ABOVE -6 SIZE $\pm 1-1/2^\circ$.

EXAMPLE OF PART NOS.
 KC128K8 = ELBOW, 1/2" OD TUBING, CORROSION RESISTANT STEEL
 KC128D12 = ELBOW, 3/4" OD TUBING, ALUMINUM ALLOY

CUSTODIAN: JOHN F. KENNEDY SPACE CENTER


PROCUREMENT SPEC. KSC-F-124	ELBOW - FLARED TUBE BULKHEAD UNIVERSAL, 45°, FOR SEAL RING	STANDARD PART
COORDINATION STATUS		KC128
KSC DE		SHEET 1 OF 1

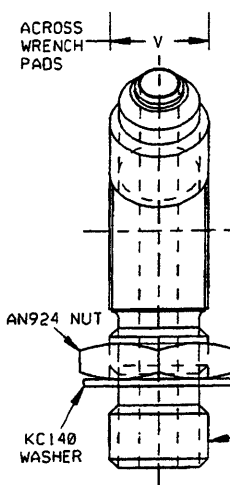
REVISED: (E) REV & REDRAWN 8-1-90

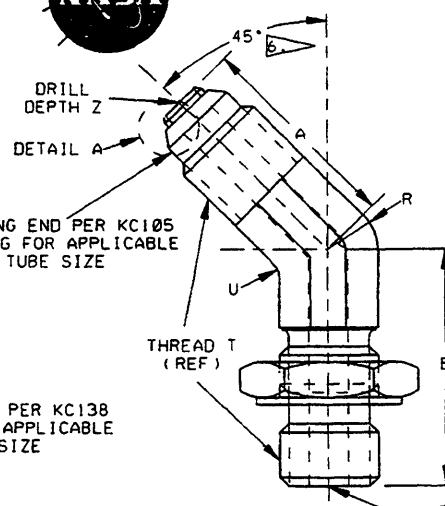
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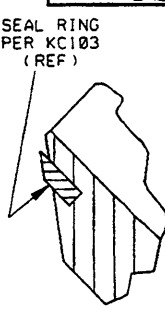
KSC FORM 32-85 (CG 4/92)

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FED SUP CLASS
4730

DASH NO.		TUBE OD REF	THREAD T REF	A DIM. +.000 -.063	B DIM. +.000 -.063	U RAD ±.03	R RAD ±.03	F PAD DIM. ±.016	BULKHEAD NUT		WASHER	
CRE STEEL	AL ALLOY			FOR CRE STEEL ASSY *	FOR AL ALLOY ASSY	FOR CRE STEEL ASSY	FOR AL ALLOY ASSY					
K4	D4	1/4	7/16-20	.750	1.078	.063	.242	.438	AN924-K4	AN924-D4	KC140C4	KC140D4
K6	D6	3/8	9/16-18	.860	1.172	.094	.317	.563	AN924-K6	AN924-D6	KC140C6	KC140D6
K8	D8	1/2	3/4-16	1.016	1.328		.414	.750	AN924-K8	AN924-D8	KC140C8	KC140D8
K10	D10	5/8	7/8-14	1.141	1.547		.484	.875	AN924-K10	AN924-D10	KC140C10	KC140D10
K12	D12	3/4	1-1/16-12	1.313	1.766		.586	1.063	AN924-K12	AN924-D12	KC140C12	KC140D12
K16	D16	1	1-5/16-12	1.500	1.891	.125	.719	1.313	AN924-K16	AN924-D16	KC140C16	KC140D16
K20	D20	1 1/4	1-5/8-12	1.625	1.938		.875	1.625	AN924-K20	AN924-D20	KC140C20	KC140D20
K24	D24	1 1/2	1-7/8-12	1.813			1.031	1.875	AN924-K24	AN924-D24	KC140C24	KC140D24
K28	D28	1 3/4	2-1/4-12	2.000	1.891	.188	1.125	2.250	AN924-K28	AN924-D28	KC140C28	KC140D28
K32	D32	2	2-1/2-12	2.250		.250	1.383	2.500	AN924-K32	AN924-D32	KC140C32	KC140D32


MATERIAL: SEE PROCUREMENT SPECIFICATION.
ALUMINUM ALLOY, 2014-T6, CODE "D"
CORROSION RESISTANT STEEL (CLASS 316), CODE "K" (WAS CODE "C")
*AN924 CRES NUTS MAY BE EITHER 304, CODE "J" OR 316, CODE "K".

FINISH: SEE PROCUREMENT SPECIFICATION.

SCREW THREAD: SEE PROCUREMENT SPECIFICATION.

NOTES:

- REMOVE BURRS AND SLIVERS. BREAK SHARP EDGES UNLESS OTHERWISE NOTED.
- DIMENSIONS IN INCHES. UNLESS OTHERWISE SPECIFIED, TOLERANCE DECIMALS ±.016.
- FOR DESIGN FEATURE PURPOSES, THIS DRAWING TAKES PRECEDENCE OVER PROCUREMENT DOCUMENTS REFERENCED HEREIN.
- REFERENCED DOCUMENTS SHALL BE OF THE ISSUE IN EFFECT ON THE DATE OF INVITATION FOR BID.
- MARKING OF FITTINGS SHALL BE CONSISTENT WITH PROCUREMENT SPECIFICATION USING APPLICABLE KC STANDARD AND PART NUMBER DESIGNATIONS AS SHOWN ON THIS DRAWING.

 TOLERANCE UP TO AND INCLUDING -.6 SIZE ± 2-1/2°; ABOVE -.6 SIZE ± 1-1/2°.

EXAMPLE OF PART NOS. KC129K8 = 45° ELBOW ASSY, 1/2" OD TUBING, CORROSION RESISTANT STEEL
KC129D12 = 45° ELBOW ASSY, 3/4" OD TUBING, ALUMINUM ALLOY

CUSTODIAN: JOHN F. KENNEDY SPACE CENTER

ELBOW ASSY, 45°, FLARED
TUBE & MALE ADJUSTABLE
END, FOR SEAL RING

STANDARD PART

KC129

SHEET 1 OF 2

PROCUREMENT SPEC.
KSC-F-124

COORDINATION STATUS
KSC DE

ELBOW ASSY, 45°, FLARED
TUBE & MALE ADJUSTABLE
END, FOR SEAL RING

STANDARD PART

KC129

SHEET 1 OF 2

KSC FORM 32-85 (CG 4/92)

REVISED: (E) REV & REDRAWN 8-1-90

APPROVED: 5-10-65

GP-425

FED SUP CLASS
4730

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DASH NO.		TUBE OD REF	THREAD T REF	Y DIM.		Z DIM.	
CRE STEEL	AL ALLOY			+ .047 - .000		+ .047 - .000	
K4	D4	1/4	7/16-20	1.094		.766	
K6	D6	3/8	9/16-18	1.203		.891	
K8	D8	1/2	3/4-16	1.375		1.063	
K10	D10	5/8	7/8-14	1.609		1.203	
K12	D12	3/4	1-1/16-12	1.844		1.391	
K16	D16	1	1-5/16-12	2.016		1.625	
K20	D20	1 1/4	1-5/8-12	2.109		1.797	
K24	D24	1 1/2	1-7/8-12	2.156		2.031	
K28	D28	1 3/4	2-1/4-12	2.016		2.266	
K32	D32	2	2-1/2-12			2.578	

REVISED: (E) REV & REDRAWN 8-1-90

APPROVED: 5-10-65

CUSTODIAN:

JOHN F. KENNEDY SPACE CENTER

PROCUREMENT SPEC.
KSC-F-124

COORDINATION STATUS

KSC DE

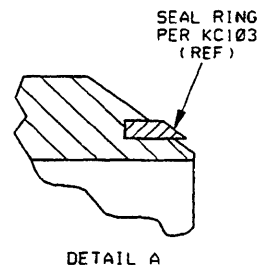
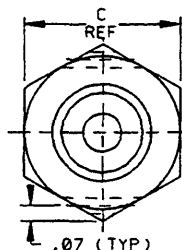
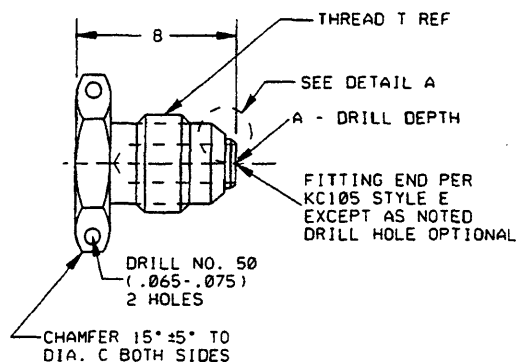
ELBOW ASSY, 45°, FLARED
TUBE & MALE ADJUSTABLE
END, FOR SEAL RING

STANDARD PART

KC129

SHEET 2 OF 2

KSC FORM 32-85 (CG 4/92)

FED SUP CLASS
4730

DASH NO.		TUBE OD REF	THREAD T REF	A	B	C
CRE STEEL	AL ALLOY			+ .000 - .060	+ .000 - .060	REF
K4	D4	1/4	7/16-20	.531	.750	.688
K6	D6	3/8	9/16-18	.563	.828	.813
K8	D8	1/2	3/4-16	.625	.953	1.000
K10	D10	5/8	7/8-14	.766	1.125	1.125
K12	D12	3/4	1-1/16-12	.813	1.219	1.375
K16	D16	1	1-5/16-12		1.297	1.625
K20	D20	1 1/4	1-5/8-12	.750	1.375	1.875
K24	D24	1 1/2	1-7/8-12	.813	1.500	2.125
K28	D28	1 3/4	2-1/4-12	.781	1.625	2.500
K32	D32	2	2-1/2-12	.828	1.750	2.750

MATERIAL: SEE PROCUREMENT SPECIFICATION.
ALUMINUM ALLOY, 2024-T6, CODE "D"
CORROSION RESISTANT STEEL (CLASS 316), CODE "K" (WAS CODE "C")

FINISH: SEE PROCUREMENT SPECIFICATION.

SCREW THREAD: SEE PROCUREMENT SPECIFICATION.

- NOTES:
1. REMOVE BURRS AND SLIVERS. BREAK SHARP EDGES UNLESS OTHERWISE NOTED.
 2. DIMENSIONS IN INCHES. UNLESS OTHERWISE SPECIFIED, TOLERANCE DECIMALS $\pm .016$.
 3. FOR DESIGN FEATURE PURPOSES, THIS DRAWING TAKES PRECEDENCE OVER PROCUREMENT DOCUMENTS REFERENCED HEREIN.
 4. REFERENCED DOCUMENTS SHALL BE OF THE ISSUE IN EFFECT ON THE DATE OF INVITATION FOR BID.
 5. MARKING OF FITTINGS SHALL BE CONSISTENT WITH PROCUREMENT SPECIFICATION USING APPLICABLE KC STANDARD AND PART NUMBER DESIGNATIONS AS SHOWN ON THIS DRAWING.

EXAMPLE OF
PART NOS.
KC130K8 = PLUG, 1/4" OD TUBING, CORROSION RESISTANT STEEL
KC130D12 = PLUG, 3/4" OD TUBING, ALUMINUM ALLOY

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CUSTODIAN:		JOHN F. KENNEDY SPACE CENTER	
PROCUREMENT SPEC.	KSC-F-124	PLUG, FLARED TUBE FOR SEAL RING	STANDARD PART
COORDINATION STATUS			KC130
KSC DE			SHEET 1 OF 1


KSC FORM 32-85 (CG 4/92)

REVISED: (E) REV & REDRAWN 8-1-90

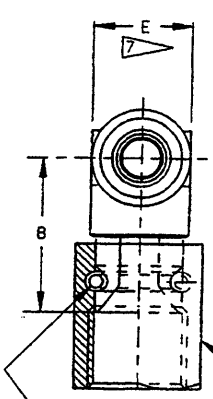
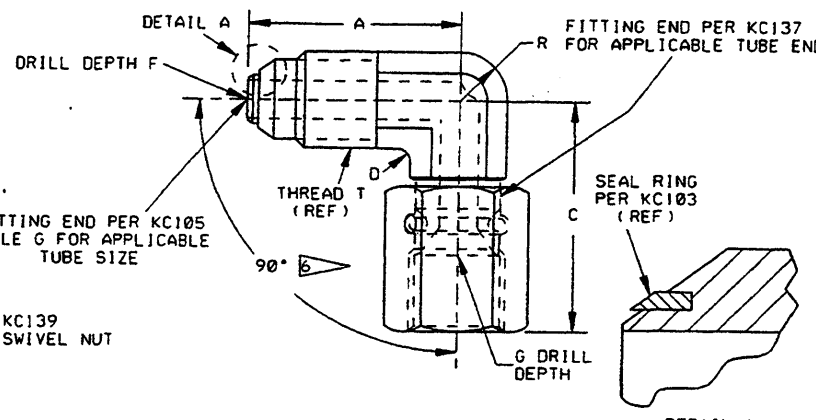
APPROVED: 8-12-65

GP-425

NOTICE: WHEN GOVERNMENT DRAWINGS, SPECIFICATIONS OR OTHER DATA ARE USED FOR ANY PURPOSE OTHER THAN IN CONNECTION WITH A DEFINITELY RELATED GOVERNMENT PROCUREMENT OPERATION, THE UNITED STATES GOVERNMENT THEREBY INCURS NO RESPONSIBILITY NOR ANY OBLIGATION WHATSOEVER AND THE FACT THAT THE GOVERNMENT MAY HAVE FORMULATED, FURNISHED, OR IN ANY WAY SUPPLIED THE SAID DRAWINGS, SPECIFICATIONS, OR OTHER DATA IS NOT REGARDED BY IMPLICATION OR OTHERWISE AS IN ANY MANNER LICENSING THE HOLDER OR ANY OTHER PERSON OR CORPORATION, OR CONVEYING ANY RIGHTS OR PERMISSION TO MANUFACTURE, USE, OR SELL ANY PATENTED INVENTION THAT MAY IN ANY WAY BE RELATED THERETO.



FED SUP CLASS
4730

DASH NO.		TUBE OD REF	THREAD T REF	A DIM. +.000 -.063	B DIM. +.000 -.031	C DIM REF	D RAD ±.03	R RAD +.03 -.03	E PAD DIM.	F DIM +.047 -.011	G DIM +.016 -.011	SWIVEL NUT KC139		RETAIN ING WIRE
CRE STEEL	AL ALLOY											CRE STEEL	AL ALLOY	
K4	D4	1/4	7/16-20	.906	.704	1.000	.063	.242	.438	.906	.734	K4	D4	KC165-4
K6	D6	3/8	9/16-18	1.078	.891	1.250		.317	.563	1.094	.933	K6	D6	KC165-6
K8	D8	1/2	3/4-16	1.266	.969	1.375		.414	.750	1.281	1.016	K8	D8	KC165-8
K10	D10	5/8	7/8-14	1.469	1.141	1.625		.484	.875	1.484	1.188	K10	D10	KC165-10
K12	D12	3/4	1-1/16-12	1.672	1.204	1.750		.586	1.063	1.688	1.250	K12	D12	KC165-12
K16	D16	1	1-5/16-12	1.828	1.422	2.000		.719	1.313	1.906	1.531	K16	D16	KC165-16
K20	D20	1 1/4	1-5/8-12	2.078	1.704	2.313		.875	1.625	2.156	1.812	K20	D20	KC165-20
K24	D24	1 1/2	1-7/8-12	2.344	1.875	2.594		1.031	1.875	2.609	2.172	K24	D24	KC165-24
K28	D28	1 3/4	2-1/4-12	2.860	2.063	2.900		1.188	2.250	2.931	2.212	K28	D28	KC165-28
K32	D32	2	2-1/2-12	3.078	2.454	3.375		1.383	2.563	3.219	2.673	K32	D32	KC165-32


MATERIAL: SEE PROCUREMENT SPECIFICATION.
ALUMINUM ALLOY, 2014-T6, CODE "D"
CORROSION RESISTANT STEEL (CLASS 316), CODE "K" (WAS CODE "C")


FINISH: SEE PROCUREMENT SPECIFICATION.

SCREW THREAD: SEE PROCUREMENT SPECIFICATION.

NOTES:

- REMOVE BURRS AND SLIVERS. BREAK SHARP EDGES UNLESS OTHERWISE NOTED.
- DIMENSIONS IN INCHES. UNLESS OTHERWISE SPECIFIED, TOLERANCE DECIMALS ±.016.
- FOR DESIGN FEATURE PURPOSES, THIS DRAWING TAKES PRECEDENCE OVER PROCUREMENT DOCUMENTS REFERENCED HEREIN.
- REFERENCED DOCUMENTS SHALL BE OF THE ISSUE IN EFFECT ON THE DATE OF INVITATION FOR BID.
- MARKING OF FITTINGS SHALL BE CONSISTENT WITH PROCUREMENT SPECIFICATION USING APPLICABLE KC STANDARD AND PART NUMBER DESIGNATIONS AS SHOWN ON THIS DRAWING.

 TOLERANCE UP TO AND INCLUDING -6 SIZE ±2-1/2" ABOVE -6 SIZE ±1-1/2".

 E DIMENSION FOR -32 SIZE EQUAL TO 2.500" IS ACCEPTABLE BUT 2.563" IS PREFERRED

EXAMPLE OF PART NOS. KC131K8 = ELBOW WITH SWIVEL END, 1/2" OD TUBING, CORROSION RESISTANT STEEL
KC131D12 = ELBOW WITH SWIVEL END, 3/4" OD TUBING, ALUMINUM ALLOY

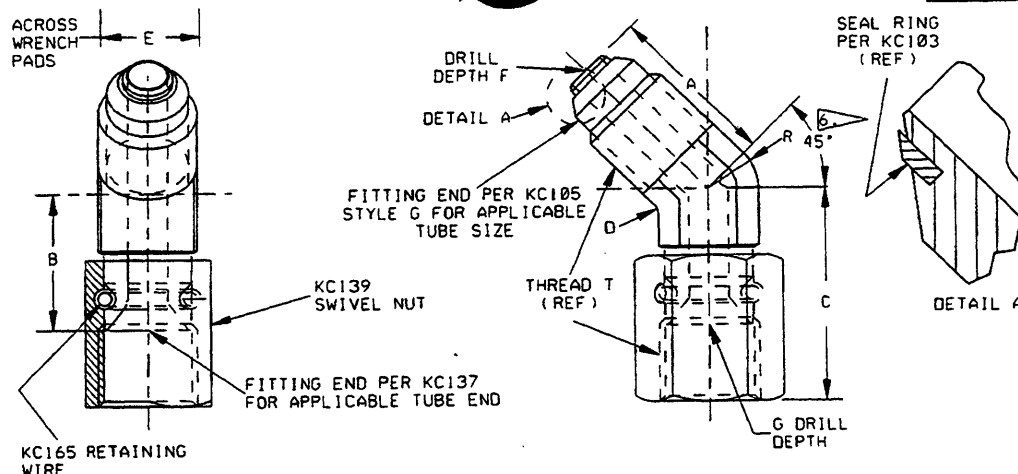
CUSTODIAN: JOHN F. KENNEDY SPACE CENTER		
PROCUREMENT SPEC. KSC-F-124	ELBOW ASSY, 90°, FLARED TUBE & FEMALE SWIVEL END, FOR SEAL RING	STANDARD PART
COORDINATION STATUS		KC131
KSC DE		SHEET 1 OF 1

KSC FORM 32-85 (CG 4/92)

 REVISED: (E) REV & REDRAWN 8-1-90 (F) ADDED NOTE 7 9-1-97
 APPROVED: 8-12-65

NOTICE: WHEN GOVERNMENT DRAWINGS, SPECIFICATIONS OR OTHER DATA ARE USED FOR ANY PURPOSE OTHER THAN IN CONNECTION WITH A DEFINITELY RELATED GOVERNMENT PROCUREMENT OPERATION, THE UNITED STATES GOVERNMENT THEREBY INCURS NO RESPONSIBILITY NOR ANY OBLIGATION WHATSOEVER AND THE FACT THAT THE GOVERNMENT MAY HAVE FORMULATED, FURNISHED, OR IN ANY WAY SUPPLIED THE SAID DRAWINGS, SPECIFICATIONS, OR OTHER DATA IS NOT RECORDED BY IMPLICATION OR OTHERWISE AS IN ANY MANNER LICENSING THE HOLDER OR ANY OTHER PERSON OR CORPORATION, OR CONVEYING ANY RIGHTS OR PERMISSION TO MANUFACTURE, USE, OR SELL ANY PATENTED INVENTION THAT MAY IN ANY WAY BE RELATED THERE TO.

NASA

FED SUP CLASS
4730

DASH NO.		TUBE OD REF	THREAD T REF	A DIM. +.000 -.063	B DIM. +.000 -.031	C DIM REF	D RAD ±.03	R RAD +.03 -.03	E PAD DIM.	F DIM +.047 -.011	G DIM +.016 -.011	SWIVEL NUT KC139		RETAIN ING WIRE
CRE STEEL	AL ALLOY											CRE STEEL	AL ALLOY	
K4	D4	1/4	7/16-20	.750	.610	.9380	.063	.242	.438	.766	.656	K4	D4	KC165-4
K6	D6	3/8	9/16-18	.860	.766	1.125	.094	.317	.563	.891	.828	K6	D6	KC165-6
K8	D8	1/2	3/4-16	1.016	.875	1.281		.414	.750	1.063	.953	K8	D8	KC165-8
K10	D10	5/8	7/8-14	1.141	.954	1.438		.484	.875	1.203	1.047	K10	D10	KC165-10
K12	D12	3/4	1-1/16-12	1.313	.954	1.500	.125	.586	1.063	1.391	1.063	K12	D12	KC165-12
K16	D16	1	1-5/16-12	1.500	1.172	1.750		.719	1.313	1.625	1.328	K16	D16	KC165-16
K20	D20	1 1/4	1-5/8-12	1.625	1.422	2.031		.875	1.625	1.797	1.625	K20	D20	KC165-20
K24	D24	1 1/2	1-7/8-12	1.813	1.532	2.250	.188	1.031	1.875	2.031	1.781	K24	D24	KC165-24
K28	D28	1 3/4	2-1/4-12	2.000	1.766	2.619		1.125	2.250	2.266	2.031	K28	D28	KC165-28
K32	D32	2	2-1/2-12	2.250	1.985	2.906	.250	1.383	2.500	2.578	2.313	K32	D32	KC165-32

MATERIAL: SEE PROCUREMENT SPECIFICATION.
ALUMINUM ALLOY, 2014-T6, CODE "D"
CORROSION RESISTANT STEEL (CLASS 316), CODE "K" (WAS CODE "C")

FINISH: SEE PROCUREMENT SPECIFICATION.

SCREW THREAD: SEE PROCUREMENT SPECIFICATION.

- NOTES:
- REMOVE BURRS AND SLIVERS. BREAK SHARP EDGES UNLESS OTHERWISE NOTED.
 - DIMENSIONS IN INCHES. UNLESS OTHERWISE SPECIFIED, TOLERANCE DECIMALS $\pm .016$.
 - FOR DESIGN FEATURE PURPOSES, THIS DRAWING TAKES PRECEDENCE OVER PROCUREMENT DOCUMENTS REFERENCED HEREIN.
 - REFERENCED DOCUMENTS SHALL BE OF THE ISSUE IN EFFECT ON THE DATE OF INVITATION FOR BID.
 - MARKING OF FITTINGS SHALL BE CONSISTENT WITH PROCUREMENT SPECIFICATION USING APPLICABLE KC STANDARD AND PART NUMBER DESIGNATIONS AS SHOWN ON THIS DRAWING.

TOLERANCE UP TO AND INCLUDING -6 SIZE $\pm 2-1/2^\circ$ ABOVE -6 SIZE $\pm 1-1/2^\circ$.

EXAMPLE OF PART NOS. KC132K8 = 45° ELBOW WITH SWIVEL END, 1/2" OD TUBING, CORROSION RESISTANT STEEL
KC132D12 = 45° ELBOW WITH SWIVEL END, 3/4" OD TUBING, ALUMINUM ALLOY

CUSTODIAN: JOHN F. KENNEDY SPACE CENTER

PROCUREMENT SPEC.
KSC-F-124

COORDINATION STATUS

KSC DE

ELBOW ASSY, 45°, FLARED
TUBE & FEMALE SWIVEL
END, FOR SEAL RING

STANDARD PART

KC132

SHEET 1 OF 1

KSC FORM 32-85 (CG 4/92)

REVISED: (D) REV & REDRAWN 8-1-90

APPROVED: 8-12-65

GP-425

NASA

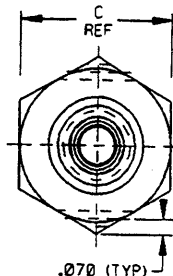
FED SUP CLASS
4730

NOTICE: WHEN GOVERNMENT DRAWINGS, SPECIFICATIONS OR OTHER DATA ARE USED FOR ANY PURPOSE OTHER THAN IN CONNECTION WITH A DEFINITELY RELATED GOVERNMENT PROCUREMENT OPERATION, THE UNITED STATES GOVERNMENT THEREBY INCURS NO RESPONSIBILITY NOR ANY OBLIGATION WHATSOEVER AND THE FACT THAT THE GOVERNMENT MAY HAVE FORMULATED, FURNISHED, OR IN ANY WAY SUPPLIED THE SAID DRAWINGS, SPECIFICATIONS, OR OTHER DATA IS NOT REGARDED BY IMPLICATION OR OTHERWISE AS IN ANY MANNER LICENSING THE HOLDER OR ANY OTHER PERSON OR CORPORATION, OR CONVEYING ANY RIGHTS OR PERMISSION TO MANUFACTURE, USE, OR SELL ANY PATENTED INVENTION THAT MAY IN ANY WAY BE RELATED THERETO.

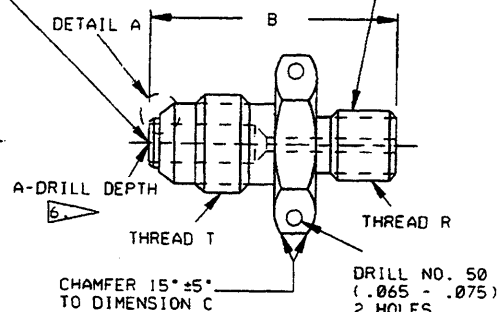
SEAL RING
PER KC103
(REF)

DETAIL A

FITTING END IN ACCORDANCE
WITH KC105, STYLE E FOR
TUBE SIZE SPECIFIED
EXCEPT AS NOTED



FITTING END IN ACCORDANCE
WITH KC136 FOR TUBE SIZE
SPECIFIED



MATERIAL:

SEE PROCUREMENT SPECIFICATION.
ALUMINUM ALLOY, 2024-T6, CODE "D"
CORROSION RESISTANT STEEL (CLASS 316), CODE "K" (WAS CODE "C")

FINISH:

SEE PROCUREMENT SPECIFICATION.

SCREW THREAD:

SEE PROCUREMENT SPECIFICATION.

NOTES:

1. REMOVE BURRS AND SLIVERS. BREAK SHARP EDGES UNLESS OTHERWISE NOTED.
2. DIMENSIONS IN INCHES. UNLESS OTHERWISE SPECIFIED, TOLERANCE DECIMALS $\pm .016$.
3. FOR DESIGN FEATURE PURPOSES, THIS DRAWING TAKES PRECEDENCE OVER PROCUREMENT DOCUMENTS REFERENCED HEREIN.
4. REFERENCED DOCUMENTS SHALL BE OF THE ISSUE IN EFFECT ON THE DATE OF INVITATION FOR BID.
5. MARKING OF FITTINGS SHALL BE CONSISTENT WITH PROCUREMENT SPECIFICATION USING APPLICABLE KC STANDARD AND PART NUMBER DESIGNATIONS AS SHOWN ON THIS DRAWING.
6. AT THE OPTION OF THE MANUFACTURER, THE SMALLER INSIDE DIAMETER DIMENSION MAY BE DRILLED FROM PORT TO PORT.

EXAMPLE OF
PART NOS.

KC133K8-4 = REDUCER-ADAPTER, $\frac{1}{4}$ " OD TUBING TO $\frac{1}{4}$ " BOSS END, CORROSION RESISTANT STEEL
KC133DI2-8 = REDUCER-ADAPTER, $\frac{3}{4}$ " OD TUBING TO $\frac{1}{2}$ " BOSS END, ALUMINUM ALLOY

REVISED: (E) REV & REDRAWN 8-1-90

APPROVED: 8-12-65

CUSTODIAN:

JOHN F. KENNEDY SPACE CENTER

PROCUREMENT SPEC.

KSC-F-124

COORDINATION STATUS

KSC DE

REDUCER - ADAPTER
FLARED TUBE TO BOSS
FOR SEAL RING

STANDARD PART

KC133

SHEET 1 OF 2

KSC FORM 32-85 (CG 4/92)

FED SUP CLASS
4730

NOTICE: WHEN GOVERNMENT DRAWINGS, SPECIFICATIONS OR OTHER DATA ARE USED FOR ANY PURPOSE OTHER THAN IN CONNECTION WITH A DEFINITELY RELATED GOVERNMENT PROCUREMENT OPERATION, THE UNITED STATES GOVERNMENT THEREBY INCURS NO RESPONSIBILITY NOR ANY OBLIGATION WHATSOEVER AND THE FACT THAT THE GOVERNMENT MAY HAVE FORMULATED, FURNISHED, OR IN ANY WAY SUPPLIED THE SAID DRAWINGS, SPECIFICATIONS, OR OTHER DATA IS NOT REGARDED BY IMPLICATION OR OTHERWISE AS IN ANY MANNER LICENSING THE HOLDER OR ANY OTHER PERSON OR CORPORATION, OR CONVEYING ANY RIGHTS OR PERMISSION TO MANUFACTURE, USE, OR SELL ANY PATENTED INVENTION THAT MAY IN ANY WAY BE RELATED THERETO.

DASH NO.		FLARED TUBE END		BOSS END		A MAX B	B +.000 -.060	C REF
		TUBE OD REF	THREAD T REF	TUBE OD REF	THREAD R REF			
CRES STEEL	AL ALLOY							
K4-2	D4-2	1/4	7/16-20	1/8	5/16-24	.452	1.100	.688
K4-3	D4-3			3/8	3/8-24		1.066	
K6-2	D6-2	3/8	9/16-18	1/8	5/16-24	.457	1.242	.813
K6-3	D6-3			3/8	3/8-24		1.208	
K6-4	D6-4			1/4	7/16-20		1.335	
K6-5	D6-5			5/8	1/2-20			
K8-2	D8-2	1/2	3/4-16	1/8	5/16-24	.538	1.357	1.000
K8-3	D8-3			3/8	3/8-24		1.323	
K8-4	D8-4			1/4	7/16-20		1.450	
K8-5	D8-5			5/8	1/2-20		1.445	
K8-6	D8-6			3/8	9/16-18			
K10-4	D10-4	5/8	7/8-14	1/4	7/16-20	.618	1.533	1.125
K10-6	D10-6			3/8	9/16-18		1.528	
K10-8	D10-8			1/2	3/4-16		1.567	
K12-4	D12-4	3/4	1-1/16-12	1/4	7/16-20	.703	1.686	1.375
K12-5	D12-5			5/8	1/2-20			
K12-6	D12-6			3/8	9/16-18		1.681	
K12-8	D12-8			1/2	3/4-16		1.719	
K12-10	D12-10			5/8	7/8-14		1.616	
K16-4	D16-4	1	1-5/16-12	1/4	7/16-20	.741	1.722	1.625
K16-8	D16-8			1/2	3/4-16		1.809	
K16-10	D16-10			5/8	7/8-14		1.852	
K16-12	D16-12			3/4	1-1/16-12		1.912	
K20-4	D20-4	1 1/4	1-5/8-12	1/4	7/16-20	.778	1.965	1.875
K20-12	D20-12			3/4	1-1/16-12		2.202	
K20-16	D20-16			1	1-5/16-12			
K24-16	D24-16	1 1/2	1-7/8-12			.878	2.159	2.125
K24-20	D24-20			1 1/4	1-5/8-12		2.154	
K28-20	D28-20	1 3/4	2-1/4-12			.978	2.373	2.500
K28-24	D28-24			1 1/2	1-7/8-12		2.404	
K32-24	D32-24	2	2-1/2-12			1.078	2.529	2.750
K32-28	D32-28			1 3/4	2-1/4-12		2.684	

REVISED: (E) REV & REDRAWN 8-1-90

APPROVED: 8-12-65

CUSTODIAN:

JOHN F. KENNEDY SPACE CENTER

PROCUREMENT SPEC.
KSC-F-124

COORDINATION STATUS

KSC DE

REDUCER - ADAPTER
FLARED TUBE TO BOSS
FOR SEAL RING

STANDARD PART

KC133

SHEET 2 OF 2

KSC FORM 32-85 (CG 4/92)

GP-425

NOTICE: WHEN GOVERNMENT DRAWINGS, SPECIFICATIONS OR OTHER DATA ARE USED FOR ANY PURPOSE OTHER THAN IN CONNECTION WITH A DEFINITELY RELATED GOVERNMENT PROCUREMENT OPERATION, THE UNITED STATES GOVERNMENT THEREBY INCURS NO RESPONSIBILITY NOR ANY OBLIGATION WHATSOEVER AND THE FACT THAT THE GOVERNMENT MAY HAVE FORMULATED, FURNISHED, OR IN ANY WAY SUPPLIED THE SAID DRAWINGS, SPECIFICATIONS, OR OTHER DATA IS NOT REGARDED BY IMPLICATION OR OTHERWISE AS IN ANY MANNER LICENSING THE HOLDER OR ANY OTHER PERSON OR CORPORATION, OR CONVEYING ANY RIGHTS OR PERMISSION TO MANUFACTURE, USE, OR SELL ANY PATENTED INVENTION THAT MAY IN ANY WAY BE RELATED THERETO.

DASH NO.		TUBE OD REF	THREAD T REF	A +.000 -.060	B +.000 -.060	C REF
CRE STEEL	AL ALLOY					
K4	D4	1/4	7/16-20	1.213	1.881	.688
K6	D6	3/8	9/16-18	1.291	2.078	.813
K8	D8	1/2	3/4-16	1.447	2.312	1.000
K10	D10	5/8	7/8-14	1.588	2.523	1.125
K12	D12	3/4	1-1/16-12	1.760	2.797	1.375
K16	D16	1	1-5/16-12	1.760	2.834	1.625
K20	D20	1 1/4	1-5/8-12	1.807	2.956	1.875
K24	D24	1 1/2	1-7/8-12	1.822	3.018	2.125
K28	D28	1 3/4	2-1/4-12	1.979	3.314	2.500
K32	D32	2	2-1/2-12	2.104	3.467	2.750

MATERIAL: SEE PROCUREMENT SPECIFICATION.
ALUMINUM ALLOY, 2024-T6, CODE "D"
CORROSION RESISTANT STEEL (CLASS 316), CODE "K" (WAS CODE "C")

FINISH: SEE PROCUREMENT SPECIFICATION.

SCREW THREAD: SEE PROCUREMENT SPECIFICATION.

NOTES:

- REMOVE BURRS AND SLIVERS. BREAK SHARP EDGES UNLESS OTHERWISE NOTED.
- DIMENSIONS IN INCHES. UNLESS OTHERWISE SPECIFIED, TOLERANCE DECIMALS $\pm .016$.
- FOR DESIGN FEATURE PURPOSES, THIS DRAWING TAKES PRECEDENCE OVER PROCUREMENT DOCUMENTS REFERENCED HEREIN.
- REFERENCED DOCUMENTS SHALL BE OF THE ISSUE IN EFFECT ON THE DATE OF INVITATION FOR BID.
- MARKING OF FITTINGS SHALL BE CONSISTENT WITH PROCUREMENT SPECIFICATION USING APPLICABLE KC STANDARD AND PART NUMBER DESIGNATIONS AS SHOWN ON THIS DRAWING.

EXAMPLE OF PART NOS.

KC134K4 = ADAPTER, BOSS TO BULKHEAD, 1/4" OD TUBING, CORROSION RESISTANT STEEL
KC134D8 = ADAPTER, BOSS TO BULKHEAD, 1/2" OD TUBING, ALUMINUM ALLOY

CUSTODIAN: JOHN F. KENNEDY SPACE CENTER

PROCUREMENT SPEC. KSC-F-124

COORDINATION STATUS

KSC DE

**ADAPTER, FLARED TUBE
3/8" BULKHEAD TO
BOSS FOR SEAL RING**

STANDARD PART

KC134

SHEET 1 OF 1

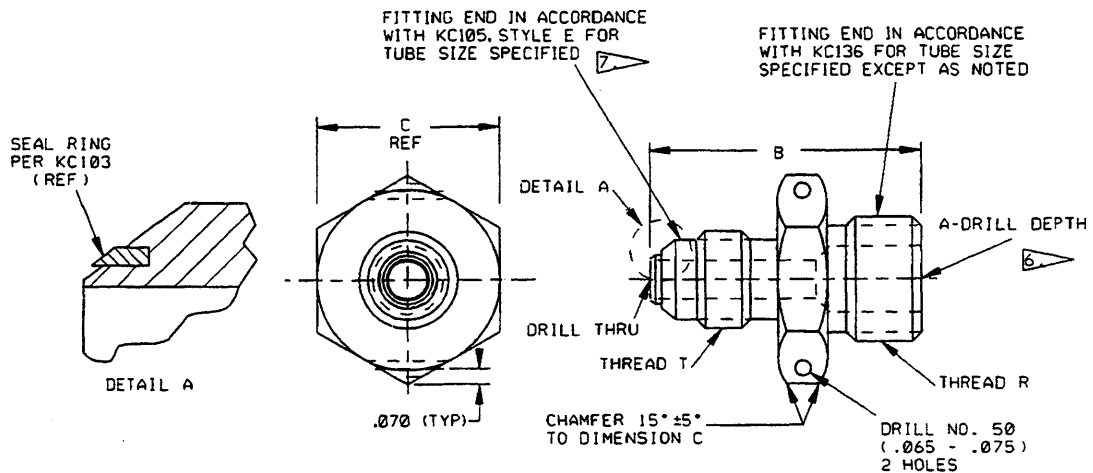
FED SUP CLASS 4730

REVISIONS: (E) REV & REDRAWN 8-1-90

APPROVED: 8-12-65

KSC FORM 32-85 (CG 4/92)

NASA

FED SUP CLASS
4730

MATERIAL: SEE PROCUREMENT SPECIFICATION.
ALUMINUM ALLOY, 2024-T6, CODE "D"
CORROSION RESISTANT STEEL (CLASS 316), CODE "K" (WAS CODE "C")

FINISH: SEE PROCUREMENT SPECIFICATION.

SCREW THREAD: SEE PROCUREMENT SPECIFICATION.

- NOTES:
1. REMOVE BURRS AND SLIVERS. BREAK SHARP EDGES UNLESS OTHERWISE NOTED.
 2. DIMENSIONS IN INCHES. UNLESS OTHERWISE SPECIFIED, TOLERANCE DECIMALS $\pm .016$.
 3. FOR DESIGN FEATURE PURPOSES, THIS DRAWING TAKES PRECEDENCE OVER PROCUREMENT DOCUMENTS REFERENCED HEREIN.
 4. REFERENCED DOCUMENTS SHALL BE OF THE ISSUE IN EFFECT ON THE DATE OF INVITATION FOR BID.
 5. MARKING OF FITTINGS SHALL BE CONSISTENT WITH PROCUREMENT SPECIFICATION USING APPLICABLE KC STANDARD AND PART NUMBER DESIGNATIONS AS SHOWN ON THIS DRAWING.

6. AT THE OPTION OF THE MANUFACTURER, THE SMALLER INSIDE DIAMETER DIMENSION MAY BE DRILLED FROM PORT TO PORT.

7. FOR -2, -3, & -5 TUBE SIZES, FITTING END SHALL BE IN COMPLIANCE WITH MS33656.

EXAMPLE OF PART NOS. KC135K6-8 = EXPANDER-ADAPTER, $\frac{3}{8}$ " OD TUBING TO $\frac{1}{2}$ " BOSS END, CORROSION RESISTANT STEEL
KC135D8-10 = EXPANDER-ADAPTER, $\frac{1}{2}$ " OD TUBING TO $\frac{3}{8}$ " BOSS END, ALUMINUM ALLOY

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
CUSTODIAN: JOHN F. KENNEDY SPACE CENTER		REVISED: (E) REV & REDRAWN 8-1-90	
PROCUREMENT SPEC. KSC-F-124	EXPANDER - ADAPTER FLARED TUBE TO BOSS, FOR SEAL RING	STANDARD PART	
COORDINATION STATUS		KC135	
KSC DE		SHEET 1 OF 2	

KSC FORM 32-85 (CG 4/92)

GP-425

FED SUP CLASS
4730

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DASH NO.		FLARED TUBE END		BOSS END		A MAX 	B +.000 -.060	C REF
CRES STEEL	AL ALLOY	TUBE OD REF	THREAD T REF	TUBE OD REF	THREAD R REF			
K2-4	D2-4	1/8	5/16-24	1/4	7/16-20	.311	1.084	.688
K3-4	D3-4	3/16	3/8-24				1.115	
K2-6	D2-6	1/8	5/16-24	3/8	9/16-18	.336	1.163	.813
K3-6	D3-6	3/16	3/8-24				1.194	
K4-6	D4-6	1/4	7/16-20				1.265	
K5-6	D5-6	5/16	1/2-20	1/2	3/4-16	.417	1.285	1.000
K2-8	D2-8	1/8	5/16-24				1.315	
K3-8	D3-8	3/16	3/8-24				1.390	
K4-8	D4-8	1/4	7/16-20				1.392	
K5-8	D5-8	5/16	1/2-20	5/8	7/8-14	.454	1.460	1.125
K6-8	D6-8	3/8	9/16-18				1.460	
K8-10	D8-10	1/2	3/4-16				1.560	
K4-12	D4-12	1/4	7/16-20	3/4	1-1/16-12	.509	1.567	1.375
K5-12	D5-12	5/16	1/2-20				1.668	
K6-12	D6-12	3/8	9/16-18				1.769	
K8-12	D8-12	1/2	3/4-16				1.597	
K10-12	D10-12	5/8	7/8-14	1	1-5/16-12	.538	1.603	1.625
K4-16	D4-16	1/4	7/16-20				1.704	
K6-16	D6-16	3/8	9/16-18				1.805	
K8-16	D8-16	1/2	3/4-16				1.911	
K10-16	D10-16	5/8	7/8-14	1 1/4	1-5/8-12	.610	1.693	1.875
K12-16	D12-16	3/4	1-1/16-12				2.007	
K16-20	D16-20	1	1-5/16-12				2.054	
K16-24	D16-24	1	1-5/16-12	1 1/2	1-7/8-12	.635	2.095	2.125
K20-24	D20-24	1 1/4	1-5/8-12				2.142	
K20-28	D20-28	1 1/4	1-5/8-12	1 3/4	2-1/4-12	.759	2.297	2.500
K24-28	D24-28	1 1/2	1-7/8-12				2.422	
K24-32	D24-32	1 1/2	1-7/8-12	2	2-1/2-12	.782	2.516	2.750
K28-32	D28-32	1 3/4	2-1/4-12				2.641	

REVISED: (E) REV & REDRAWN 8-1-90

APPROVED: 8-12-65

CUSTODIAN:

JOHN F. KENNEDY SPACE CENTER

PROCUREMENT SPEC.

KSC-F-124

COORDINATION STATUS

KSC DE

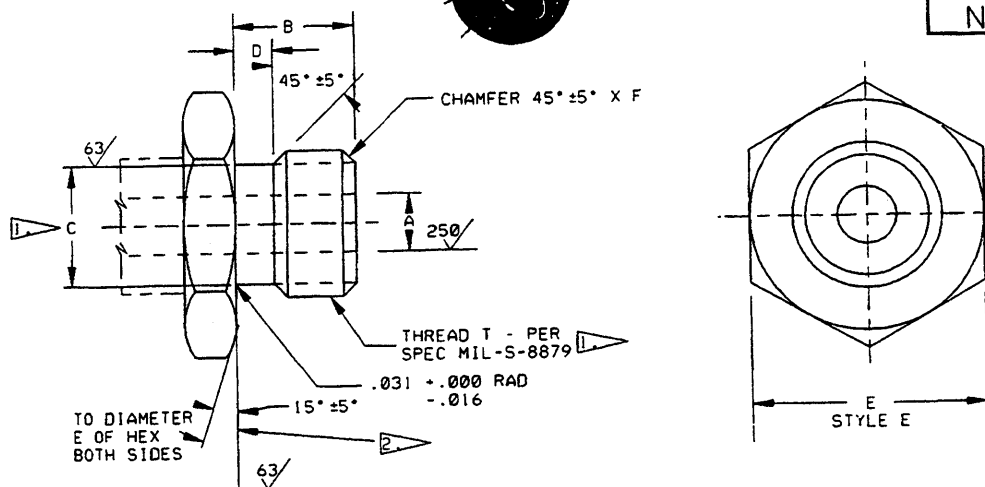
EXPANDER - ADAPTER
FLARED TUBE TO BOSS,
FOR SEAL RING

STANDARD PART

KC135

SHEET 2 OF 2

KSC FORM 32-85 (CG 4/92)

FED SUP CLASS
NONE

DASH NO.	TUBE OD REF	THREAD T MIL-S-8879	A DIA	B +.000 -.015	C DIA +.002 -.003	D +.015 -.000	E DIA	F	
								MIN	MAX
-2	1/8	.3125-24UNJF-3A	.062	.351	.250	.063	.563	.031	.052
-3	3/16	.3750-24UNJF-3A	.125	.355	.312		.625		
-4	1/4	.4375-20UNJF-3A	.172	.389	.364	.075	.688	.038	.063
-5	5/16	.5000-20UNJF-3A	.234	.411	.426		.750		
-6	3/8	.5625-18UNJF-3A	.297	.420	.481	.083	.813	.042	.069
-8	1/2	.7500-16UNJF-3A	.391	.521	.660	.094	1.000	.047	.078
-10	5/8	.8750-14UNJF-3A	.484	.567	.773	.107	1.125	.054	.089
-12	3/4	1.0625-12UNJ-3A	.609	.636	.945		1.375		
-16	1	1.3125-12UNJ-3A	.844	.672	1.195		1.625	.063	.104
-20	1 1/4	1.6250-12UNJ-3A	1.078		1.507	.125	1.875		
-24	1 1/2	1.8750-12UNJ-3A	1.312	.720	1.756		2.125		
-28	1 3/4	2.2500-12UNJ-3A	1.547		.772	2.131	2.500		
-32	2	2.5000-12UNJ-3A	1.781	.887	2.381		2.750		

- NOTES:
1. DIAMETER C AND T THREAD (PITCH DIA) SHALL BE CONCENTRIC WITHIN .015 FULL INDICATOR READING.
 2. SQUARENESS BETWEEN THREAD T PITCH DIAMETER AND FACE OF HEX SHALL NOT EXCEED .005 FOR SIZES DASH 10 AND SMALLER OR .008 FOR LARGER SIZES, WHEN MEASURED AT THE OUTER DIAMETER OF THE FACE.
 3. DIMENSIONS IN INCHES, TOLERANCES NOTED.
 4. ROUGHNESS OF MACHINED SURFACES SHALL BE 125 AA MAX PER ANSI B46.1 UNLESS OTHERWISE SPECIFIED.
 5. BREAK ALL SHARP EDGES UNLESS OTHERWISE NOTED. REMOVE BURRS AND SLIVERS.
 6. THIS STANDARD TAKES PRECEDENCE OVER DOCUMENTS REFERENCED HEREIN.

CUSTODIAN:

JOHN F. KENNEDY SPACE CENTER

PROCUREMENT SPEC.
NONE

COORDINATION STATUS

KSC DE

STANDARD DIMENSIONS FOR
FITTING END,
STRAIGHT THREAD

DESIGN STANDARD

KC136

SHEET 1 OF 1

KSC FORM 32-85 (CG 4/92)


REVISED: (F) REV 8 REDRAWN 8-1-90

APPROVED: 8-12-65

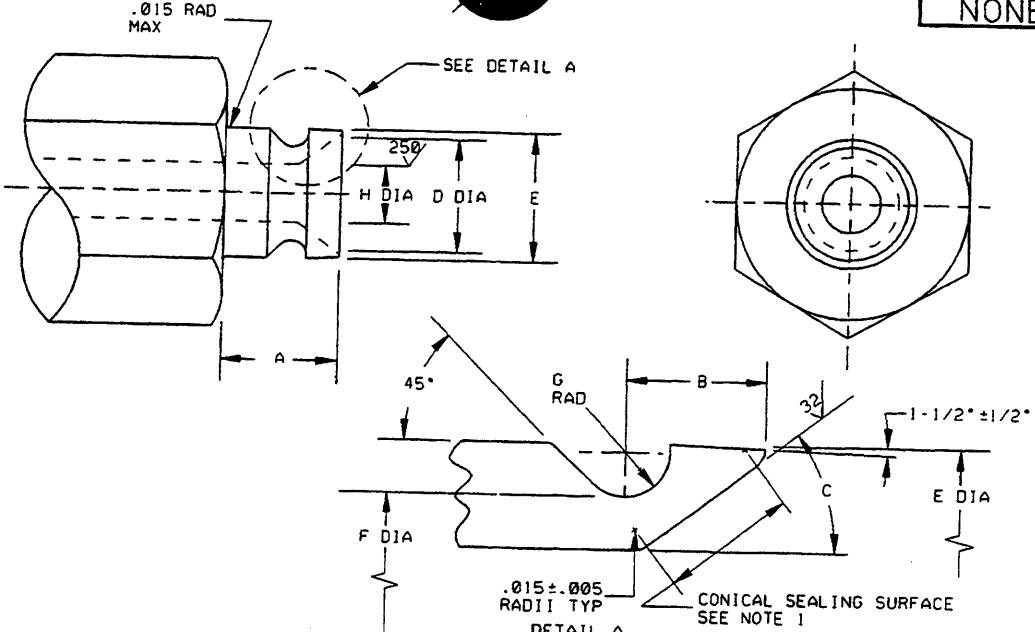
NOTICE: WHEN GOVERNMENT DRAWINGS, SPECIFICATIONS OR OTHER DATA ARE USED FOR ANY PURPOSE OTHER THAN IN CONNECTION WITH A DEFINITELY RELATED GOVERNMENT PROCUREMENT OPERATION, THE UNITED STATES GOVERNMENT THEREBY INCURS NO RESPONSIBILITY NOR ANY OBLIGATION WHATSOEVER AND THE FACT THAT THE GOVERNMENT MAY HAVE FORMULATED, FURNISHED, OR IN ANY WAY SUPPLIED THE SAID DRAWINGS, SPECIFICATIONS, OR OTHER DATA IS NOT REGARDED BY IMPLICATION OR OTHERWISE AS IN ANY MANNER LICENSING THE HOLDER OR ANY OTHER PERSON OR CORPORATION, OR CONVEYING ANY RIGHTS OR PERMISSION TO MANUFACTURE, USE, OR SELL ANY PATENTED INVENTION THAT MAY IN ANY WAY BE RELATED THERETO.

GP-425

NOTICE: WHEN GOVERNMENT DRAWINGS, SPECIFICATIONS OR OTHER DATA ARE USED FOR ANY PURPOSE OTHER THAN IN CONNECTION WITH A DEFINITELY RELATED GOVERNMENT PROCUREMENT OPERATION, THE UNITED STATES GOVERNMENT THEREBY INCURS NO RESPONSIBILITY NOR ANY OBLIGATION WHATSOEVER AND THE FACT THAT THE GOVERNMENT MAY HAVE FORMULATED, FURNISHED, OR IN ANY WAY SUPPLIED THE SAID DRAWINGS, SPECIFICATIONS, OR OTHER DATA IS NOT REGARDED BY IMPLICATION OR OTHERWISE AS IN ANY MANNER LICENSING THE HOLDER OR ANY OTHER PERSON OR CORPORATION, OR CONVEYING ANY RIGHTS OR PERMISSION TO MANUFACTURE, USE, OR SELL ANY PATENTED INVENTION THAT MAY IN ANY WAY BE RELATED THERETO.



FED SUP CLASS
NONE



DASH NO.	TUBE OD REF	A ±.016	B	C DEG ±30	D DIA	E DIA +.005 -.005	F DIA +.000 -.005	G RAD +.005 -.003	H DIA
-4	1/4	.370	.140	39 1/2	.295	.383	.278	.044	.172 +.003 -.004
-6	3/8	.465	.156		.435	.502	.397		.297
-8	1/2		.188		.572	.682	.565	.050	.391 ±.004
-10	5/8	.454			.680	.797	.681		.484
-12	3/4	.512	.219	37	.850	.972	.824	.066	.609 ±.005
-16	1	.579	.250		1.075	1.224	1.072		.844 +.007 -.005
-20	1 1/4	.672	.344		1.410	1.536	1.382		1.078 +.008 -.005
-24	1 1/2	.721	.381		1.625	1.786	1.636		1.312 ±.010 -.005
-28	1 3/4	.829	.394		2.034	2.178	2.027		1.546
-32	2		.406		2.284	2.411	2.262		1.781

DETAIL A

CONICAL SEALING SURFACE
SEE NOTE 1

NOTES:

1. THE CONICAL SEALING SURFACE SHALL BE CONCENTRIC WITH E DIA WITHIN .005 FULL INDICATOR READING.
2. MACHINED SURFACE ROUGHNESS, UNLESS OTHERWISE SPECIFIED, SHALL NOT EXCEED 63 ✓ PER ANSI B46.1.
3. DIMENSIONS IN INCHES UNLESS OTHERWISE SPECIFIED; DECIMALS ±.005 ANGLES ±5°.
4. BREAK ALL SHARP EDGES UNLESS OTHERWISE NOTED. REMOVE BURRS AND SLIVERS.
5. THIS STANDARD TAKES PRECEDENCE OVER DOCUMENTS REFERENCED HEREIN.

CUSTODIAN:		JOHN F. KENNEDY SPACE CENTER	
PROCUREMENT SPEC.	NONE	FITTING END, SWIVEL FLARED TUBE CONNECTOR, STANDARD DIMENSIONS FOR	DESIGN STANDARD
COORDINATION STATUS			KC137
KSC DE			SHEET 1 OF 1

KSC FORM 32-85 (CG 4/92)

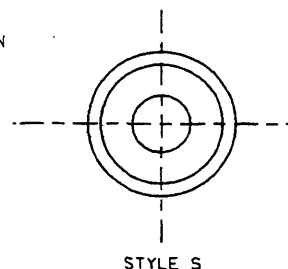
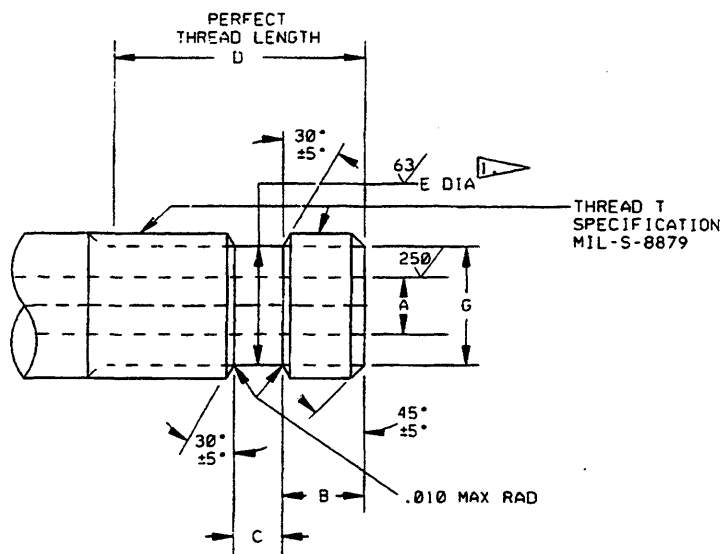
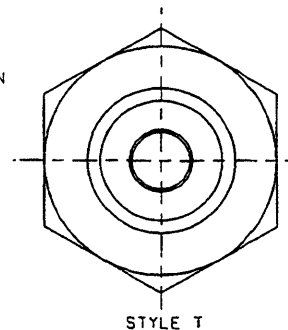
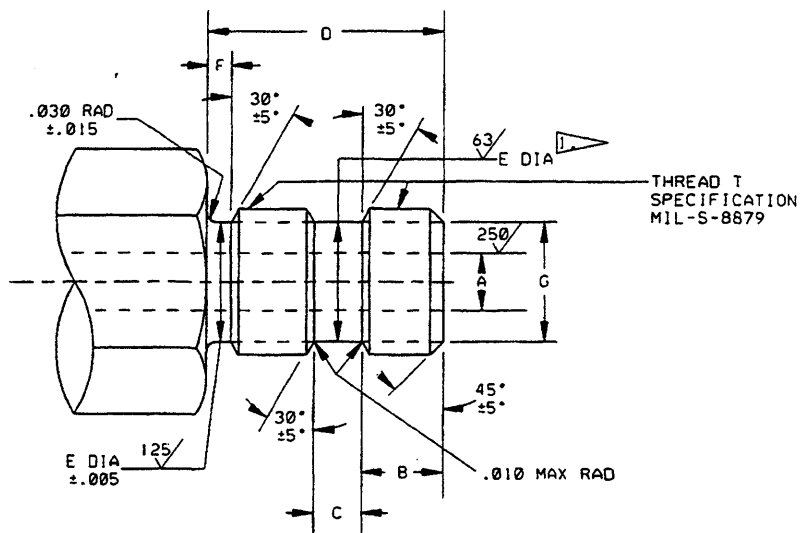
REVISED: (F) REV & REDRAWN 8-1-90

APPROVED: 8-12-65



FED SUP CLASS
NONE

NOTICE: WHEN GOVERNMENT DRAWINGS, SPECIFICATIONS OR OTHER DATA ARE USED FOR ANY PURPOSE OTHER THAN IN CONNECTION WITH A DEFINITELY RELATED GOVERNMENT PROCUREMENT OPERATION, THE UNITED STATES GOVERNMENT THEREBY INCURS NO RESPONSIBILITY NOR ANY OBLIGATION WHATSOEVER AND THE FACT THAT THE GOVERNMENT MAY HAVE FORMULATED, FURNISHED, OR IN ANY WAY SUPPLIED THE SAID DRAWINGS, SPECIFICATIONS, OR OTHER DATA IS NOT REGARDED BY IMPLICATION OR OTHERWISE AS IN ANY MANNER LICENSING THE HOLDER OR ANY OTHER PERSON OR CORPORATION, OR CONVEYING ANY RIGHTS OR PERMISSION TO MANUFACTURE, USE, OR SELL ANY PATENTED INVENTION THAT MAY IN ANY WAY BE RELATED THERETO.



REVISED: (D) REV & REDRAWN 8-1-90

APPROVED: 8-12-65

CUSTODIAN:

JOHN F. KENNEDY SPACE CENTER

PROCUREMENT SPEC.

NONE

COORDINATION STATUS

KSC DE

FITTING END, ADJUSTABLE,
STANDARD DIMENSIONS FOR

DESIGN STANDARD

KC138

SHEET 1 OF 2

KSC FORM 32-85 (CG 4/92)

GP-425

FED SUP CLASS
NONE

DASH NO.	TUBE OD REF	THREAD T MIL-S-8879	A DIA		B DIM	C $\pm .010$ $-.000$	D DIM $\pm .016$	E $\pm .002$ $-.003$	F $\pm .015$ $-.000$	G DIA $\pm .016$		
-4	1/4	.4375-20-UNJF-3A	.172	$\pm .004$.281	.140	.703	.364	.075	.359		
-6	3/8	.5625-18-UNJF-3A	.297		.312	.156	.766	.482	.083	.484		
-8	1/2	.7500-16-UNJF-3A	.391		.344	.187	.875	.660	.094	.656		
-10	5/8	.8750-14-UNJF-3A	.484		.391	.219	1.016	.773	.107	.766		
-12	3/4	1.0625-12-UNJ-3A	.609	$\pm .005$.469	.234	1.156	.945	.125	.938		
-16	1	1.3125-12-UNJ-3A	.844					$\pm .007$ $-.005$		1.195	1.188	
-20	1 1/4	1.6250-12-UNJ-3A	1.078					$\pm .008$ $-.005$		1.507	1.500	
-24	1 1/2	1.8750-12-UNJ-3A	1.312							1.756	1.750	
-28	1 3/4	2.2500-12-UNJ-3A	1.547							$\pm .010$ $-.005$	2.131	2.125
-32	2	2.5000-12-UNJ-3A	1.781								2.381	2.375

- NOTES:
1. "E" DIAMETER GROOVE SHALL BE SMOOTH AND FREE OF ALL THREAD MARKS.
 2. SURFACE FINISH OF DRILLED HOLE SHALL BE 250 $\sqrt{\text{IN}}$ PER ANSI B46.1.
 3. MACHINED SURFACE ROUGHNESS, UNLESS OTHERWISE SPECIFIED, SHALL NOT EXCEED 100 $\sqrt{\text{IN}}$ PER ANSI B46.1.
 4. DIMENSIONS IN INCHES, UNLESS OTHERWISE SPECIFIED, TOLERANCES: DECIMALS $\pm .005$.
 5. THIS STANDARD TAKES PRECEDENCE OVER DOCUMENTS REFERENCED HEREIN.

REVISED: ① REV & REDRAWN 8-1-90

APPROVED: 8-12-65

CUSTODIAN:		JOHN F. KENNEDY SPACE CENTER	
PROCUREMENT SPEC.	FITTING END, ADJUSTABLE, STANDARD DIMENSIONS FOR	DESIGN STANDARD	
NONE		KC138	
COORDINATION STATUS		SHEET 2 OF 2	
KSC DE			

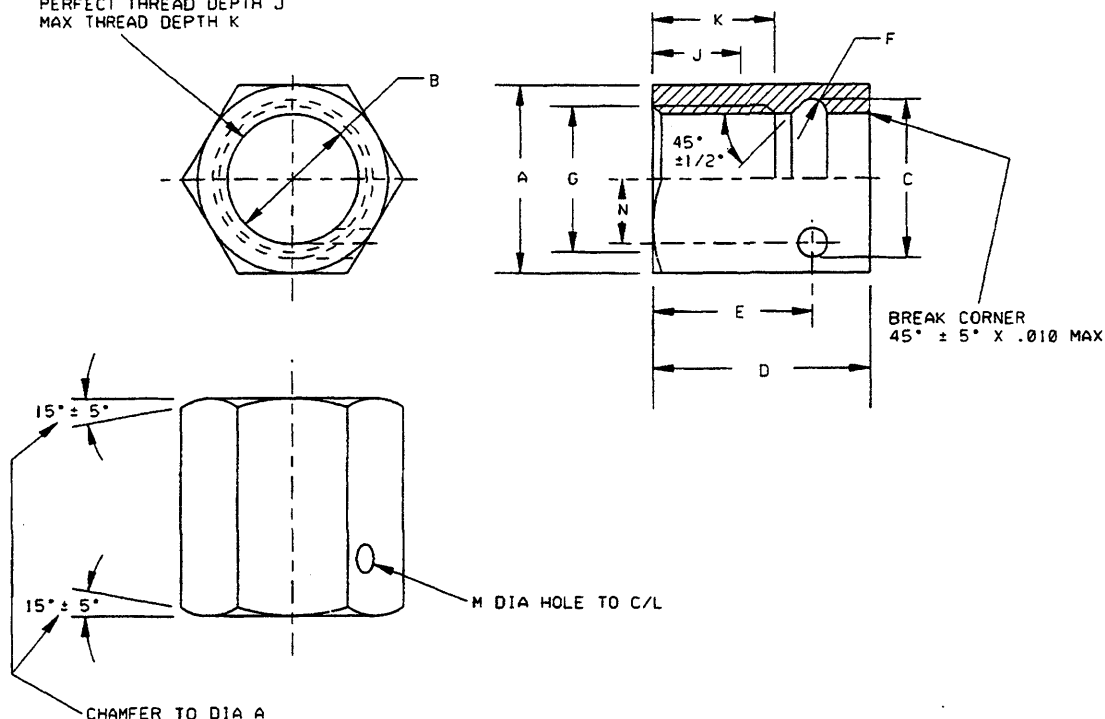
KSC FORM 32-85 (CG 4/92)

NOTICE: WHEN GOVERNMENT DRAWINGS, SPECIFICATIONS OR OTHER DATA ARE USED FOR ANY PURPOSE OTHER THAN IN CONNECTION WITH A DEFINITELY RELATED GOVERNMENT PROCUREMENT OPERATION, THE UNITED STATES GOVERNMENT THEREBY INCURS NO RESPONSIBILITY NOR ANY OBLIGATION WHATSOEVER AND THE FACT THAT THE GOVERNMENT MAY HAVE FORMULATED, FURNISHED, OR IN ANY WAY SUPPLIED THE SAID DRAWINGS, SPECIFICATIONS, OR OTHER DATA IS NOT REGARDED BY IMPLICATION OR OTHERWISE AS IN ANY MANNER LICENSING THE HOLDER OR ANY OTHER PERSON OR CORPORATION, OR CONVEYING ANY RIGHTS OR PERMISSION TO MANUFACTURE, USE, OR SELL ANY PATENTED INVENTION THAT MAY IN ANY WAY BE RELATED THERETO.



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C SINK 90° X DIA G
THREAD T PER MIL-S-8879
PERFECT THREAD DEPTH J
MAX THREAD DEPTH K



FED SUP CLASS
4730

MATERIAL: SEE PROCUREMENT SPECIFICATION.
ALUMINUM ALLOY, 2024-T6, CODE "D"
CORROSION RESISTANT STEEL (CLASS 316), CODE "K" (WAS CODE "C")

FINISH: SEE PROCUREMENT SPECIFICATION

SCREW THREAD: SEE PROCUREMENT SPECIFICATION

- NOTES:
1. REMOVE BURRS AND SLIVERS. BREAK SHARP EDGES UNLESS OTHERWISE NOTED.
 2. DIMENSIONS IN INCHES. UNLESS OTHERWISE SPECIFIED, TOLERANCE DECIMALS $\pm .016$.
 3. FOR DESIGN FEATURE PURPOSES, THIS DRAWING TAKES PRECEDENCE OVER PROCUREMENT DOCUMENTS REFERENCED HEREIN.
 4. REFERENCED DOCUMENTS SHALL BE OF THE ISSUE IN EFFECT ON THE DATE OF INVITATION FOR BID.
 5. MARKING OF FITTINGS SHALL BE CONSISTENT WITH PROCUREMENT SPECIFICATION USING APPLICABLE KC STANDARD AND PART NUMBER DESIGNATIONS AS SHOWN ON THIS DRAWING.

EXAMPLE OF
PART NOS.

KC139K8 = SWIVEL NUT, $\frac{1}{2}$ " TUBE FITTING, CORROSION RESISTANT STEEL
KC139D12 = SWIVEL NUT, $\frac{3}{4}$ " TUBE FITTING, ALUMINUM ALLOY

REVISED: (C) REV & REDRAWN 8-1-90

APPROVED: 8-12-65

CUSTODIAN:

JOHN F. KENNEDY SPACE CENTER

PROCUREMENT SPEC.

KSC-F-124

COORDINATION STATUS

KSC DE

SWIVEL NUT,
FLARED TUBE FITTING

STANDARD PART

KC139

SHEET 1 OF 2

KSC FORM 32-85 (CG 4/92)

GP-425

FED SUP CLASS
4730

NOTICE: WHEN GOVERNMENT DRAWINGS, SPECIFICATIONS OR OTHER DATA ARE USED FOR ANY PURPOSE OTHER THAN IN CONNECTION WITH A DEFINITELY RELATED GOVERNMENT PROCUREMENT OPERATION, THE UNITED STATES GOVERNMENT THEREBY INCURS NO RESPONSIBILITY NOR ANY OBLIGATION WHATSOEVER AND THE FACT THAT THE GOVERNMENT MAY HAVE FORMULATED, FURNISHED, OR IN ANY WAY SUPPLIED THE SAID DRAWINGS, SPECIFICATIONS, OR OTHER DATA IS NOT REGARDED BY IMPLICATION OR OTHERWISE AS IN ANY MANNER LICENSING THE HOLDER OR ANY OTHER PERSON OR CORPORATION, OR CONVEYING ANY RIGHTS OR PERMISSION TO MANUFACTURE, USE, OR SELL ANY PATENTED INVENTION THAT MAY IN ANY WAY BE RELATED THERE TO.

DASH NO.		TUBE OD REF	THREAD T MIL-S-8879	A HEX		B DIA	C	D DIM	E DIM	F RAD	G DIA	J DIM	
CRE STEEL	AL ALLOY					+.005 -.000	+.005 -.000	±.016	±.003	+.005 -.003	±.005	MIN	
K4	D4	¼	.4375-20UNJF-3B	.563	+.003 -.004	.388	.474	.656	.484	.044	.438	.300	
K6	D6	⅜	.5625-18UNJF-3B	.688		.508	.593	.781	.531		.563	.333	
K8	D8	½	.7500-16UNJF-3B	.875		.688	.785	.828	.609	.050	.750	.375	
K10	D10	⅝	.8750-14UNJF-3B	1.000		.804	.901	.875	.687		.875	.461	
K12	D12	¾	1.0625-12UNJ-3B	1.250		.979	1.108	1.016	.781	.066	1.063	.469	
K16	D16	1	1.3125-12UNJ-3B	1.500		1.229	1.361	1.094	.844		1.313	.563	
K20	D20	1¼	1.6250-12UNJ-3B	2.000		±.016	1.541	1.670	1.219		.969		1.625
K24	D24	1½	1.8750-12UNJ-3B	2.250		±.020	1.791	1.920	1.297		1.015	1.875	.661
K28	D28	1¾	2.2500-12UNJ-3B	2.625	±.020		2.183	2.314	1.513		1.247	2.250	.730
K32	D32	2	2.5000-12UNJ-3B	2.875	±.020		2.416	2.546	1.656		1.344	2.500	.844

DASH NO.		TUBE OD REF	K DIM MAX	M DIA ±.005	N DIM ±.003
CRE STEEL	AL ALLOY				
K4	D4	1/4	.450	.093	.193
K6	D6	3/8	.500		.253
K8	D8	1/2	.563	.102	.343
K10	D10	5/8	.675		.401
K12	D12	3/4	.719	.134	.488
K16	D16	1	.813		.613
K20	D20	1 1/4	.911		.769
K24	D24	1 1/2	.911		.894
K28	D28	1 3/4	.980		1.091
K32	D32	2	1.094		1.207

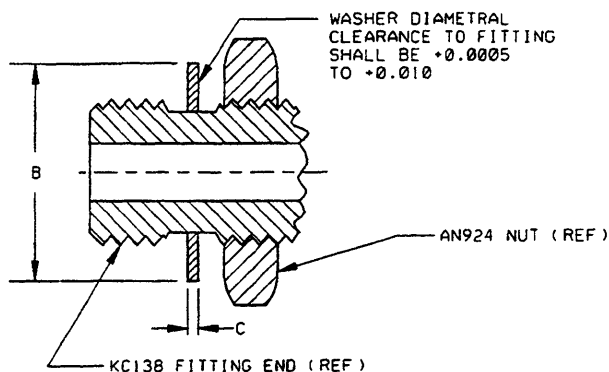
REVISED: (C) REV & REDRAWN 8-1-90

APPROVED: 8-12-65

CUSTODIAN:		JOHN F. KENNEDY SPACE CENTER	
PROCUREMENT SPEC.	SWIVEL NUT, FLARED TUBE FITTING		STANDARD PART
KSC-F-124			KC139
COORDINATION STATUS			SHEET 2 OF 2
KSC DE			

KSC FORM 32-85 (CG 4/92)

NASA

FED SUP CLASS
NONE

DASH NO.		C DIM STOCK THK ±.003	FINAL ASSY DIM. FOR B ±.015	FLATNESS TOL "D" B
CRE STEEL	AL ALLOY			
C4	D4	.031	.650	.015
C6	D6		.794	
C8	D8	.040	1.010	.020
C10	D10	.050	1.155	.025
C12	D12		1.444	
C16	D16		1.732	
C20	D20		2.165	
C24	D24		2.454	
C28	D28		2.868	
C32	D32		3.160	

MATERIAL: ALUMINUM ALLOY, CODE "D"; TYPE 2024-T3 OF SPECIFICATION QQ-A-250/4; CORROSION RESISTANT STEEL (CLASS 302 OR 304) CONDITION A OF SPECIFICATION QQ-S-766.

- NOTES:
1. REMOVE BURRS AND SLIVERS. BREAK SHARP EDGES UNLESS OTHERWISE NOTED.
 2. DIMENSIONS IN INCHES; TOLERANCES NOTED.
 3. FOR DESIGN FEATURE PURPOSES, THIS DRAWING TAKES PRECEDENCE OVER PROCUREMENT DOCUMENTS REFERENCED HEREIN.
 4. REFERENCED DOCUMENTS SHALL BE OF THE ISSUE IN EFFECT ON DATE OF INVITATION FOR BID.

WASHER SHALL BE FLAT WITHIN "D" AFTER INSTALLATION ON FITTING END.

EXAMPLE OF
PART NOS.

KC140C4 = CORROSION RESISTANT STEEL WASHER FOR 1/4" OD TUBE
ADJ END FITTING

KC140D6 = ALUMINUM ALLOY WASHER FOR 1/2" OD TUBE ADJ END FITTING

CUSTODIAN:

JOHN F. KENNEDY SPACE CENTER

PROCUREMENT SPEC.

KSC-F-124

COORDINATION STATUS

KSC DE

WASHER
FLARED TUBE FITTING
ADJUSTABLE END

STANDARD PART

KC140

SHEET 1 OF 1

KSC FORM 32-85 (CG 4/92)

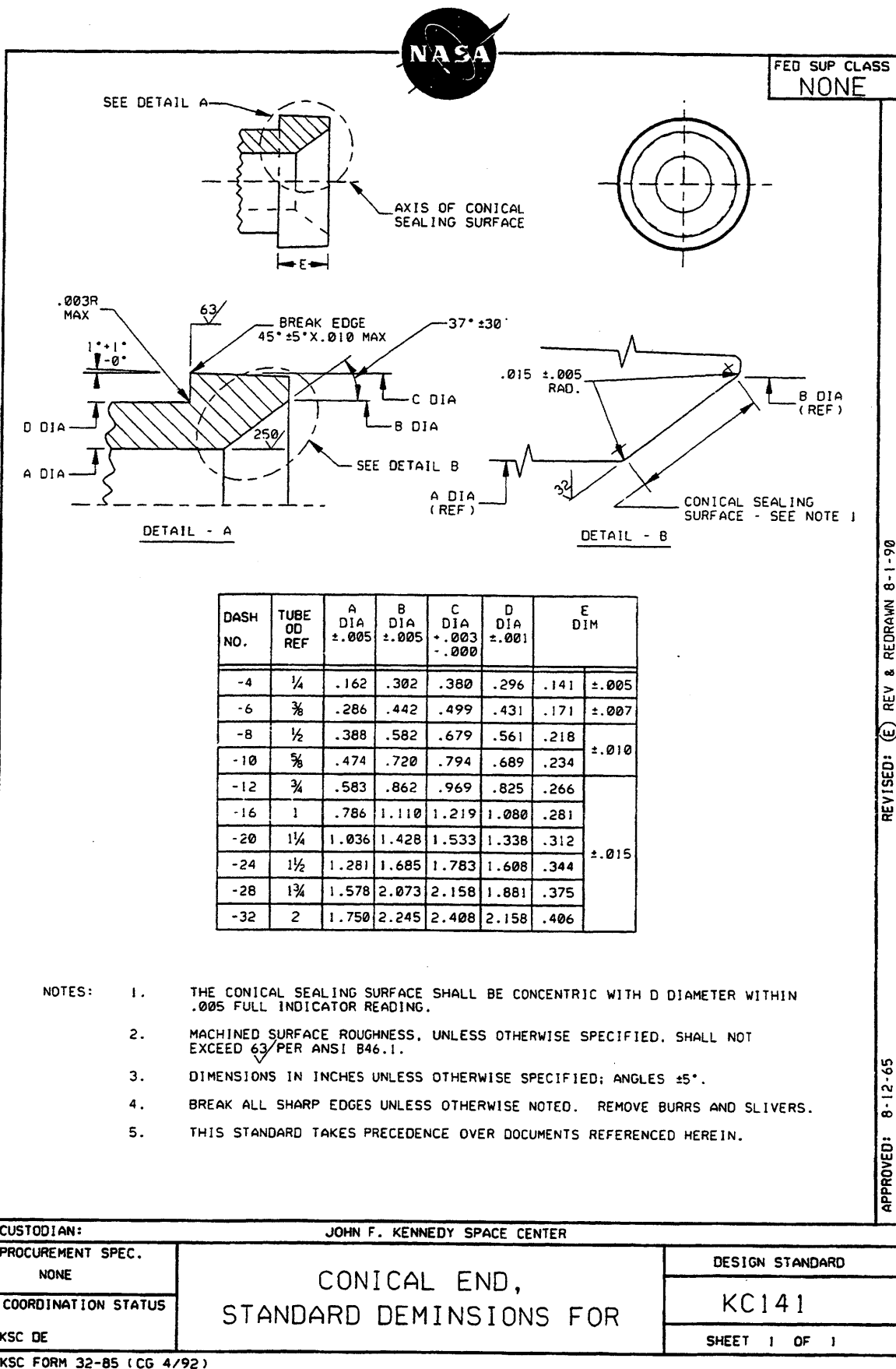
REVISED: (C) REV & REDRAWN 8-1-90

APPROVED: 8-12-65

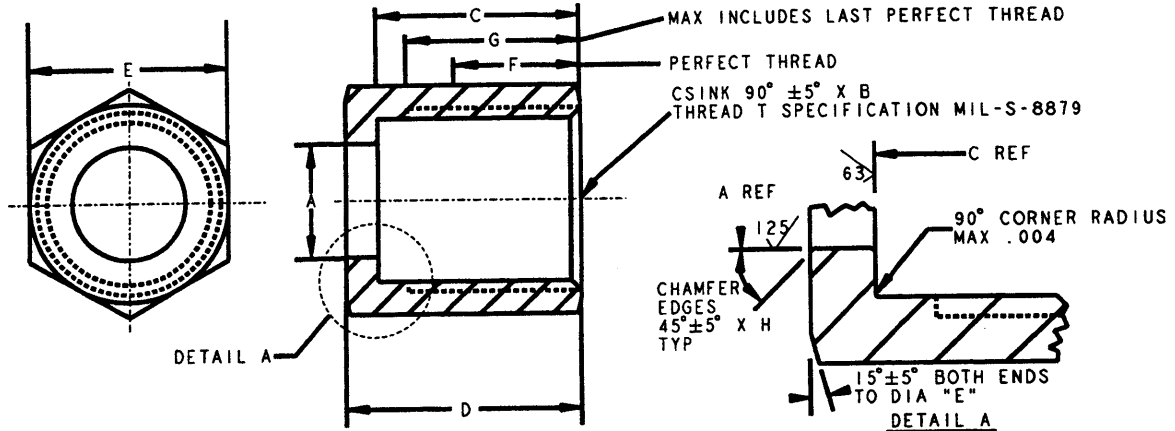
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GP-425

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GP425G AMEND 1

FED SUP CLASS
4730

DASH NO.			TUBE OD REF	THREAD T MIL-S-8879	A DIA +.003 -.000	B DIA ±.005	C DIM ±.005	D DIM ±.005	E DIM	F MIN	G MAX	H +.005 -.000	
316 STEEL	AL ALLOY	AL6XN											
K2	D2	L2	1/8	.3125-24UNJF-3B	.180	.313	.460	.542	.375	+.003 -.004	.251	.376	.005
K3	D3	L3	3/16	.3750-24UNJF-3B	.242	.375	.506	.604	.438		.282	.407	
K4	D4	L4	1/4	.4375-20UNJF-3B	.305	.438	.532	.620	.563		.300	.450	
K5	D5	L5	5/16	.5000-20UNJF-3B	.374	.500	.579	.683	.625		.331	.481	
K6	D6	L6	3/8	.5625-18UNJF-3B	.440	.563	.603	.729	.688		.333	.500	
K8	D8	L8	1/2	.7500-16UNJF-3B	.570	.750	.723	.854	.875		.375	.563	.010
K10	D10	L10	5/8	.8750-14UNJF-3B	.698	.875	.817	.979	1.000		.461	.675	
K12	D12	L12	3/4	1.0625-12UNJF-3B	.834	1.063	.868	1.026	1.250		.469	.719	
K16	D16	L16	1	1.3125-12UNJF-3B	1.089	1.313	.962	1.136	1.500		.563	.813	
K20	D20	L20	1-1/4	1.6250-12UNJF-3B	1.347	1.625	1.017	1.229	2.000		±.016	.661	
K24	D24	L24	1-1/2	1.8750-12UNJF-3B	1.617	1.875	1.170	1.417	2.250	±.020	.730	.980	.015
K28	D28	L28	1-3/4	2.2500-12UNJF-3B	1.890	2.250	1.316	1.563	2.625		.844	1.094	
K32	D32	L32	2	2.5000-12UNJF-3B	2.167	2.500	1.462	1.734	2.875				

MATERIAL: SEE PROCUREMENT SPECIFICATION.
ALUMINUM ALLOY, 2024-T6, CODE "D"
CORROSION RESISTANT STEEL (CLASS 316), CODE "K" (WAS CODE "C")
CORROSION RESISTANT STEEL (AL6XN), CODE "L" PER ASTM -B691

FINISH: SEE PROCUREMENT SPECIFICATION

SCREW THREAD: SEE PROCUREMENT SPECIFICATION

- NOTES:**
1. REMOVE BURRS AND SLIVERS. BREAK SHARP EDGES UNLESS OTHERWISE NOTED.
 2. DIMENSIONS IN INCHES. UNLESS OTHERWISE SPECIFIED, TOLERANCE DECIMALS ±.016.
 3. FOR DESIGN FEATURE PURPOSES, THIS DRAWING TAKES PRECEDENCE OVER PROCUREMENT DOCUMENTS REFERENCED HEREIN.
 4. REFERENCED DOCUMENTS SHALL BE OF THE ISSUE IN EFFECT ON THE DATE OF INVITATION FOR BID.
 5. MARKING OF FITTINGS SHALL BE CONSISTENT WITH PROCUREMENT SPECIFICATION USING APPLICABLE KC STANDARD AND PART NUMBER DESIGNATIONS AS SHOWN ON THIS DRAWING.
 6. DIMENSION A AND THREAD T (PITCH DIAMETER) TO BE CONCENTRIC WITHIN .005 FULL INDICATOR READING.
 7. AFTER MACHINING, THE CODE L FITTINGS SHALL BE PICKLED IN ACCORDANCE WITH ASTM A380 CODE B AND THEN PASSIVATED IN ACCORDANCE WITH SAE-AMS-2700 METHOD 1 TYPE 6, EXCEPT THAT 20% TO 25% NITRIC ACID SOLUTION SHALL BE USED. A TEST FOR SURFACE PASSIVITY SHALL BE DONE IN ACCORDANCE WITH SAE-AMS-2700 TEST METHOD 102 - COPPER SULFATE TEST.

EXAMPLE OF PART NOS. KC142K8 = NUT, COUPLING, 1/2" TUBE FITTING, TYPE 316 SS
KC142D12 = NUT, COUPLING, 3/4" TUBE FITTING, ALUMINUM ALLOY
KC142L16 = NUT, COUPLING, 1" TUBE FITTING, AL6XN

CUSTODIAN: JOHN F. KENNEDY SPACE CENTER		STANDARD PART	
PROCUREMENT SPEC. KSC-F-124	NUT, COUPLING		KC142
COORDINATION STATUS			SHEET 1 OF 1
KSC DE			

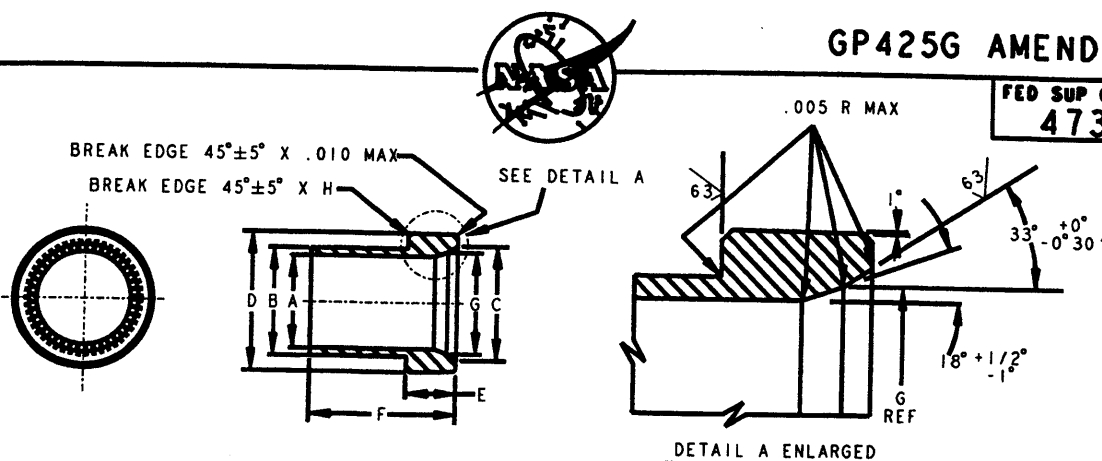
KSC FORM 32-85 (CG 4/92)

NOTICE: WHEN GOVERNMENT DRAWINGS, SPECIFICATIONS OR OTHER DATA ARE USED FOR ANY PURPOSE OTHER THAN IN CONNECTION WITH A DEFINITELY RELATED GOVERNMENT PROCUREMENT OPERATION, THE UNITED STATES GOVERNMENT THEREBY INCURS NO RESPONSIBILITY FOR ANY OBLIGATION WHATSOEVER AND THE FACT THAT THE GOVERNMENT MAY HAVE FORMULATED, FURNISHED, OR IN ANY WAY SUPPLIED THE SAID DRAWINGS, SPECIFICATIONS, OR OTHER DATA IS NOT REGARDED BY IMPLICATION OR OTHERWISE AS IN ANY MANNER LICENSING THE HOLDER OR ANY PERSON OR CORPORATION, OR CONVEYING ANY RIGHTS OR PERMISSION TO MANUFACTURE, USE, OR SELL ANY PATENTED INVENTION THAT MAY IN ANY WAY BE RELATED THERE TO.

REVISED: ADDED CODE "L" MATERIAL AND NOTE 7 5-1-07

APPROVED: 8-12-65

GP425G AMEND 1

FED SUP CLASS
4730

DASH NO.			TUBE OD REF	A DIA +.003 -.000	B DIA +.000 -.003	C DIA ±.002	D DIA +.000 -.003	E ±.005	F ±.016	G DIA +.000 -.005	H	
316 STEEL	AL ALLOY	AL6XN										MAX
K2	D2	L2	1/8	.130	.172	.205	.267	.125	.344	.178	.010	
K3	D3	L3	3/16	.193	.234	.267	.329	.141	.406	.240		
K4	D4	L4	1/4	.255	.297	.315	.383	.141	.406	.280		
K5	D5	L5	5/16	.318	.366	.375	.445	.156	.438	.348		
K6	D6	L6	3/8	.380	.432	.441	.502	.172	.500	.406		
K8	D8	L8	1/2	.506	.562	.589	.682	.219	.562	.538	.015	
K10	D10	L10	5/8	.631	.690	.705	.797	.234	.656	.663		
K12	D12	L12	3/4	.756	.826	.880	.972	.266	.688	.794		
K16	D16	L16	1	1.006	1.081	1.130	1.222	.281	.781	1.050		
K20	D20	L20	1-1/4	1.260	1.339	1.412	1.534	.312	.906	1.310		
K24	D24	L24	1-1/2	1.510	1.609	1.630	1.784	.344	1.125	1.564		
K28	D28	L28	1-3/4	1.762	1.882	1.945	2.159	.375	1.125	1.818		
K32	D32	L32	2	2.014	2.159	2.195	2.409	.406	1.188	2.070		

MATERIAL:

SEE PROCUREMENT SPECIFICATION.
ALUMINUM ALLOY, 2024-T6, CODE "D"
CORROSION RESISTANT STEEL (CLASS 316), CODE "K" (WAS CODE "C")
CORROSION RESISTANT STEEL (AL6XN), CODE "L" PER ASTM -B691

FINISH:

SEE PROCUREMENT SPECIFICATION.

SCREW THREAD:

SEE PROCUREMENT SPECIFICATION.

NOTES:

1. REMOVE BURRS AND SLIVERS. BREAK SHARP EDGES UNLESS OTHERWISE NOTED.
2. DIMENSIONS IN INCHES. UNLESS OTHERWISE SPECIFIED, TOLERANCE DECIMALS $\pm .016$. ANGLES $\pm 1/2^\circ$.
3. FOR DESIGN FEATURE PURPOSES, THIS DRAWING TAKES PRECEDENCE OVER PROCUREMENT DOCUMENTS REFERENCED HEREIN.
4. REFERENCED DOCUMENTS SHALL BE OF THE ISSUE IN EFFECT ON THE DATE OF INVITATION FOR BID.
5. MARKING OF FITTINGS SHALL BE CONSISTENT WITH PROCUREMENT SPECIFICATION USING APPLICABLE KC STANDARD AND PART NUMBER DESIGNATIONS AS SHOWN ON THIS DRAWING.
6. SURFACE ROUGHNESS VALUES NOT INDICATED ON DRAWING SHALL NOT EXCEED 125 PER ANSI B46.1.
7. DIMENSIONS A, B, C, AND D SHALL BE CONCENTRIC WITHIN .005 FULL INDICATOR READING FOR TUBE SIZES UP TO AND INCLUDING 3/4" AND .010 FULL INDICATOR READING FOR SIZES 1" AND ABOVE.
8. AFTER MACHINING, THE CODE L FITTINGS SHALL BE PICKLED IN ACCORDANCE WITH ASTM A380 CODE B AND THEN PASSIVATED IN ACCORDANCE WITH SAE-AMS-2700 METHOD 1 TYPE 6, EXCEPT THAT 20% TO 25% NITRIC ACID SOLUTION SHALL BE USED. A TEST FOR SURFACE PASSIVITY SHALL BE DONE IN ACCORDANCE WITH SAE-AMS-2700 TEST METHOD 102 - COPPER SULFATE TEST.

EXAMPLE OF
PART NOS.

KC143K8 = SLEEVE, 1/2" OD TUBING, TYPE 316 SS
KC143D12 = SLEEVE, 3/4" OD TUBING, ALUMINUM ALLOY
KC143L16 = SLEEVE, 1" OD TUBING, AL6XN

CUSTODIAN:

JOHN F. KENNEDY SPACE CENTER

PROCUREMENT SPEC.

KSC-F-124

COORDINATION STATUS

KSC DE

SLEEVE,
FLARED TUBE FITTING

STANDARD PART

KC143

SHEET 1 OF 1

KSC FORM 32-85 (CG 4/92)

REVISED: ADDED CODE "L" MATERIAL AND NOTE 8 3-1-07

APPROVED: 8-12-65

NOTICE: WHEN GOVERNMENT DRAWINGS, SPECIFICATIONS OR OTHER DATA ARE USED FOR ANY PURPOSE OTHER THAN IN CONNECTION WITH A DEFINITELY RELATED GOVERNMENT PROCUREMENT OPERATION, THE UNITED STATES GOVERNMENT THEREBY INCURS NO RESPONSIBILITY NOR ANY OBLIGATION WHATSOEVER AND THE FACT THAT THE GOVERNMENT MAY HAVE FORMULATED, FURNISHED, OR IN ANY WAY SUPPLIED THE SAID DRAWINGS, SPECIFICATIONS, OR OTHER DATA IS NOT REGARDED BY IMPLICATION OR OTHERWISE AS IN ANY MANNER LICENSING THE HOLDER OR ANY OTHER PERSON OR CORPORATION, OR CONVEYING ANY RIGHTS OR PERMISSION TO MANUFACTURE, USE, OR SELL ANY PATENTED IN-VENTION THAT MAY IN ANY WAY BE RELATED THERETO.

NOTICE: WHEN GOVERNMENT DRAWINGS, SPECIFICATIONS OR OTHER DATA ARE USED FOR ANY PURPOSE OTHER THAN IN CONNECTION WITH A DEFINITELY RELATED GOVERNMENT PROCUREMENT OPERATION, THE UNITED STATES GOVERNMENT THEREBY INCURS NO RESPONSIBILITY NOR ANY OBLIGATION WHATSOEVER AND THE FACT THAT THE GOVERNMENT MAY HAVE FORMULATED, FURNISHED, OR IN ANY WAY SUPPLIED THE SAID DRAWINGS, SPECIFICATIONS, OR OTHER DATA IS NOT REGARDED BY IMPLICATION OR OTHERWISE AS IN ANY MANNER LICENSING THE HOLDER OR ANY OTHER PERSON OR CORPORATION, OR CONVEYING ANY RIGHTS OR PERMISSION TO MANUFACTURE, USE, OR SELL ANY PATENTED INVENTION THAT MAY IN ANY WAY BE RELATED THERETO.

NASA		FED SUP CLASS 4730
MATERIAL:	SEE PROCUREMENT SPECIFICATION. ALUMINUM ALLOY, 2024-T6, CODE "D" CORROSION RESISTANT STEEL (CLASS 316), CODE "X" (WAS CODE "C")	
FINISH:	SEE PROCUREMENT SPECIFICATION.	
SCREW THREAD:	SEE PROCUREMENT SPECIFICATION.	
NOTES:	<ol style="list-style-type: none"> 1. REMOVE BURRS AND SLIVERS. BREAK SHARP EDGES UNLESS OTHERWISE NOTED. 2. DIMENSIONS IN INCHES. UNLESS OTHERWISE SPECIFIED, TOLERANCE DECIMALS ± 0.16. 3. FOR DESIGN FEATURE PURPOSES, THIS DRAWING TAKES PRECEDENCE OVER PROCUREMENT DOCUMENTS REFERENCED HEREIN. 4. REFERENCED DOCUMENTS SHALL BE OF THE ISSUE IN EFFECT ON THE DATE OF INVITATION FOR BID. 5. MARKING OF FITTINGS SHALL BE CONSISTENT WITH PROCUREMENT SPECIFICATION USING APPLICABLE KC STANDARD AND PART NUMBER DESIGNATIONS AS SHOWN ON THIS DRAWING. 	
EXAMPLE OF PART NOS.	<p>AT THE OPTION OF THE MANUFACTURER, THE SMALLER INSIDE DIAMETER DIMENSION MAY BE DRILLED FROM PORT TO PORT</p> <p>KC14410-6 = REDUCER, BULKHEAD END: $\frac{3}{8}$" TUBING SHORT END: $\frac{3}{8}$" TUBING CORROSION RESISTANT STEEL.</p> <p>KC144D12-8 = REDUCER, BULKHEAD END: $\frac{3}{4}$" TUBING SHORT END: $\frac{1}{2}$" TUBING ALUMINUM ALLOY.</p>	
CUSTODIAN: JOHN F. KENNEDY SPACE CENTER		
PROCUREMENT SPEC. KSC-F-124	<p>REDUCER, FLARED TUBE $\frac{3}{8}$" BULKHEAD AND UNIVERSAL FOR SEAL RING</p>	STANDARD PART
COORDINATION STATUS KSC DE		KC144
		SHEET 1 OF 3

KSC FORM 32-85 (CG 4/92)

REVISED: (E) REV & REDRAWN 8-1-90 (F) REV. SH. 2 9-1-97

APPROVED: 8-12-65

GP-425

FED SUP CLASS
4730

NOTICE: WHEN GOVERNMENT DRAWINGS, SPECIFICATIONS OR OTHER DATA ARE USED FOR ANY PURPOSE OTHER THAN IN CONNECTION WITH A DEFINITELY RELATED GOVERNMENT PROCUREMENT OPERATION, THE UNITED STATES GOVERNMENT THEREBY INCURS NO RESPONSIBILITY NOR ANY OBLIGATION WHATSOEVER AND THE FACT THAT THE GOVERNMENT MAY HAVE FORMULATED, FURNISHED, OR IN ANY WAY SUPPLIED THE SAID DRAWINGS, SPECIFICATIONS, OR OTHER DATA IS NOT REGARDED BY IMPLICATION OR OTHERWISE AS IN ANY MANNER LICENSING THE HOLDER OR ANY OTHER PERSON OR CORPORATION, OR CONVEYING ANY RIGHTS OR PERMISSION TO MANUFACTURE, USE, OR SELL ANY PATENTED INVENTION THAT MAY IN ANY WAY BE RELATED THERETO.

DASH NO.		BULKHEAD END		SHORT END		A +.000 -.045	B +.000 -.090	C MAX	D MAX	E REF
CRES STEEL	AL ALLOY	TUBE OD REF	THREAD T REF	TUBE OD REF	THREAD R REF					
K4-6	D4-6	1/4	7/16-20	3/8	9/16-18	1.208	2.147		.457	.813
K4-8	D4-8			1/2	3/4-16		2.225		.538	1.000
K4-10	D4-10			5/8	7/8-14		2.350		.618	1.125
K4-12	D4-12			3/4	1-1/6-12		2.491		.703	1.375
K4-16	D4-16			1	1-5/16-12		2.538		.741	1.625
K4-20	D4-20			1-1/4	1-5/8-12		2.569		.778	1.875
K6-4	D6-4	3/8	9/16-18	1/4	7/16-20	1.286	2.219	.883		.813
K6-8	D6-8			1/2	3/4-16		2.303		.538	1.000
K6-10	D6-10			5/8	7/8-14		2.428		.618	1.125
K6-12	D6-12			3/4	1-1/16-12		2.569		.703	1.375
K8-4	D8-4	1/2	3/4-16	1/4	7/16-20	1.442	2.352	1.008		1.000
K8-6	D8-6			3/8	9/16-18		2.358	1.008		
K8-10	D8-10			5/8	7/8-14		2.584		.618	1.125
K8-12	D8-12			3/4	1-1/16-12		2.725		.703	1.375
K8-16	D8-16			1	1-5/16-12		2.772		.741	1.625
K10-4	D10-4	5/8	7/8-14	1/4	7/16-20	1.583	2.517	1.121		
K10-6	D10-6			3/8	9/16-18		2.523	1.121		1.125
K10-8	D10-8			1/2	3/4-16		2.624	1.121		
K10-12	D10-12			3/4	1-1/16-12		2.866		.703	1.375
K10-16	D10-16			1	1-5/16-12		2.913		.741	1.625
K12-4	D12-4	3/4	1-1/6-12	1/4	7/16-20	1.755	2.723	1.258		
K12-6	D12-6			3/8	9/16-18		2.729	1.258		
K12-8	D12-8			1/2	3/4-16		2.830	1.258		1.375
K12-10	D12-10			5/8	7/8-14		2.931	1.258		
K12-16	D12-16			1	1-5/16-12		3.084		.741	1.625
K12-20	D12-20			1 1/4	1-5/8-12		3.115		.778	1.875
K16-4	D16-4	1	1-5/16-12	1/4	7/16-20	1.755	2.723	1.258		
K16-8	D16-8			1/2	3/4-16		2.830	1.258		
K16-10	D16-10			5/8	7/8-14		2.931	1.258		1.625
K16-12	D16-12			3/4	1-1/16-12		3.037	1.258		
K16-20	D16-20			1 1/4	1-5/8-12		3.115		.778	1.875
K16-24	D16-24			1 1/2	1-7/8-12		3.256		.878	2.125

REVISED: (C) REV & REDRAWN 8-1-90 (E) REV. DIM. C ON -4 & -6 9-1-97
APPROVED: 8-12-65

CUSTODIAN:

JOHN F. KENNEDY SPACE CENTER

PROCUREMENT SPEC.
KSC-F-124

COORDINATION STATUS

KSC DE

REDUCER, FLARED TUBE
3/8" BULKHEAD AND UNIVERSAL
FOR SEAL RING

STANDARD PART

KC144

SHEET 2 OF 3

KSC FORM 32-85 (CG 4/92)

FED SUP CLASS
4730

NOTICE: WHEN GOVERNMENT DRAWINGS, SPECIFICATIONS OR OTHER DATA ARE USED FOR ANY PURPOSE OTHER THAN IN CONNECTION WITH A DEFINITELY RELATED GOVERNMENT PROCUREMENT OPERATION, THE UNITED STATES GOVERNMENT THEREBY INCURS NO RESPONSIBILITY NOR ANY OBLIGATION WHATSOEVER AND THE FACT THAT THE GOVERNMENT MAY HAVE FORMULATED, FURNISHED, OR IN ANY WAY SUPPLIED THE SAID DRAWINGS, SPECIFICATIONS, OR OTHER DATA IS NOT REGARDED BY IMPLICATION OR OTHERWISE AS IN ANY MANNER LICENSING THE HOLDER OR ANY OTHER PERSON OR CORPORATION, OR CONVEYING ANY RIGHTS OR PERMISSION TO MANUFACTURE, USE, OR SELL ANY PATENTED INVENTION THAT MAY IN ANY WAY BE RELATED THERETO.

DASH NO.		BULKHEAD END		SHORT END		A +.000 -.045	B +.000 -.090	C MAX	D MAX	E REF
		TUBE OD REF	THREAD T REF	TUBE OD REF	THREAD R REF					
K20-4	D20-4	1 1/4	1-5/8-12	1/4	7/16-20	1.802	2.754	1.295		1.875
K20-12	D20-12			3/4	1-1/16-12		3.068	1.295		
K20-16	D20-16			1	1-5/16-12		3.015	1.295		
K20-24	D20-24			1 1/2	1-7/8-12		3.303		.878	
K24-16	D24-16	1 1/2	1-7/8-12	1	1-5/16-12	1.817	3.147	1.308		2.125
K24-20	D24-20			1 1/4	1-5/8-12		3.194	1.308		
K28-20	D28-20	1 3/4	2-1/4-12	1 1/4	1-5/8-12	1.973	3.379	1.433		2.500
K28-24	D28-24			1 1/2	1-7/8-12		3.504	1.433		
K32-24	D32-24	2	2-1/2-12	1 1/2	1-7/8-12	2.098	3.629	1.533		2.750
K32-28	D32-28			1 3/4	2-1/4-12		3.754	1.533		

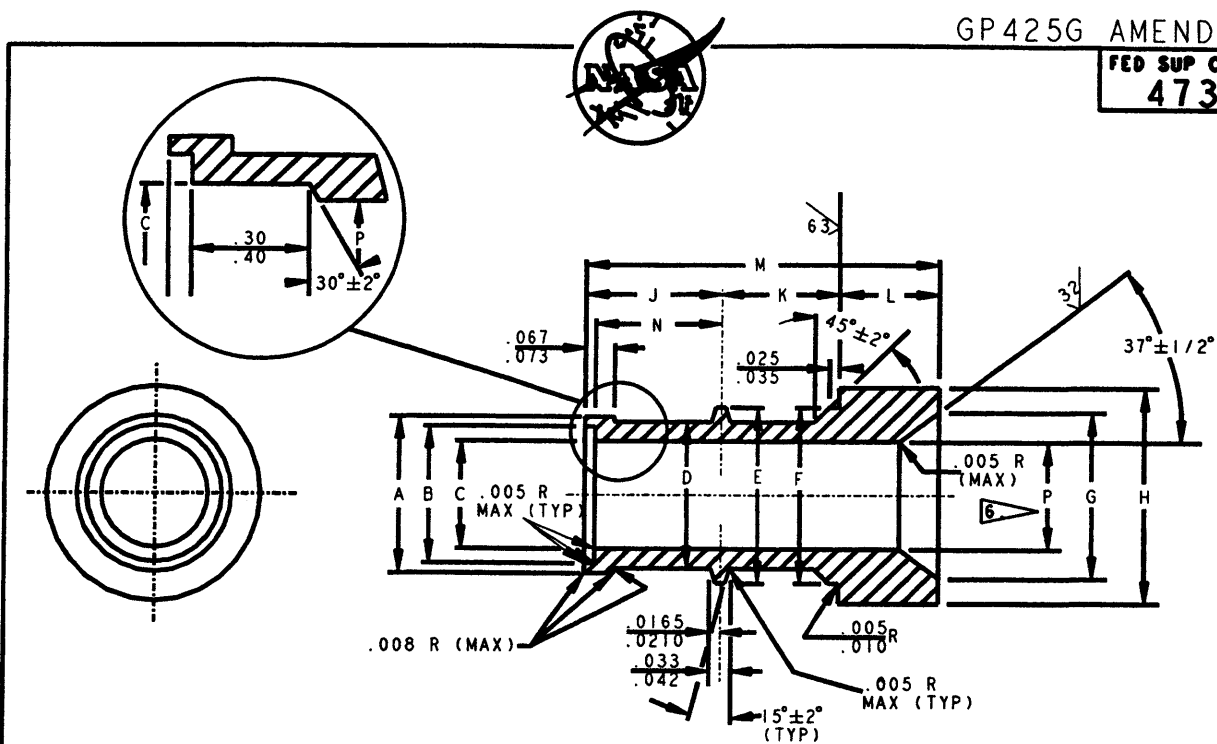
REVISED: © REV & REDRAWN 8-1-90 © REV. SH. 2 9-1-97

APPROVED: 8-12-65

CUSTODIAN:		JOHN F. KENNEDY SPACE CENTER	
PROCUREMENT SPEC.	REDUCER, FLARED TUBE $\frac{3}{8}$ " BULKHEAD AND UNIVERSAL FOR SEAL RING	STANDARD PART	
KSC-F-124		KC144	
COORDINATION STATUS		SHEET 3 OF 3	
KSC DE			

KSC FORM 32-85 (CG 4/92)

NOTICE: WHEN GOVERNMENT DRAWINGS, SPECIFICATIONS OR OTHER DATA ARE USED FOR ANY PURPOSE OTHER THAN IN CONNECTION WITH A DEFINITELY RELATED GOVERNMENT PROCUREMENT OPERATION, THE UNITED STATES GOVERNMENT THEREBY INCURS NO RESPONSIBILITY NOR ANY OBLIGATION WHATSOEVER AND THE FACT THAT THE GOVERNMENT MAY HAVE FORMULATED, FURNISHED, OR IN ANY WAY SUPPLIED THE SAID DRAWINGS, SPECIFICATIONS, OR OTHER DATA IS NOT REGARDED BY IMPLICATION OR OTHERWISE AS IN ANY MANNER LICENSING THE HOLDER OR ANY OTHER PERSON OR CORPORATION, OR CONVEYING ANY RIGHTS OR PERMISSION TO MANUFACTURE, USE, OR SELL ANY PATENTED INVENTION THAT MAY IN ANY WAY BE RELATED THERETO.



SCHEDULE:

ADD	"A"	AFTER	DASH	NUMBER	TO	DENOTE	.035"	TUBE	WALL
ADD	"B"	AFTER	DASH	NUMBER	TO	DENOTE	.049"	TUBE	WALL
ADD	"C"	AFTER	DASH	NUMBER	TO	DENOTE	.058"	TUBE	WALL
ADD	"D"	AFTER	DASH	NUMBER	TO	DENOTE	.065"	TUBE	WALL
ADD	"E"	AFTER	DASH	NUMBER	TO	DENOTE	.072"	TUBE	WALL
ADD	"F"	AFTER	DASH	NUMBER	TO	DENOTE	.095"	TUBE	WALL
ADD	"G"	AFTER	DASH	NUMBER	TO	DENOTE	.109"	TUBE	WALL
ADD	"H"	AFTER	DASH	NUMBER	TO	DENOTE	.120"	TUBE	WALL
ADD	"J"	AFTER	DASH	NUMBER	TO	DENOTE	.134"	TUBE	WALL
ADD	"K"	AFTER	DASH	NUMBER	TO	DENOTE	.156"	TUBE	WALL
ADD	"L"	AFTER	DASH	NUMBER	TO	DENOTE	.188"	TUBE	WALL

MATERIAL:

SEE PROCUREMENT SPECIFICATION.
CORROSION RESISTANT STEEL (CLASS 316), CODE "K"
CORROSION RESISTANT STEEL (AL6XN), CODE "L" PER ASTM -B691

FINISH:
NOTES:

1. REMOVE BURRS AND SLIVERS. BREAK SHARP EDGES UNLESS OTHERWISE NOTED.
2. DIMENSIONS IN INCHES. UNLESS OTHERWISE SPECIFIED, TOLERANCE DECIMALS $\pm .016$.
3. FOR DESIGN FEATURE PURPOSES, THIS DRAWING TAKES PRECEDENCE OVER PROCUREMENT DOCUMENTS REFERENCED HEREIN.
4. REFERENCED DOCUMENTS SHALL BE OF THE ISSUE IN EFFECT ON THE DATE OF INVITATION FOR BID.
5. MARKING OF FITTINGS SHALL BE CONSISTANT WITH PROCUREMENT SPECIFICATION USING APPLICABLE KC STANDARD AND PART NUMBER DESIGNATIONS AS SHOWN ON THIS DRAWING.
6. DIAMETER "P" APPLICABLE TO KC145K20B AND KC145K24B ONLY.
7. ALL DIAMETRAL DIMENSIONS SHALL BE CONCENTRIC WITH "C" BORE WITHIN .005 T.I.R.
8. FITTINGS PROVIDED HEREIN SHALL BE WELDED TO CORRESPONDING TUBE SIZES USING AUTOMATIC WELDING EQUIPMENT (ASTRO-ARC CO. OR EQUIVALENT).
9. AFTER MACHINING, THE CODE L FITTINGS SHALL BE PICKLED IN ACCORDANCE WITH ASTM A380 CODE B AND THEN PASSIVATED IN ACCORDANCE WITH SAE-AMS-2700 METHOD 1 TYPE 6. EXCEPT THAT 20% TO 25% NITRIC ACID SOLUTION SHALL BE USED. A TEST FOR SURFACE PASSIVITY SHALL BE DONE IN ACCORDANCE WITH SAE-AMS-2700 TEST METHOD 102 - COPPER SULFATE TEST.

**EXAMPLE OF
PART NOS.**

KC145K4A = SPUD, BUTTWELD TUBE, FOR 1/4" X .035 WALL TUBING, TYPE 316 SS.
KC145L6C = SPUD, BUTTWELD TUBE, FOR 3/8" X .058 WALL TUBING, AL6XN.

CUSTODIAN:

JOHN F. KENNEDY SPACE CENTER

PROCUREMENT SPEC.

KSC-F-124

STANDARD PART

COORDINATION STATUS

SPUD, BUTTWELD TUBE

KC 145

KSC DE

SHEET 1 OF 2

REVISID: ADDED CODE "L" MATERIAL AND NOTE 9 5-1-07

APPROVED: 5-1-90

FED SUP CLASS
4730

NOTICE: WHEN GOVERNMENT DRAWINGS, SPECIFICATIONS OR OTHER DATA ARE USED FOR ANY PURPOSE OTHER THAN IN CONNECTION WITH A DEFINITELY RELATED GOVERNMENT PROCUREMENT OPERATION, THE UNITED STATES GOVERNMENT THEREBY INCURS NO RESPONSIBILITY NOR ANY OBLIGATION WHATSOEVER AND THE FACT THAT THE GOVERNMENT MAY HAVE FORMULATED, FURNISHED, OR IN ANY WAY SUPPLIED THE SAID DRAWINGS, SPECIFICATIONS, OR OTHER DATA IS NOT REGARDED BY IMPLICATION OR OTHERWISE AS IN ANY MANNER LICENSING THE HOLDER OR ANY OTHER PERSON OR CORPORATION, OR CONVEYING ANY RIGHTS OR PERMISSION TO MANUFACTURE, USE, OR SELL ANY PATENTED INVENTION THAT MAY IN ANY WAY BE RELATED THERETO.

DASH NO.	TUBE SIZE REF	A ±.003	B ±.005 -.000	C ±.003	D ±.005 -.000	E ±.003	F ±.004	G ±.005	H ±.000 -.003	J ±.005	K ±.005	L ±.005	M (REF)	N ±.005	P ±.000 -.003
316 STEEL	AL6XN														
K4A	L4A	1/4"X.035	.285	.255	.172	.258	.297	.299	.315	.383	.385	.328	.165	.878	.350
K6A	L6A	3/8"X.035	.410	.380	.297	.383	.428	.434	.441	.502	.385	.395	.245	1.025	.350
K6C	L6C	3/8"X.050	.410	.380	.251	.383	.428	.434	.441	.502	.385	.395	.245	1.025	.350
K8B	L8B	1/2"X.049	.546	.506	.393	.509	.554	.564	.589	.682	.385	.405	.280	1.070	.350
K8E	L8E	1/2"X.072	.546	.506	.347	.509	.554	.564	.589	.682	.385	.405	.280	1.070	.350
K12D	L12D	3/4"X.065	.816	.756	.611	.759	.804	.828	.880	.972	.535	.405	.300	1.240	.500
K12G	L12G	3/4"X.109	.816	.756	.523	.759	.804	.828	.880	.972	.535	.405	.300	1.240	.500
K16F	L16F	1"X.095	1.066	1.006	.801	1.009	1.054	1.083	1.130	1.222	.535	.405	.400	1.340	.500
K16H	L16H	1"X.129	1.066	1.006	.751	1.009	1.054	1.083	1.130	1.222	.535	.405	.400	1.340	.500
K20B	L20B	1-1/4"X.049	1.330	1.256	1.143	1.259	1.304	1.341	1.412	1.536	.535	.475	.400	1.410	.500
K20J	L20J	1-1/4"X.134	1.330	1.256	.973	1.259	1.304	1.341	1.412	1.536	.535	.475	.400	1.410	.500
K24B	L24B	1-1/2"X.049	1.605	1.511	1.398	1.514	1.559	1.611	1.630	1.786	.535	.485	.475	1.495	.500
K24J	L24J	1-1/2"X.134	1.605	1.511	1.218	1.514	1.559	1.611	1.630	1.786	.535	.485	.475	1.495	.500
K24K	L24K	1-1/2"X.156	1.605	1.511	1.174	1.514	1.559	1.611	1.630	1.786	.535	.485	.475	1.495	.500
K24L	L24L	1-1/2"X.188	1.605	1.511	1.120	1.514	1.559	1.611	1.630	1.786	.535	.485	.475	1.495	.500
K32D	L32D	2"X.065	2.105	2.011	1.866	2.014	2.059	2.161	2.195	2.411	.535	.635	.540	1.710	.500
K32L	L32L	2"X.188	2.105	2.011	1.620	2.014	2.059	2.161	2.195	2.411	.535	.635	.540	1.710	.500

CUSTODIAN:

JOHN F. KENNEDY SPACE CENTER

PROCUREMENT SPEC.
KSC-F-124

COORDINATION STATUS

KSC DE

SPUD, BUTTWELD TUBE

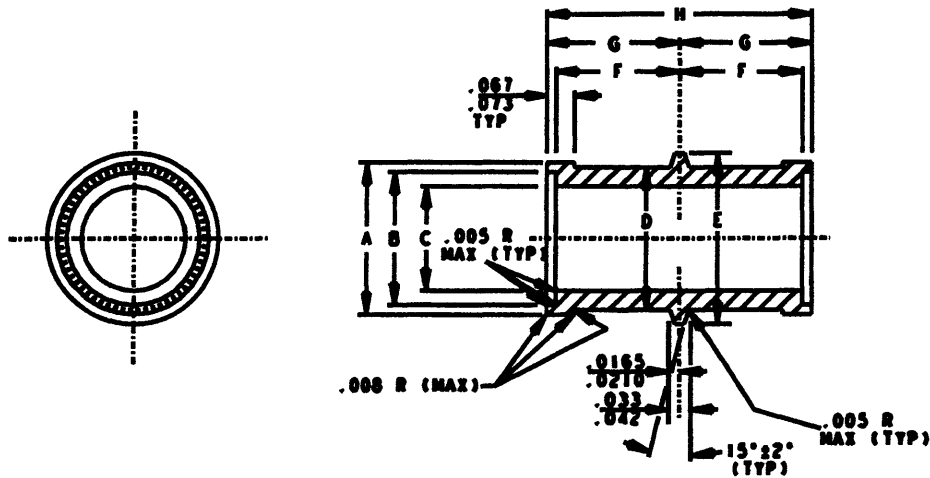
STANDARD PART

KC145

SHEET 2 OF 2

APPROVED: 5-1-90
REVISED: ADDED CODE "L" MATERIAL DASH NO. 5-1-07

GP425G AMEND 1

FED SUP CLASS
4730

SCHEDULE:

ADD "-A" AFTER DASH NUMBER TO DENOTE .035" TUBE WALL.
 ADD "-B" AFTER DASH NUMBER TO DENOTE .049" TUBE WALL.
 ADD "-C" AFTER DASH NUMBER TO DENOTE .058" TUBE WALL.
 ADD "-D" AFTER DASH NUMBER TO DENOTE .065" TUBE WALL.
 ADD "-E" AFTER DASH NUMBER TO DENOTE .072" TUBE WALL.
 ADD "-F" AFTER DASH NUMBER TO DENOTE .095" TUBE WALL.
 ADD "-G" AFTER DASH NUMBER TO DENOTE .109" TUBE WALL.
 ADD "-H" AFTER DASH NUMBER TO DENOTE .120" TUBE WALL.
 ADD "-J" AFTER DASH NUMBER TO DENOTE .134" TUBE WALL.
 ADD "-K" AFTER DASH NUMBER TO DENOTE .156" TUBE WALL.
 ADD "-L" AFTER DASH NUMBER TO DENOTE .188" TUBE WALL.

MATERIAL:

SEE PROCUREMENT SPECIFICATION.
 CORROSION RESISTANT STEEL (CLASS 316), CODE "-K"
 CORROSION RESISTANT STEEL (AL6ZN), CODE "-L" PER ASTM -B691

FINISH:

SURFACE SHALL BE 125 RMS MAXIMUM PER ANSI B46.1 UNLESS OTHERWISE SPECIFIED.

NOTES:

1. REMOVE BURRS AND SLIVERS. BREAK SHARP EDGES UNLESS OTHERWISE NOTED.
2. DIMENSIONS IN INCHES. UNLESS OTHERWISE SPECIFIED, TOLERANCE DECIMALS $\pm .016$.
3. FOR DESIGN FEATURE PURPOSES, THIS DRAWING TAKES PRECEDENCE OVER PROCUREMENT DOCUMENTS REFERENCED HEREIN.
4. REFERENCED DOCUMENTS SHALL BE OF THE ISSUE IN EFFECT ON THE DATE OF INVITATION FOR BID.
5. MARKING OF FITTINGS SHALL BE CONSISTANT WITH PROCUREMENT SPECIFICATION USING APPLICABLE NC STANDARD AND PART NUMBER DESIGNATIONS AS SHOWN ON THIS DRAWING.
6. ALL DIAMETRAL DIMENSIONS SHALL BE CONCENTRIC WITH "-C" BORE WITHIN .005 T.I.R.
7. FITTINGS PROVIDED HEREIN SHALL BE WELDED TO CORRESPONDING TUBE SIZES USING AUTOMATIC WELDING EQUIPMENT (ASTRO-ARC CO. OR EQUIVALENT).
8. AFTER MACHINING, THE CODE L FITTINGS SHALL BE PICKLED IN ACCORDANCE WITH ASTM A380 CODE B AND THEN PASSIVATED IN ACCORDANCE WITH SAE-AMS-2700 METHOD 1 TYPE 6, EXCEPT THAT 20% TO 25% NITRIC ACID SOLUTION SHALL BE USED. A TEST FOR SURFACE PASSIVITY SHALL BE DONE IN ACCORDANCE WITH SAE-AMS-2700 TEST METHOD 102 - COPPER SULFATE TEST.

EXAMPLE OF
PART NOS.

KC146K4A : UNION, BUTTWELD TUBE, FOR 1/4" X .035 WALL TYPE 316 SS TUBING.
 KC146L12G : UNION, BUTTWELD TUBE, FOR 3/4" X .109 WALL AL6ZN TUBING.

CUSTODIAN:

JOHN F. KENNEDY SPACE CENTER

PROCUREMENT SPEC.

KSC-F-124

COORDINATION STATUS

KSC DE

UNION, BUTTWELD TUBE

STANDARD PART

KC146

SHEET 1 OF 2

KSC FORM 32-85 (CG 4/92)

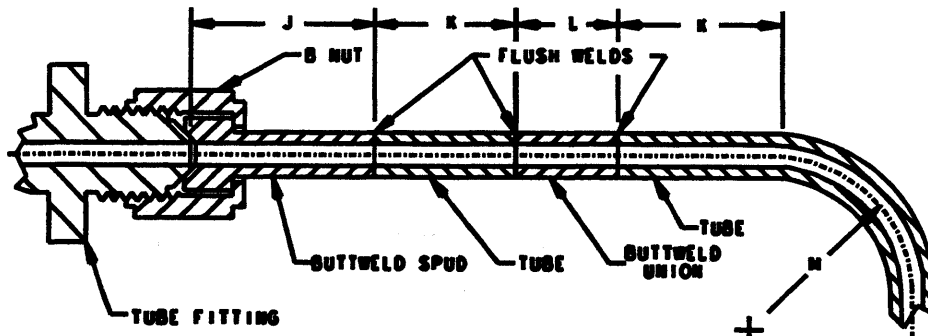
REVISED: ADDED CODE "-L" MATERIAL AND NOTE 8 5-1-07

APPROVED: 5-1-90

NOTICE: WHEN GOVERNMENT DRAWINGS, SPECIFICATIONS OR OTHER DATA ARE USED FOR ANY PURPOSE OTHER THAN IN CONNECTION WITH A DEFINITELY RELATED GOVERNMENT PROCUREMENT OPERATION, THE UNITED STATES GOVERNMENT THEREBY INCURS NO RESPONSIBILITY NOR ANY OBLIGATION WHATSOEVER AND THE FACT THAT THE GOVERNMENT MAY HAVE FORMULATED, FURNISHED, OR IN ANY WAY SUPPLIED THE SAID DRAWINGS, SPECIFICATIONS, OR OTHER DATA IS NOT REGARDED BY IMPLICATION OR OTHERWISE AS IN ANY MANNER LICENSING THE HOLDER OR ANY OTHER PERSON OR CORPORATION, OR CONVEYING ANY RIGHTS OR PERMISSION TO MANUFACTURE, USE, OR SELL ANY PATENTED INVENTION THAT MAY IN ANY WAY BE RELATED THERETO.

NOTICE: WHEN GOVERNMENT DRAWINGS, SPECIFICATIONS OR OTHER DATA ARE USED FOR ANY PURPOSE OTHER THAN IN CONNECTION WITH A DEFINITELY RELATED GOVERNMENT PROCUREMENT OPERATION, THE UNITED STATES GOVERNMENT THEREBY INCURS NO RESPONSIBILITY FOR ANY OBLIGATION WHATSOEVER AND THE FACT THAT THE GOVERNMENT MAY HAVE FORMULATED, FURNISHED, OR IN ANY WAY SUPPLIED THE SAID DRAWINGS, SPECIFICATIONS, OR OTHER DATA IS NOT REGARDED BY IMPLICATION OR OTHERWISE AS IN ANY MANNER LICENSING THE HOLDER OR ANY OTHER PERSON OR CORPORATION, OR CONVEYING ANY RIGHTS OR PERMISSION TO MANUFACTURE, USE, OR SELL ANY PATENTED INVENTION THAT MAY IN ANY WAY BE RELATED THERETO.

DASH NO.		TUBE SIZE REF	A 1.003	B 1.005 1.000	C 1.003	D 1.005 1.000	E 1.003	F 1.005	G 1.005	H (REF)
316 STEEL	AL6ZN									
K4A	L4A	1/4"x.035	.205	.255	.172	.250	.297	.350	.305	.770
K6A	L6A	3/8"x.035	.410	.300	.297	.303	.420	.350	.305	.770
K6C	L6C	3/8"x.050	.410	.300	.251	.303	.420	.350	.305	.770
K80	L80	1/2"x.049	.546	.506	.393	.509	.554	.350	.305	.770
K8C	L8C	1/2"x.072	.546	.506	.347	.509	.554	.350	.305	.770
K120	L120	3/4"x.065	.816	.756	.611	.759	.804	.500	.535	1.070
K126	L126	3/4"x.109	.816	.756	.523	.759	.804	.500	.535	1.070
K16F	L16F	1"x.095	1.066	1.006	.801	1.009	1.054	.500	.535	1.070
K16H	L16H	1"x.120	1.066	1.006	.751	1.009	1.054	.500	.535	1.070
K200	L200	1-1/4"x.049	1.330	1.256	1.143	1.259	1.304	.500	.535	1.070
K20J	L20J	1-1/4"x.134	1.330	1.256	.973	1.259	1.304	.500	.535	1.070
K240	L240	1-1/2"x.049	1.605	1.511	1.390	1.514	1.559	.500	.535	1.070
K24J	L24J	1-1/2"x.134	1.605	1.511	1.210	1.514	1.559	.500	.535	1.070
K24K	L24K	1-1/2"x.156	1.605	1.511	1.174	1.514	1.559	.500	.535	1.070
K24L	L24L	1-1/2"x.180	1.605	1.511	1.120	1.514	1.559	.500	.535	1.070
K320	L320	2"x.065	2.105	2.011	1.866	2.014	2.059	.500	.535	1.070
K32L	L32L	2"x.100	2.105	2.011	1.620	2.014	2.059	.500	.535	1.070



TUBE SIZE REF	J	K (MIN)	L	M (MIN)
1/4"	.71	1.44	.70	.56
3/8"	.78	1.44	.70	.94
1/2"	.88	1.44	.70	1.25
3/4"	1.12	1.44	1.00	1.75
1"	1.19	1.44	1.00	3.00
1-1/4"	1.22	1.63	1.00	3.75
1-1/2"	1.31	1.63	1.00	4.50
2"x.065	1.41	1.75	1.00	6.00
2"x.100	1.41	4.25	1.00	6.00

BUTTWELD UNION APPLICATION DATA

CUSTODIAN:

JOHN F. KENNEDY SPACE CENTER

PROCUREMENT SPEC.
KSC-F-124

COORDINATION STATUS

KSC DE

UNION, BUTTWELD TUBE

STANDARD PART

KC146

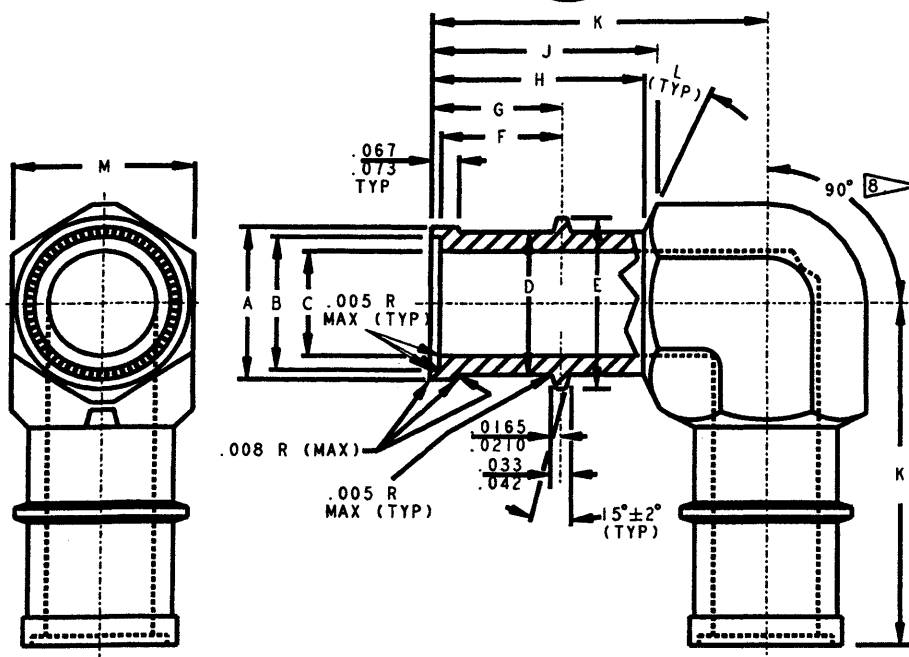
SHEET 2 OF 2

KSC FORM 32-85 (CG 4/92)

REVISED: ADDED CODE "L" MATERIAL DASH NO. 5-1-07

APPROVED: 5-1-90

NOTICE: WHEN GOVERNMENT DRAWINGS, SPECIFICATIONS OR OTHER DATA ARE USED FOR ANY PURPOSE OTHER THAN IN CONNECTION WITH A DEFINITELY RELATED GOVERNMENT PROCUREMENT OPERATION, THE UNITED STATES GOVERNMENT THEREBY INCURS NO RESPONSIBILITY NOR ANY OBLIGATION WHATSOEVER AND THE FACT THAT THE GOVERNMENT MAY HAVE FORMULATED, FURNISHED, OR IN ANY WAY SUPPLIED THE SAID DRAWINGS, SPECIFICATIONS, OR OTHER DATA IS NOT REGARDED BY IMPLICATION OR OTHERWISE AS IN ANY MANNER LICENSING THE HOLDER OR ANY OTHER PERSON OR CORPORATION, OR CONVEYING ANY RIGHTS OR PERMISSION TO MANUFACTURE, USE, OR SELL ANY PATENTED INVENTION THAT MAY IN ANY WAY BE RELATED THERETO.



SCHEDULE:

ADD	-A-	AFTER	DASH	NUMBER	TO	DENOTE	.035"	TUBE	WALL
ADD	-B-	AFTER	DASH	NUMBER	TO	DENOTE	.049"	TUBE	WALL
ADD	-C-	AFTER	DASH	NUMBER	TO	DENOTE	.058"	TUBE	WALL
ADD	-D-	AFTER	DASH	NUMBER	TO	DENOTE	.065"	TUBE	WALL
ADD	-E-	AFTER	DASH	NUMBER	TO	DENOTE	.072"	TUBE	WALL
ADD	-F-	AFTER	DASH	NUMBER	TO	DENOTE	.095"	TUBE	WALL
ADD	-G-	AFTER	DASH	NUMBER	TO	DENOTE	.109"	TUBE	WALL
ADD	-H-	AFTER	DASH	NUMBER	TO	DENOTE	.120"	TUBE	WALL
ADD	-J-	AFTER	DASH	NUMBER	TO	DENOTE	.134"	TUBE	WALL
ADD	-K-	AFTER	DASH	NUMBER	TO	DENOTE	.156"	TUBE	WALL
ADD	-L-	AFTER	DASH	NUMBER	TO	DENOTE	.188"	TUBE	WALL

MATERIAL:

SEE PROCUREMENT SPECIFICATION

CORROSION RESISTANT STEEL (CLASS 316), CODE "K"

CORROSION RESISTANT STEEL (AL6XN), CODE "L" PER ASTM -B691

FINISH:

SURFACE SHALL BE 125 RMS MAXIMUM PER ANSI B46.1 UNLESS OTHERWISE SPECIFIED.

NOTES:

1. REMOVE BURRS AND SLIVERS. BREAK SHARP EDGES UNLESS OTHERWISE NOTED.
2. DIMENSIONS IN INCHES, UNLESS OTHERWISE SPECIFIED TOLERANCE DECIMALS $\pm .016$.
3. FOR DESIGN FEATURE PURPOSES, THIS DRAWING TAKES PRECEDENCE OVER PROCUREMENT DOCUMENTS REFERENCED HEREIN.
4. REFERENCED DOCUMENTS SHALL BE OF THE ISSUE IN EFFECT ON THE DATE OF
5. INVITATION FOR BID.
6. MARKING OF FITTINGS SHALL BE CONSISTANT WITH PROCUREMENT SPECIFICATION
7. USING APPLICABLE NC STANDARD AND PART NUMBER DESIGNATIONS AS SHOWN ON
8. THIS DRAWING.
9. ALL DIAMETRAL DIMENSIONS SHALL BE CONCENTRIC WITH "C" BORE WITHIN .005 T.I.R.
10. FITTINGS PROVIDED HEREIN SHALL BE WELDED TO CORRESPONDING TUBE SIZES
11. USING AUTOMATIC WELDING EQUIPMENT (ASTRO-ARC CO. OR EQUIVALENT).
12. FOR TUBE SIZES UP TO AND INCLUDING .375" OD, TOLERANCE IS $\pm 2/12"$. FOR ALL
13. OTHERS, TOLERANCE IS $\pm 1/12"$.
14. AFTER MACHINING, THE CODE 1 FITTINGS SHALL BE PICKLED IN ACCORDANCE WITH
15. ASTM A380 CODE B AND THEN PASSIVATED IN ACCORDANCE WITH SAE-AMS-2700
16. METHOD 1 TYPE 6, EXCEPT THAT 20% TO 25% NITRIC ACID SOLUTION SHALL BE USED.
17. A TEST FOR SURFACE PASSIVITY SHALL BE DONE IN ACCORDANCE WITH SAE-AMS-2700
18. TEST METHOD 102 - COPPER SULFATE TEST.

**EXAMPLE OF
PART NOS.**

KC147K4A = ELBOW, 90° BUTTWELD TUBE, FOR 1/4" X .035 WALL TUBING, TYPE 316 SS.
KC147L6C = ELBOW, 90° BUTTWELD TUBE, FOR 3/8" X .058 WALL TUBING, AL6XN.

CUSTODIAN:

JOHN F. KENNEDY SPACE CENTER

PROCUREMENT SPEC.

STANDARD PART

KSC-F-124

ELBOW, 90° BUTTWELD TUBE

KC 147

COORDINATION STATUS

RSC DE

SHEET 1 OF 2

KSC FORM 32-85 (CG 4/92)

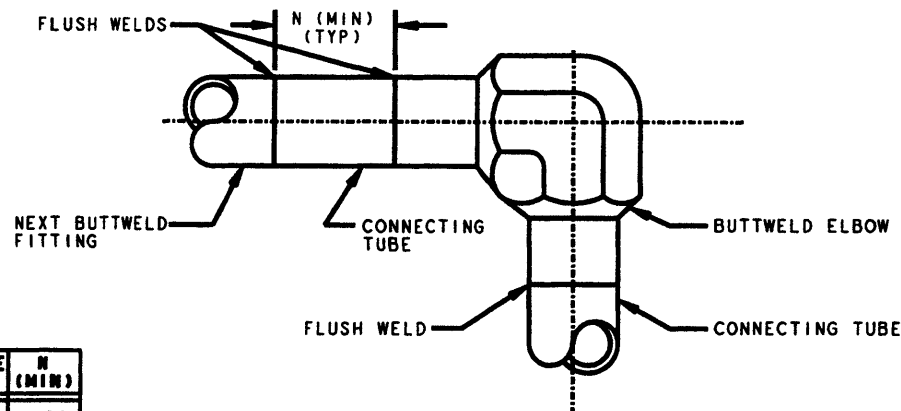
REVISID: "ADDED CODE "L" MATERIAL AND NOTE 9 5-1-07

APPROVED: 5-1-90

GP425G AMEND 1

FED SUP CLASS
4730

DASH NO.		TUBE SIZE REF	A	B	C	D	E	F	G	H	J	K	L	M	R
316 STEEL	AL6XM		±.003	±.005 -.000	±.003	±.005 -.000	±.003	±.005	±.005	±.015 -.005	(REF)	±.016	(REF)	(REF)	±.005
K4A	L4A	1/4" X .035	.285	.255	.172	.258	.297	.350	.385	.656	.680	.920	15	.438	.030
K6A	L6A	3/8" X .035	.410	.380	.297	.383	.428	.350	.385	.718	.742	1.110	15	.563	.030
K6C	L6C	3/8" X .058	.410	.380	.251	.383	.428	.350	.385	.718	.742	1.110	15	.563	.030
K8B	L8B	1/2" X .049	.546	.506	.393	.509	.554	.350	.385	.780	.812	1.280	15	.750	.030
K8E	L8E	1/2" X .072	.546	.506	.347	.509	.554	.350	.385	.780	.812	1.280	15	.750	.030
K12D	L12D	3/4" X .065	.816	.756	.611	.759	.804	.500	.535	.868	.909	1.640	15	1.063	.030
K12G	L12G	3/4" X .109	.816	.756	.523	.759	.804	.500	.535	.868	.909	1.640	15	1.063	.030
K16F	L16F	1" X .095	1.066	1.006	.801	1.009	1.054	.500	.535	.868	.909	1.810	15	1.313	.030
K16H	L16H	1" X .120	1.066	1.006	.751	1.009	1.054	.500	.535	.868	.909	1.810	15	1.313	.030
K20B	L20B	1-1/4" X .049	1.330	1.256	1.143	1.259	1.304	.500	.535	.930	1.036	2.090	30	1.625	.060
K20J	L20J	1-1/4" X .134	1.330	1.256	.973	1.259	1.304	.500	.535	.930	1.036	2.090	30	1.625	.060
K24B	L24B	1-1/2" X .049	1.605	1.511	1.398	1.514	1.559	.500	.535	.930	1.034	2.280	30	1.875	.060
K24J	L24J	1-1/2" X .134	1.605	1.511	1.218	1.514	1.559	.500	.535	.930	1.034	2.280	30	1.875	.060
K24K	L24K	1-1/2" X .156	1.605	1.511	1.174	1.514	1.559	.500	.535	.930	1.034	2.280	30	1.875	.060
K24L	L24L	1-1/2" X .188	1.605	1.511	1.120	1.514	1.559	.500	.535	.930	1.034	2.280	30	1.875	.060
K32D	L32D	2" X .065	2.105	2.011	1.866	2.014	2.059	.500	.535	1.055	1.298	3.060	45	2.500	.375
K32L	L32L	2" X .188	2.105	2.011	1.620	2.014	2.059	.500	.535	1.055	1.298	3.060	45	2.500	.375



TUBE SIZE REF	N (MIN)
1/4"	1.44
3/8"	1.44
1/2"	1.44
3/4"	1.44
1"	1.44
1-1/4"	1.63
1-1/2"	1.63
2" X .065	1.75
2" X .188	4.25

BUTTWELD ELBOW APPLICATION DATA

APPROVED: 5-1-90
REVISED: ADDED CODE "L" MATERIAL DASH NO. 5-1-07

CUSTODIAN:

JOHN F. KENNEDY SPACE CENTER

PROCUREMENT SPEC.

KSC-F-124

COORDINATION STATUS

KSC DE

ELBOW, 90° BUTTWELD TUBE

STANDARD PART

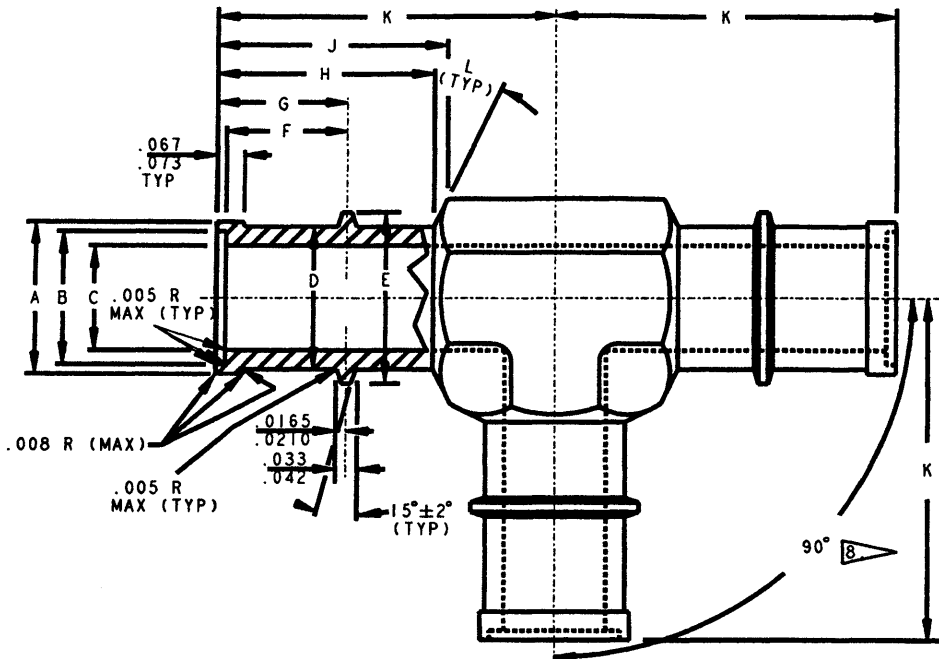
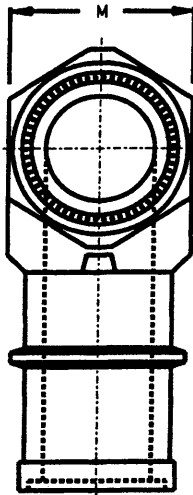
KC147

SHEET 2 OF 2

KSC FORM 32-85 (CG 4/92)

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GP425G AMEND 1

FED SUP CLASS
4730

SCHEDULE:

ADD "A" AFTER DASH NUMBER TO DENOTE .035" TUBE WALL.
 ADD "B" AFTER DASH NUMBER TO DENOTE .049" TUBE WALL.
 ADD "C" AFTER DASH NUMBER TO DENOTE .058" TUBE WALL.
 ADD "D" AFTER DASH NUMBER TO DENOTE .065" TUBE WALL.
 ADD "E" AFTER DASH NUMBER TO DENOTE .072" TUBE WALL.
 ADD "F" AFTER DASH NUMBER TO DENOTE .095" TUBE WALL.
 ADD "G" AFTER DASH NUMBER TO DENOTE .109" TUBE WALL.
 ADD "H" AFTER DASH NUMBER TO DENOTE .120" TUBE WALL.
 ADD "J" AFTER DASH NUMBER TO DENOTE .134" TUBE WALL.
 ADD "K" AFTER DASH NUMBER TO DENOTE .156" TUBE WALL.
 ADD "L" AFTER DASH NUMBER TO DENOTE .188" TUBE WALL.

MATERIAL:

SEE PROCUREMENT SPECIFICATION.
 CORROSION RESISTANT STEEL (CLASS 316), CODE "K"
 CORROSION RESISTANT STEEL (AL6XN), CODE "L" PER ASTM -B691

FINISH:

SURFACE SHALL BE 125 RMS MAXIMUM PER ANSI B46.1 UNLESS OTHERWISE SPECIFIED.
 REMOVE BURRS AND SLIVERS. BREAK SHARP EDGES UNLESS OTHERWISE NOTED.

NOTES:

1. DIMENSIONS IN INCHES. UNLESS OTHERWISE SPECIFIED, TOLERANCE DECIMALS $\pm .016$.
2. FOR DESIGN FEATURE PURPOSES, THIS DRAWING TAKES PRECEDENCE OVER PROCUREMENT DOCUMENTS REFERENCED HEREIN.
3. REFERENCED DOCUMENTS SHALL BE OF THE ISSUE IN EFFECT ON THE DATE OF INVITATION FOR BID.
4. MARKING OF FITTINGS SHALL BE CONSISTANT WITH PROCUREMENT SPECIFICATION USING APPLICABLE KC STANDARD AND PART NUMBER DESIGNATIONS AS SHOWN ON THIS DRAWING.
5. ALL DIAMETRAL DIMENSIONS SHALL BE CONCENTRIC WITH "C" BORE WITHIN .005 T.I.R.
6. FITTINGS PROVIDED HEREIN SHALL BE WELDED TO CORRESPONDING TUBE SIZES USING AUTOMATIC WELDING EQUIPMENT (ASTRO-ARC CO. OR EQUIVALENT).
7. FOR TUBE SIZES UP TO AND INCLUDING .375" OD, TOLERANCE IS $\pm 2-1/2^\circ$. FOR ALL OTHERS, TOLERANCE IS $\pm 1-1/2^\circ$.
8. AFTER MACHINING, THE CODE L FITTINGS SHALL BE PICKLED IN ACCORDANCE WITH ASTM A380 CODE B AND THEN PASSIVATED IN ACCORDANCE WITH SAE-AMS-2700 METHOD 1 TYPE 6, EXCEPT THAT 20% TO 25% NITRIC ACID SOLUTION SHALL BE USED. A TEST FOR SURFACE PASSIVITY SHALL BE DONE IN ACCORDANCE WITH SAE-AMS-2700 TEST METHOD 102 - COPPER SULFATE TEST.

EXAMPLE OF
PART NOS.

KC148K4A = TEE, BUTTWELD TUBE, FOR 1/4" X .035 WALL TUBING, TYPE 316 SS.
 KC148L6C = TEE, BUTTWELD TUBE, FOR 3/8" X .058 WALL TUBING, AL6XN.

CUSTODIAN:

JOHN F. KENNEDY SPACE CENTER

PROCUREMENT SPEC.

KSC-F-124

COORDINATION STATUS

KSC DE

TEE, BUTTWELD TUBE

STANDARD PART

KC148

SHEET 1 OF 2

KSC FORM 32-85 (CG 4/92)

REVISED: ADDED CODE "L" MATERIAL AND NOTE 9 5-1-07

APPROVED: 5-1-90

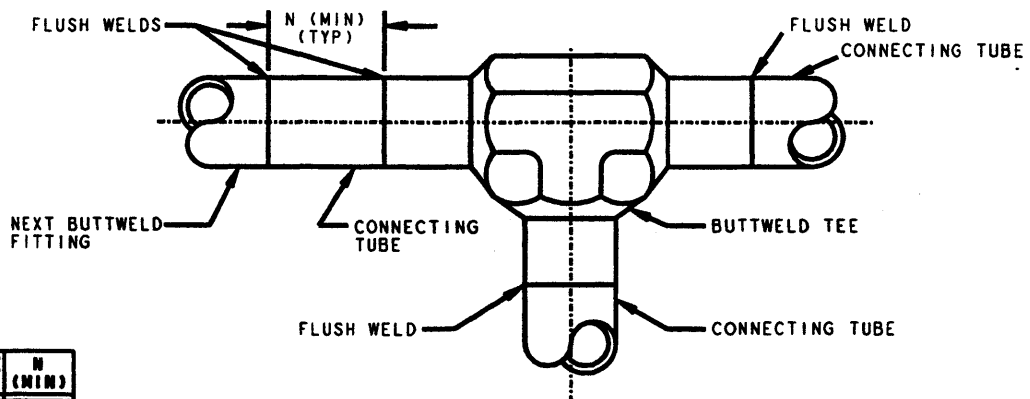
NOTICE: WHEN GOVERNMENT DRAWINGS, SPECIFICATIONS OR OTHER DATA ARE USED FOR ANY PURPOSE OTHER THAN IN CONNECTION WITH A DEFINITELY RELATED GOVERNMENT PROCUREMENT OPERATION, THE UNITED STATES GOVERNMENT THEREBY INCURS NO LIABILITY NOR ANY OBLIGATION WHATSOEVER AND THE FACT THAT THE GOVERNMENT MAY HAVE FORMULATED, FURNISHED, OR IN ANY WAY SUPPLIED THE SAID DRAWINGS, SPECIFICATIONS, OR OTHER DATA IS NOT REGARDED BY IMPLICATION OR OTHERWISE AS IN ANY MANNER LICENSING THE HOLDER OR ANY OTHER PERSON OR CORPORATION, OR CONFERRING ANY RIGHTS OR PERMISSION TO MANUFACTURE, USE, OR SELL ANY PATENTED INVENTION THAT MAY IN ANY WAY BE RELATED THERETO.

GP425G AMEND 1

FED SUP CLASS
4730

NOTICE: WHEN GOVERNMENT DRAWINGS, SPECIFICATIONS OR OTHER DATA ARE USED FOR ANY PURPOSE OTHER THAN IN CONNECTION WITH A DEFINITELY RELATED GOVERNMENT PROCUREMENT OPERATION, THE UNITED STATES GOVERNMENT THEREBY INCURS NO RESPONSIBILITY FOR ANY OBLIGATION WHATSOEVER AND THE FACT THAT THE GOVERNMENT MAY HAVE FORMULATED, FURNISHED, OR IN ANY WAY SUPPLIED THE SAID DRAWINGS, SPECIFICATIONS, OR OTHER DATA IS NOT REGARDED BY IMPLICATION OR OTHERWISE AS IN ANY MANNER LICENSING THE HOLDER OR ANY OTHER PERSON OR CORPORATION, OR CONVEYING ANY RIGHTS OR PERMISSION TO MANUFACTURE, USE, OR SELL ANY PATENTED INVENTION THAT MAY IN ANY WAY BE RELATED THERE TO.

DASH NO.	TUBE SIZE REF	A ±.003	B +.005 -.000	C ±.003	D +.005 -.000	E ±.003	F ±.005	G ±.005	H +.015 -.005	J (REF)	K ±.016	L KREF	M (REF)	R ±.005
316 STEEL	AL6XN													
K4A	L4A	1/4" X .035	.285	.255	.172	.258	.297	.350	.385	.656	.680	.920	15	.438 .030
K6A	L6A	3/8" X .035	.410	.380	.297	.383	.428	.350	.385	.718	.742	1.110	15	.563 .030
K6C	L6C	3/8" X .058	.410	.380	.251	.383	.428	.350	.385	.718	.742	1.110	15	.563 .030
K8B	L8B	1/2" X .049	.546	.506	.393	.509	.554	.350	.385	.780	.812	1.280	15	.750 .030
K8E	L8E	1/2" X .072	.546	.506	.347	.509	.554	.350	.385	.780	.812	1.280	15	.750 .030
K12D	L12D	3/4" X .065	.816	.756	.611	.759	.804	.500	.535	.868	.909	1.640	15	1.063 .030
K12G	L12G	3/4" X .109	.816	.756	.523	.759	.804	.500	.535	.868	.909	1.640	15	1.063 .030
K16F	L16F	1" X .095	1.066	1.006	.801	1.009	1.054	.500	.535	.868	.909	1.810	15	1.313 .030
K16H	L16H	1" X .120	1.066	1.006	.751	1.009	1.054	.500	.535	.868	.909	1.810	15	1.313 .030
K20B	L20B	1-1/4" X .049	1.330	1.256	1.143	1.259	1.304	.500	.535	.930	1.036	2.090	30	1.625 .060
K20J	L20J	1-1/4" X .134	1.330	1.256	.973	1.259	1.304	.500	.535	.930	1.036	2.090	30	1.625 .060
K24B	L24B	1-1/2" X .049	1.605	1.511	1.398	1.514	1.559	.500	.535	.930	1.034	2.280	30	1.875 .060
K24J	L24J	1-1/2" X .134	1.605	1.511	1.218	1.514	1.559	.500	.535	.930	1.034	2.280	30	1.875 .060
K24K	L24K	1-1/2" X .156	1.605	1.511	1.174	1.514	1.559	.500	.535	.930	1.034	2.280	30	1.875 .060
K24L	L24L	1-1/2" X .188	1.605	1.511	1.120	1.514	1.559	.500	.535	.930	1.034	2.280	30	1.875 .060
K32D	L32D	2" X .065	2.105	2.011	1.866	2.014	2.059	.500	.535	1.055	1.298	3.060	45	2.500 .375
K32L	L32L	2" X .188	2.105	2.011	1.620	2.014	2.059	.500	.535	1.055	1.298	3.060	45	2.500 .375



TUBE SIZE REF	N (MIN)
1/4"	1.44
3/8"	1.44
1/2"	1.44
3/4"	1.44
1"	1.44
1-1/4"	1.63
1-1/2"	1.63
2" X .065	1.75
2" X .188	4.25

BUTTWELD TEE APPLICATION DATA

CUSTODIAN:

JOHN F. KENNEDY SPACE CENTER

PROCUREMENT SPEC.
KSC-F-124

COORDINATION STATUS

KSC DE

TEE, BUTTWELD TUBE

STANDARD PART

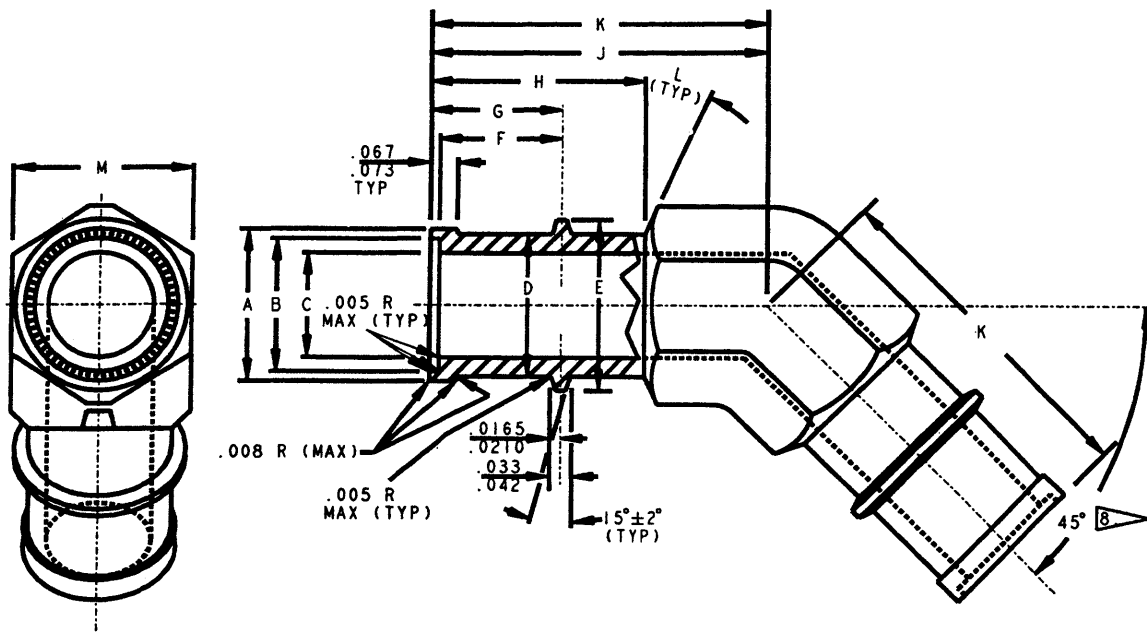
KC148

SHEET 2 OF 2

KSC FORM 32-85 (CG 4/92)

REVISED: ADDED CODE "L" MATERIAL DASH NO. 3-1-07
APPROVED: 3-1-99

GP425G AMEND 1

FED SUP CLASS
4730

SCHEDULE:

ADD "A" AFTER DASH NUMBER TO DENOTE .035" TUBE WALL.
 ADD "B" AFTER DASH NUMBER TO DENOTE .049" TUBE WALL.
 ADD "C" AFTER DASH NUMBER TO DENOTE .058" TUBE WALL.
 ADD "D" AFTER DASH NUMBER TO DENOTE .065" TUBE WALL.
 ADD "E" AFTER DASH NUMBER TO DENOTE .072" TUBE WALL.
 ADD "F" AFTER DASH NUMBER TO DENOTE .095" TUBE WALL.
 ADD "G" AFTER DASH NUMBER TO DENOTE .109" TUBE WALL.
 ADD "H" AFTER DASH NUMBER TO DENOTE .120" TUBE WALL.
 ADD "J" AFTER DASH NUMBER TO DENOTE .134" TUBE WALL.
 ADD "K" AFTER DASH NUMBER TO DENOTE .156" TUBE WALL.
 ADD "L" AFTER DASH NUMBER TO DENOTE .188" TUBE WALL.

MATERIAL:

SEE PROCUREMENT SPECIFICATION.

CORROSION RESISTANT STEEL (CLASS 316), CODE "K"

CORROSION RESISTANT STEEL (AL6XN), CODE "L" PER ASTM -B691

FINISH:

SURFACE SHALL BE 125 RMS MAXIMUM PER ANSI B46.1 UNLESS OTHERWISE SPECIFIED.

NOTES:

1. REMOVE BURRS AND SLIVERS. BREAK SHARP EDGES UNLESS OTHERWISE NOTED.
2. DIMENSIONS IN INCHES. UNLESS OTHERWISE SPECIFIED, TOLERANCE DECIMALS $\pm .016$.
3. FOR DESIGN FEATURE PURPOSES, THIS DRAWING TAKES PRECEDENCE OVER PROCUREMENT DOCUMENTS REFERENCED HEREIN.
4. REFERENCED DOCUMENTS SHALL BE OF THE ISSUE IN EFFECT ON THE DATE OF INVITATION FOR BID.
5. MARKING OF FITTINGS SHALL BE CONSISTANT WITH PROCUREMENT SPECIFICATION USING APPLICABLE KC STANDARD AND PART NUMBER DESIGNATIONS AS SHOWN ON THIS DRAWING.
6. ALL DIAMETRAL DIMENSIONS SHALL BE CONCENTRIC WITH "C" BORE WITHIN .005 T.I.R.
7. FITTINGS PROVIDED HEREIN SHALL BE WELDED TO CORRESPONDING TUBE SIZES USING AUTOMATIC WELDING EQUIPMENT (ASTRO-ARC CO. OR EQUIVALENT).
8. FOR TUBE SIZES UP TO AND INCLUDING .375" OD, TOLERANCE IS $\pm 2-1/2^\circ$. FOR ALL OTHERS, TOLERANCE IS $\pm 1-1/2^\circ$.
9. AFTER MACHINING, THE CODE L FITTINGS SHALL BE PICKLED IN ACCORDANCE WITH ASTM A380 CODE B AND THEN PASSIVATED IN ACCORDANCE WITH SAE-AMS-2700 METHOD 1 TYPE 6, EXCEPT THAT 20% TO 25% NITRIC ACID SOLUTION SHALL BE USED. A TEST FOR SURFACE PASSIVITY SHALL BE DONE IN ACCORDANCE WITH SAE-AMS-2700 TEST METHOD 102 - COPPER SULFATE TEST.

EXAMPLE OF
PART NOS.

KC149K4A = ELBOW, 45° BUTTWELD TUBE, FOR 1/2" X .035 WALL TUBING, TYPE 316 SS.
 KC149L6C = ELBOW, 45° BUTTWELD TUBE, FOR 3/8" X .058 WALL TUBING, AL6XN.

CUSTODIAN:

JOHN F. KENNEDY SPACE CENTER

PROCUREMENT SPEC.

KSC-F-124

COORDINATION STATUS

KSC DC

ELBOW, 45° BUTTWELD TUBE

STANDARD PART

KC149

SHEET 1 OF 2

KSC FORM 32-85 (CG 4/92)

REVISED: ADDED CODE "L" MATERIAL AND NOTE 9 3-1-07

APPROVED: 8-1-90

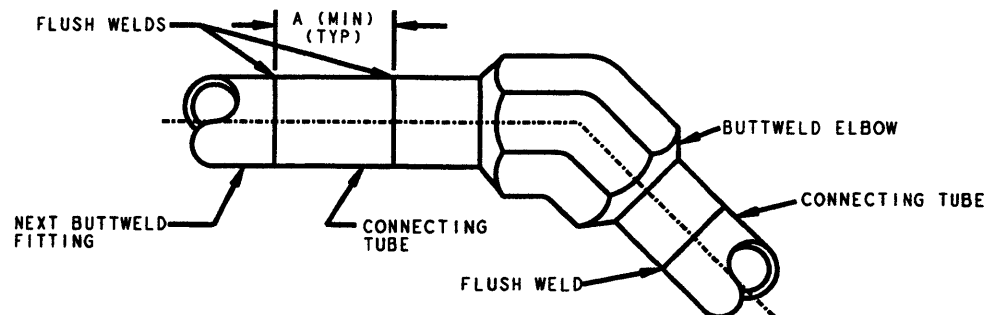
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GP425G AMEND I

FED SUP CLASS
4730

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DASH NO.	TUBE SIZE REF	A	B	C	D	E	F	G	H	J	K	L	M	R
CRE STEEL	AL6XN	±.003	±.005 -.000	±.003	±.005 -.000	±.003	±.005	±.005	±.015 -.005	(REF)	±.016 (REF)	(REF)	(REF)	±.005
K4A	L4A	1/4"X.035	.285	.255	.172	.258	.297	.350	.385	.656	.680	.920	15	.438 .030
K6A	L6A	3/8"X.035	.410	.380	.297	.383	.428	.350	.385	.718	.742	1.110	15	.563 .030
K6C	L6C	3/8"X.058	.410	.380	.251	.383	.428	.350	.385	.718	.742	1.110	15	.563 .030
K8B	L8B	1/2"X.049	.546	.506	.393	.509	.554	.350	.385	.780	.812	1.280	15	.750 .030
K8E	L8E	1/2"X.072	.546	.506	.347	.509	.554	.350	.385	.780	.812	1.280	15	.750 .030
K12D	L12D	3/4"X.065	.816	.756	.611	.759	.804	.500	.535	.868	.909	1.640	15	1.063 .030
K12G	L12G	3/4"X.109	.816	.756	.523	.759	.804	.500	.535	.868	.909	1.640	15	1.063 .030
K16F	L16F	1"X.095	1.066	1.006	.801	1.009	1.054	.500	.535	.868	.909	1.810	15	1.313 .030
K16H	L16H	1"X.120	1.066	1.006	.751	1.009	1.054	.500	.535	.868	.909	1.810	15	1.313 .030
K20B	L20B	1-1/4"X.049	1.330	1.256	1.143	1.259	1.304	.500	.535	.930	1.036	2.090	30	1.625 .060
K20J	L20J	1-1/4"X.134	1.330	1.256	.973	1.259	1.304	.500	.535	.930	1.036	2.090	30	1.625 .060
K24B	L24B	1-1/2"X.049	1.605	1.511	1.398	1.514	1.559	.500	.535	.930	1.034	2.280	30	1.875 .060
K24J	L24J	1-1/2"X.134	1.605	1.511	1.218	1.514	1.559	.500	.535	.930	1.034	2.280	30	1.875 .060
K24K	L24K	1-1/2"X.156	1.605	1.511	1.174	1.514	1.559	.500	.535	.930	1.034	2.280	30	1.875 .060
K24L	L24L	1-1/2"X.188	1.605	1.511	1.120	1.514	1.559	.500	.535	.930	1.034	2.280	30	1.875 .060
K32D	L32D	2"X.065	2.105	2.011	1.866	2.014	2.059	.500	.535	1.055	1.298	3.060	30	2.500 .375
K32L	L32L	2"X.188	2.105	2.011	1.620	2.014	2.059	.500	.535	1.055	1.298	3.060	30	2.500 .375



TUBE SIZE REF	A (MIN)
1/4"	1.44
3/8"	1.44
1/2"	1.44
3/4"	1.44
1"	1.44
1-1/4"	1.63
1-1/2"	1.63
2" X .065	1.75
2" X .188	4.25

BUTTWELD ELBOW APPLICATION DATA

CUSTODIAN:

JOHN F. KENNEDY SPACE CENTER

PROCUREMENT SPEC.

KSC-F-124

COORDINATION STATUS

KSC DE

ELBOW, 45° BUTTWELD TUBE

STANDARD PART

KC149

SHEET 2 OF 2


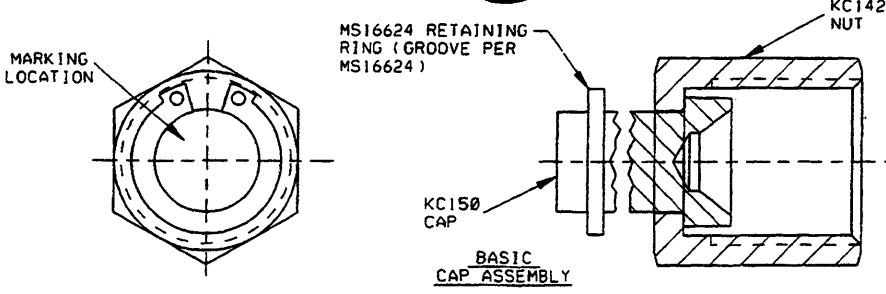
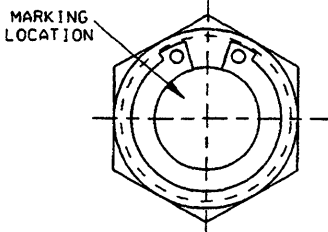
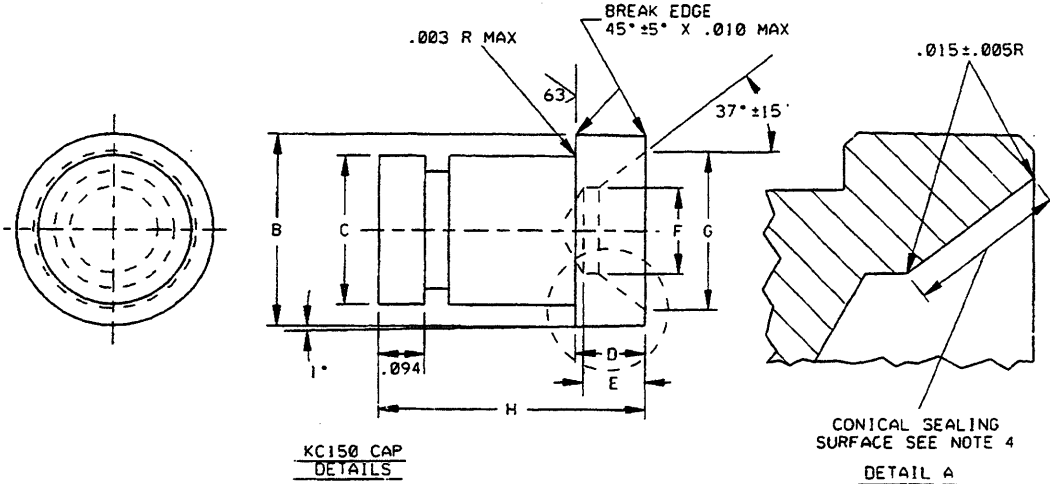
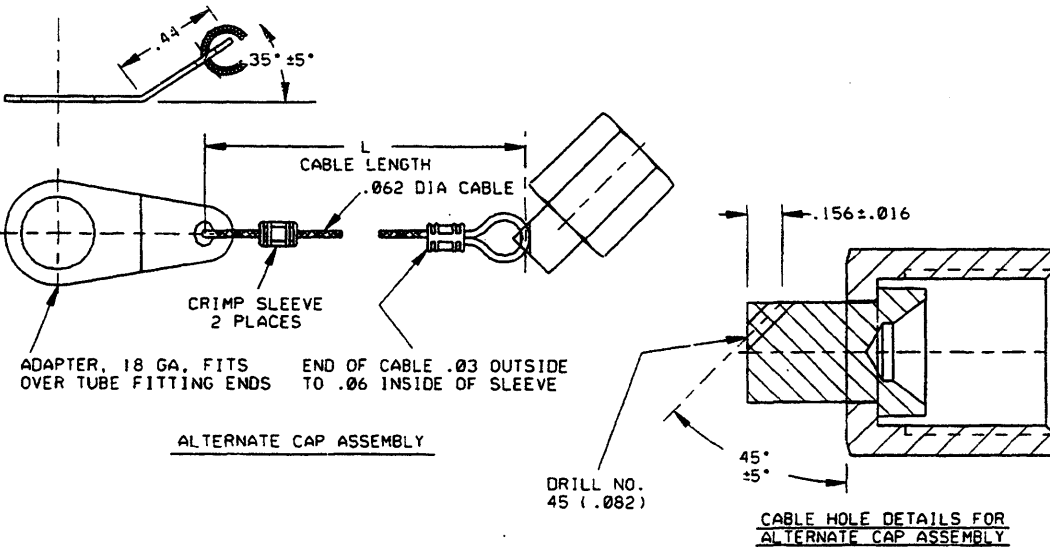
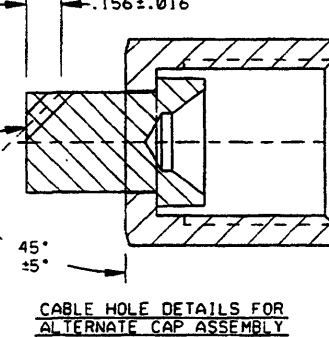
KSC FORM 32-85 (CG 4/92)

REVISED: ADDED CODE "L" MATERIAL DASH NO. 5-1-07

APPROVED: 8-1-90

GP-425

NOTICE: WHEN GOVERNMENT DRAWINGS, SPECIFICATIONS OR OTHER DATA ARE USED FOR ANY PURPOSE OTHER THAN IN CONNECTION WITH A DEFINITELY RELATED GOVERNMENT PROCUREMENT OPERATION, THE UNITED STATES GOVERNMENT THEREBY INCURS NO RESPONSIBILITY NOR ANY OBLIGATION WHATSOEVER AND THE FACT THAT THE GOVERNMENT MAY HAVE FORMULATED, FURNISHED, OR IN ANY WAY SUPPLIED THE SAID DRAWINGS, SPECIFICATIONS, OR OTHER DATA IS NOT REGARDED BY IMPLICATION OR OTHERWISE AS IN ANY MANNER LICENSING THE HOLDER OR ANY OTHER PERSON OR CORPORATION, OR CONVEYING ANY RIGHTS OR PERMISSION TO MANUFACTURE, USE, OR SELL ANY PATENTED INVENTION THAT MAY IN ANY WAY BE RELATED THERETO.

		FED SUP CLASS 4730	
		 <p>MS16624 RETAINING RING (GROOVE PER MS16624)</p> <p>KC150 CAP</p> <p>KC142 NUT</p> <p>BASIC CAP ASSEMBLY</p>	
 <p>MARKING LOCATION</p>		 <p>.003 R MAX</p> <p>BREAK EDGE 45°±5° X .010 MAX</p> <p>63°</p> <p>37°±15°</p> <p>.015±.005R</p> <p>CONICAL SEALING SURFACE SEE NOTE 4 DETAIL A</p> <p>KC150 CAP DETAILS</p>	
 <p>ADAPTER, 18 GA, FITS OVER TUBE FITTING ENDS</p> <p>CRIMP SLEEVE 2 PLACES</p> <p>CABLE LENGTH</p> <p>.062 DIA CABLE</p> <p>END OF CABLE .03 OUTSIDE TO .06 INSIDE OF SLEEVE</p> <p>ALTERNATE CAP ASSEMBLY</p> <p>DRILL NO. 45 (.082)</p> <p>CABLE HOLE DETAILS FOR ALTERNATE CAP ASSEMBLY</p>		 <p>.156±.016</p> <p>45°±5°</p>	
<p>CUSTODIAN: JOHN F. KENNEDY SPACE CENTER</p>			
PROCUREMENT SPEC.	CAP, CAP ASSEMBLY PRESSURE SEAL FLARED TUBE FITTING		STANDARD PART
COORDINATION STATUS			KC150
KSC DE			SHEET 1 OF 2

KSC FORM 32-85 (CG 4/92)

REVISED: (F) 8-1-90 (G) DASH NUMBER CHANGE 1-2-91 (H) DIM D & E 7-24-97
APPROVED: 3-23-66

GP-425

FED SUP CLASS
4730

DASH NO.		TUBE OD REF	B DIA +.000 -.003	C DIA +.000 -.003	D DIM	E DIM	F DIA	G DIA	H DIM	L CABLE LENGTH ±.25	KC142 NUT		MS16624 RETAINING RING DASH NO.
CRE STEEL	AL ALLOY										CRE STEEL	AL ALLOY	
K4	D4	1/4	.383	.297	.203	.125	.172	.315	.531	7	K4	D4	-4028
K6	D6	3/8	.502	.432	.266	.156	.297	.441	.625		K6	D6	-4043
K8	D8	1/2	.682	.562	.313	.172	.391	.589	.750		K8	D8	-4056
K10	D10	5/8	.797	.690	.281	.250	.438	.705			K10	D10	-4068
K12	D12	3/4	.972	.826		.313	.563	.880	.875		K12	D12	-4081
K16	D16	1	1.222	1.081	.297		.813	1.130			K16	D16	-4106
K20	D20	1-1/4	1.534	1.339	.375		1.078	1.412	1.000	9	K20	D20	-4131
K24	D24	1-1/2	1.784	1.609	.406	.375	1.313	1.630	1.125		K24	D24	-4162
K28	D28	1-3/4	2.159	1.882	.500	.375	1.547	1.945	1.375	11	K28	D28	-4187
K32	D32	2	2.409	2.159	.578	.500	1.781	2.195	1.438		K32	D32	-4215

CAP ASSY :
MATERIAL

SEE PROCUREMENT SPECIFICATION.
ALUMINUM ALLOY, 2024-T6, CODE "D". CABLE SHALL BE 300 SERIES SST.
CORROSION RESISTANT STEEL (CLASS 316), CODE "K" (WAS CODE "C").
CABLE SHALL BE 300 SERIES SST.

FINISH:

SEE PROCUREMENT SPECIFICATION.

NOTES:

1. REMOVE BURRS AND SLIVERS. BREAK SHARP EDGES UNLESS OTHERWISE NOTED.
2. DIMENSIONS IN INCHES UNLESS OTHERWISE SPECIFIED. TOLERANCE DECIMALS ±.016, ANGLES ±1/2°.
3. MACHINED SURFACE ROUGHNESS, UNLESS OTHERWISE SPECIFIED, SHALL NOT EXCEED 125/ OR 125 RMS PER ANSI B46.1.
4. THE CONICAL SEALING SURFACE SHALL BE CONCENTRIC WITH G DIA WITHIN .005 FULL INDICATOR READING.
5. DIAMETERS B, C, AND G TO BE CONCENTRIC WITHIN .005 FULL INDICATOR READING FOR TUBE SIZE UP TO AND INCLUDING 3/4" OD AND .010 FULL INDICATOR READING FOR 1" OD AND ABOVE.
6. CAP ASSEMBLY SHALL CONSIST OF A KC142 NUT, A RETAINING DEVICE FOR THE BASIC CAP ASSEMBLY ONLY, AND A CAP.
7. FOR DESIGN FEATURE PURPOSES, THIS DRAWING TAKES PRECEDENCE OVER PROCUREMENT DOCUMENTS REFERENCED HEREIN.
8. REFERENCED DOCUMENTS SHALL BE OF THE ISSUE IN EFFECT ON THE DATE OF INVITATION FOR BID.
9. MARKING OF FITTINGS SHALL BE CONSISTENT WITH PROCUREMENT SPECIFICATION USING APPLICABLE KC STANDARD AND PART NUMBER DESIGNATIONS AS SHOWN ON THIS DRAWING.

CODE:

"A" AFTER DASH NUMBER INDICATES ALTERNATE CAP ASSEMBLY WITH DRILLED CAP AND RETAINING CABLE.

EXAMPLE OF
PART NOS.

KC150K8 = CAP ASSEMBLY, 1/2" OD TUBE, CORROSION RESISTANT STEEL
KC150D12A = ALTERNATE CAP ASSEMBLY, 3/4" OD TUBE, ALUMINUM ALLOY

CUSTODIAN:

JOHN F. KENNEDY SPACE CENTER

PROCUREMENT SPEC.

NONE

COORDINATION STATUS

KSC DE

CAP, CAP ASSEMBLY
PRESSURE SEAL
FLARED TUBE FITTING

STANDARD PART

KC150

SHEET 2 OF 2

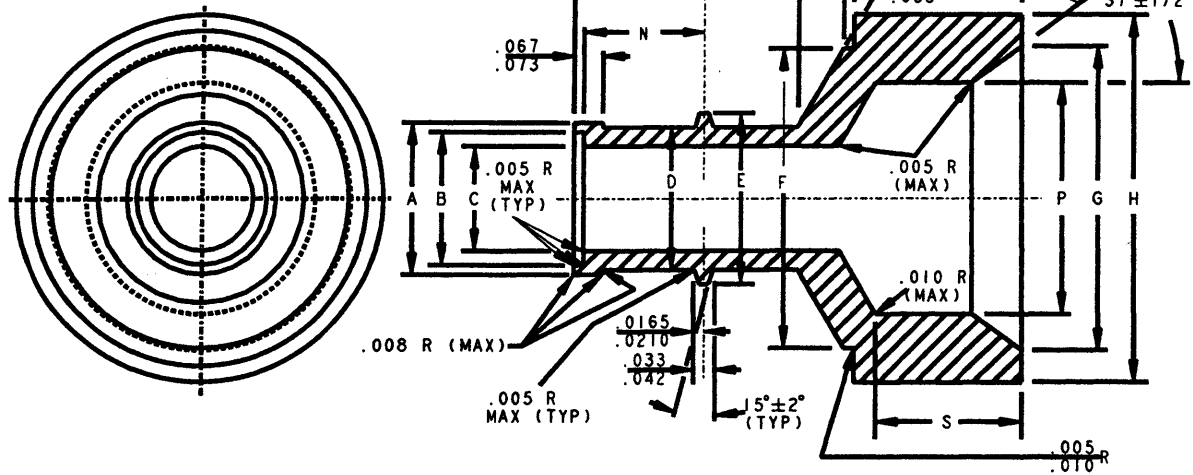
KSC FORM 32-85 (CG 4/92)

NOTICE: WHEN GOVERNMENT DRAWINGS, SPECIFICATIONS OR OTHER DATA ARE USED FOR ANY PURPOSE OTHER THAN IN CONNECTION WITH A DEFINITELY RELATED GOVERNMENT PROCUREMENT OPERATION, THE UNITED STATES GOVERNMENT THEREBY INCURS NO RESPONSIBILITY NOR ANY OBLIGATION WHATSOEVER AND THE FACT THAT THE GOVERNMENT MAY HAVE FORMULATED, FURNISHED, OR IN ANY WAY SUPPLIED THE SAID DRAWINGS, SPECIFICATIONS, OR OTHER DATA IS NOT REGARDED BY IMPLICATION OR OTHERWISE AS IN ANY MANNER LICENSING THE HOLDER OR ANY OTHER PERSON OR CORPORATION, OR CONVEYING ANY RIGHTS OR PERMISSION TO MANUFACTURE, USE, OR SELL ANY PATENTED INVENTION THAT MAY IN ANY WAY BE RELATED THERETO.

REVISED: (F) 8-1-90 (G) DASH NUMBER CHANGE 1-2-91 (H) DIM D & E SHEET 1 7-24-97

APPROVED:

FED SUP CLASS
4730



SCHEDULE :

ADD	"A"	AFTER	DASH	NUMBER	TO	DENOTE	.035"	TUBE	WALL
ADD	"B"	AFTER	DASH	NUMBER	TO	DENOTE	.049"	TUBE	WALL
ADD	"C"	AFTER	DASH	NUMBER	TO	DENOTE	.058"	TUBE	WALL
ADD	"D"	AFTER	DASH	NUMBER	TO	DENOTE	.065"	TUBE	WALL
ADD	"E"	AFTER	DASH	NUMBER	TO	DENOTE	.072"	TUBE	WALL
ADD	"F"	AFTER	DASH	NUMBER	TO	DENOTE	.095"	TUBE	WALL
ADD	"G"	AFTER	DASH	NUMBER	TO	DENOTE	.109"	TUBE	WALL
ADD	"H"	AFTER	DASH	NUMBER	TO	DENOTE	.120"	TUBE	WALL
ADD	"J"	AFTER	DASH	NUMBER	TO	DENOTE	.134"	TUBE	WALL
ADD	"K"	AFTER	DASH	NUMBER	TO	DENOTE	.156"	TUBE	WALL
ADD	"L"	AFTER	DASH	NUMBER	TO	DENOTE	.188"	TUBE	WALL

MATERIAL:

SEE PROCUREMENT SPECIFICATION.
CORROSION RESISTANT STEEL (CLASS 316), CODE "K"
CORROSION RESISTANT STEEL (AL6XN), CODE "L" PER ASTM -B691

FINISH:

SURFACE SHALL BE 125 RMS MAXIMUM PER ANSI B46.1 UNLESS OTHERWISE SPECIFIED.

NOTES:

1. REMOVE BURRS AND SLIVERS. BREAK SHARP EDGES UNLESS OTHERWISE NOTED.
2. DIMENSIONS IN INCHES. UNLESS OTHERWISE SPECIFIED, TOLERANCE DECIMALS $\pm .016$.
3. FOR DESIGN FEATURE PURPOSES, THIS DRAWING TAKES PRECEDENCE OVER PROCUREMENT DOCUMENTS REFERENCED HEREIN.
4. REFERENCED DOCUMENTS SHALL BE OF THE ISSUE IN EFFECT ON THE DATE OF INVITATION FOR BID.
5. MARKING OF FITTINGS SHALL BE CONSISTANT WITH PROCUREMENT SPECIFICATION USING APPLICABLE NC STANDARD AND PART NUMBER DESIGNATIONS AS SHOWN ON THIS DRAWING.
6. ALL DIAMETRAL DIMENSIONS SHALL BE CONCENTRIC WITH "C" BORE WITHIN .005 T.I.R.
7. FITTINGS PROVIDED HEREIN SHALL BE WELDED TO CORRESPONDING TUBE SIZES USING AUTOMATIC WELDING EQUIPMENT (ASTRO-ARC CO. OR EQUIVALENT).
8. AFTER MACHINING, THE CODE L FITTINGS SHALL BE PICKLED IN ACCORDANCE WITH ASTM A380 CODE B AND THEN PASSIVATED IN ACCORDANCE WITH SAE-AMS-2700 METHOD 1 TYPE 6, EXCEPT THAT 20% TO 25% NITRIC ACID SOLUTION SHALL BE USED. A TEST FOR SURFACE PASSIVITY SHALL BE DONE IN ACCORDANCE WITH SAE-AMS-2700 TEST METHOD 102 - COPPER SULFATE TEST.

**EXAMPLE OF
PART NOS.**

KC151K4A-8 = SPUD, BUTTWELD TUBE, REDUCER-ADAPTER, FOR 1/4" X .035 WALL TUBING TO 1/2" TUBE SIZE, TYPE 316 SS.
KC151L6C-8 = SPUD, BUTTWELD TUBE, REDUCER-ADAPTER, FOR 3/8" X .058 WALL TUBING TO 1/2" TUBE SIZE, AL6XN.

CUSTODIAN:

JOHN F. KENNEDY SPACE CENTER

PROCUREMENT SPEC.

KSC-F-124

COORDINATION STATUS

KSC DE

SPUD, BUTTWELD TUBE
REDUCER - ADAPTER

STANDARD PART

KC 151

SHEET 1 OF 2

RSC FORM 32-85 (CG 4/92)

REVISID: ADDED CODE "L" MATERIAL AND NOTE 8 5-1-07

APPROVED: 3-1-90

NOTICE: WHEN GOVERNMENT DRAWINGS, SPECIFICATIONS OR OTHER DATA ARE USED FOR ANY PURPOSE OTHER THAN IN CONNECTION WITH A DEFINITELY RELATED GOVERNMENT PROCUREMENT OPERATION, THE UNITED STATES GOVERNMENT THEREBY INCURS NO RESPONSIBILITY NOR ANY OBLIGATION WHATSOEVER AND THE FACT THAT THE GOVERNMENT MAY HAVE FORMULATED, FURNISHED, OR IN ANY WAY SUPPLIED THE SAID DRAWINGS, SPECIFICATIONS, OR OTHER DATA IS NOT REGARDED BY IMPLICATION OR OTHERWISE AS IN ANY MANNER LICENSING THE HOLDER OR ANY OTHER PERSON OR CORPORATION, OR CONVEYING ANY RIGHTS OR PERMISSION TO MANUFACTURE, USE, OR SELL ANY PATENTED INVENTION THAT MAY IN ANY WAY BE RELATED THERETO.

GP425G AMEND 1

FED SUP CLASS
4730

NOTICE: WHEN GOVERNMENT DRAWINGS, SPECIFICATIONS OR OTHER DATA ARE USED FOR ANY PURPOSE OTHER THAN IN CONNECTION WITH A DEFINITELY RELATED GOVERNMENT PROCUREMENT OPERATION, THE UNITED STATES GOVERNMENT THEREBY INCURS NO RESPONSIBILITY NOR ANY OBLIGATION WHATSOEVER AND THE FACT THAT THE GOVERNMENT MAY HAVE FORMULATED, FURNISHED, OR IN ANY WAY SUPPLIED THE SAID DRAWINGS, SPECIFICATIONS, OR OTHER DATA IS NOT REGARDED BY IMPLICATION OR OTHERWISE AS IN ANY MANNER LICENSING THE HOLDER OR ANY OTHER PERSON OR CORPORATION, OR CONVEYING ANY RIGHTS OR PERMISSION TO MANUFACTURE, USE, OR SELL ANY PATENTED INVENTION THAT MAY IN ANY WAY BE RELATED THERE TO.

DASH NO.	TUBE SIZE REF	FITTING END TUBE SIZE	A ±.003 ±.000	B ±.005 ±.000	C ±.003 ±.000	D ±.005 ±.000	E ±.003 ±.000	F ±.004 ±.003	G ±.005 ±.003	H ±.000 ±.003	J ±.005 ±.003	K ±.005 ±.003	L ±.005 ±.003	M (REF) ±.005	N ±.005	P ±.000 ±.003	S ±.000 ±.015
316 STEEL																	
K4A-6	1/4"x.035	3/8	.285	.255	.172	.258	.297	.434	.441	.502	.385	.382	.245	1.012	.350	.297	.236
K4A-8	1/4"x.035	1/2	.285	.255	.172	.258	.297	.564	.589	.682	.385	.420	.280	1.085	.350	.393	.282
K4A-12	1/4"x.035	3/4	.285	.255	.172	.258	.297	.828	.880	.972	.385	.496	.300	1.181	.350	.611	.315
K6A-6	3/8"x.035	1/2	.410	.380	.297	.383	.428	.564	.589	.682	.385	.446	.280	1.111	.350	.393	.282
K6A-12	3/8"x.035	3/4	.410	.380	.297	.383	.428	.828	.880	.972	.385	.522	.300	1.207	.350	.611	.315
K6C-8	3/8"x.058	1/2	.410	.380	.251	.383	.428	.564	.589	.682	.385	.446	.280	1.111	.350	.393	.255
K6C-12	3/8"x.058	3/4	.410	.380	.251	.383	.428	.828	.880	.972	.385	.522	.300	1.207	.350	.611	.288
K8B-12	1/2"x.049	3/4	.546	.506	.393	.509	.554	.828	.880	.972	.385	.548	.300	1.233	.350	.611	.299
K8B-16	1/2"x.049	1	.546	.506	.393	.509	.554	1.083	1.130	1.222	.385	.621	.400	1.406	.350	.801	.417
K8E-12	1/2"x.072	3/4	.546	.506	.347	.509	.554	.828	.880	.972	.385	.548	.300	1.233	.350	.611	.272
K8E-16	1/2"x.072	1	.546	.506	.347	.509	.554	1.083	1.130	1.222	.385	.621	.400	1.412	.350	.801	.391
K12D-16	3/4"x.065	1	.816	.756	.611	.759	.804	1.083	1.130	1.222	.535	.456	.400	1.391	.500	.801	.399
K12D-20	3/4"x.065	1-1/4	.816	.756	.611	.759	.804	1.341	1.412	1.536	.535	.530	.400	1.465	.500	1.184	.362
K12D-24	3/4"x.065	1-1/2	.816	.756	.611	.759	.804	1.611	1.630	1.786	.535	.608	.475	1.618	.500	1.444	.440
K12G-16	3/4"x.109	1	.816	.756	.523	.759	.804	1.083	1.130	1.222	.535	.456	.400	1.391	.500	.801	.348
K12G-20	3/4"x.109	1-1/4	.816	.756	.523	.759	.804	1.341	1.412	1.536	.535	.530	.400	1.465	.500	1.184	.312
K12G-24	3/4"x.109	1-1/2	.816	.756	.523	.759	.804	1.611	1.630	1.786	.535	.608	.475	1.618	.500	1.444	.389
K16F-20	1"x.095	1-1/4	1.066	1.006	.801	1.009	1.054	1.341	1.412	1.536	.535	.458	.400	1.393	.500	1.184	.328
K16F-24	1"x.095	1-1/2	1.066	1.006	.801	1.009	1.054	1.611	1.630	1.786	.535	.536	.475	1.546	.500	1.444	.406
K16H-20	1"x.120	1-1/4	1.066	1.006	.751	1.009	1.054	1.341	1.412	1.536	.535	.458	.400	1.393	.500	1.184	.299
K16H-24	1"x.120	1-1/2	1.066	1.006	.751	1.009	1.054	1.611	1.630	1.786	.535	.536	.475	1.546	.500	1.444	.377
K20B-24	1-1/4"x.049	1-1/2	1.330	1.256	1.143	1.259	1.304	1.611	1.630	1.786	.535	.526	.475	1.536	.500	1.444	.459
K20J-24	1-1/4"x.134	1-1/2	1.330	1.256	.973	1.259	1.304	1.611	1.630	1.786	.535	.526	.475	1.536	.500	1.444	.361
K24B-32	1-1/2"x.049	2	1.605	1.511	1.398	1.514	1.559	2.161	2.195	2.411	.535	.611	.540	1.686	.500	1.856	.564
K24L-32	1-1/2"x.188	2	1.605	1.511	1.218	1.514	1.559	2.161	2.195	2.411	.535	.611	.540	1.686	.500	1.856	.404

CUSTODIAN:

JOHN F. KENNEDY SPACE CENTER

PROCUREMENT SPEC.

KSC-F-124

COORDINATION STATUS

KSC DC

SPUD, BUTTWELD TUBE
REDUCER - ADAPTER

STANDARD PART

KC151

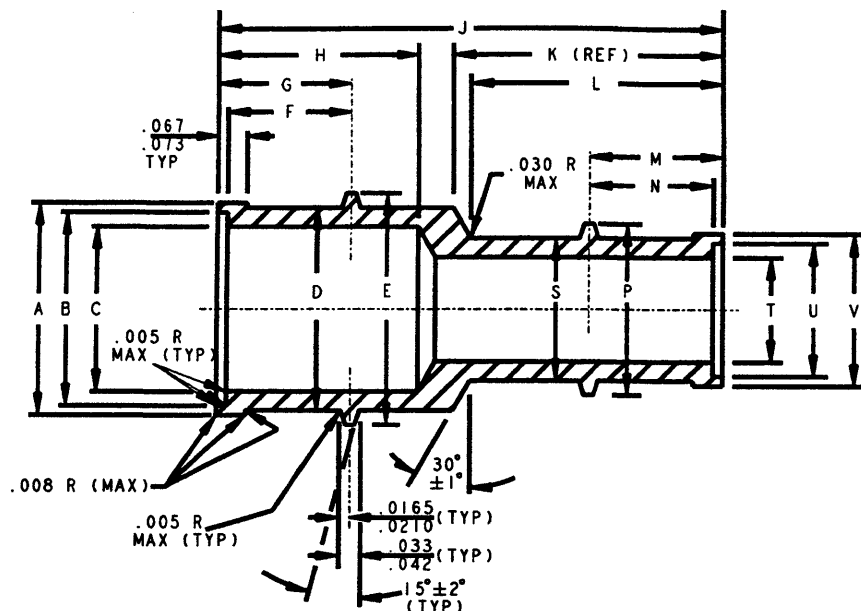
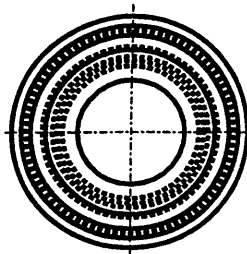
SHEET 2 OF 2

KSC FORM 32-85 (CG 4/92)

REVISED: ADDED CODE "L" MATERIAL DASH NO. 3-1-07

APPROVED: 3-1-90

GP425G AMEND 1

FED SUP CLASS
4730

SCHEDULE:

ADD "A" AFTER DASH NUMBER TO DENOTE .035" TUBE WALL.
 ADD "B" AFTER DASH NUMBER TO DENOTE .049" TUBE WALL.
 ADD "C" AFTER DASH NUMBER TO DENOTE .058" TUBE WALL.
 ADD "D" AFTER DASH NUMBER TO DENOTE .065" TUBE WALL.
 ADD "E" AFTER DASH NUMBER TO DENOTE .072" TUBE WALL.
 ADD "F" AFTER DASH NUMBER TO DENOTE .095" TUBE WALL.
 ADD "G" AFTER DASH NUMBER TO DENOTE .109" TUBE WALL.
 ADD "H" AFTER DASH NUMBER TO DENOTE .120" TUBE WALL.
 ADD "J" AFTER DASH NUMBER TO DENOTE .134" TUBE WALL.
 ADD "K" AFTER DASH NUMBER TO DENOTE .156" TUBE WALL.
 ADD "L" AFTER DASH NUMBER TO DENOTE .188" TUBE WALL.

MATERIAL:

SEE PROCUREMENT SPECIFICATION.
 CORROSION RESISTANT STEEL (CLASS 316), CODE "K"
 CORROSION RESISTANT STEEL (AL6XN), CODE "L" PER ASTM -B691

FINISH:

SURFACE SHALL BE 125 RMS MAXIMUM PER ANSI B46.1 UNLESS OTHERWISE SPECIFIED.

NOTES:

1. REMOVE BURRS AND SLIVERS. BREAK SHARP EDGES UNLESS OTHERWISE NOTED.
2. DIMENSIONS IN INCHES. UNLESS OTHERWISE SPECIFIED, TOLERANCE DECIMALS $\pm .016$.
3. FOR DESIGN FEATURE PURPOSES, THIS DRAWING TAKES PRECEDENCE OVER PROCUREMENT DOCUMENTS REFERENCED HEREIN.
4. REFERENCED DOCUMENTS SHALL BE OF THE ISSUE IN EFFECT ON THE DATE OF INVITATION FOR BID.
5. MARKING OF FITTINGS SHALL BE CONSISTANT WITH PROCUREMENT SPECIFICATION USING APPLICABLE KC STANDARD AND PART NUMBER DESIGNATIONS AS SHOWN ON THIS DRAWING.
6. ALL DIAMETRAL DIMENSIONS SHALL BE CONCENTRIC WITH "C" BORE WITHIN .005 T.I.R.
7. FITTINGS PROVIDED HEREIN SHALL BE WELDED TO CORRESPONDING TUBE SIZES USING AUTOMATIC WELDING EQUIPMENT (ASTRO-ARC CO. OR EQUIVALENT).
8. AFTER MACHINING, THE CODE L FITTINGS SHALL BE PICKLED IN ACCORDANCE WITH ASTM A380 CODE B AND THEN PASSIVATED IN ACCORDANCE WITH SAE-AMS-2700 METHOD 1 TYPE 6, EXCEPT THAT 20% TO 25% NITRIC ACID SOLUTION SHALL BE USED. A TEST FOR SURFACE PASSIVITY SHALL BE DONE IN ACCORDANCE WITH SAE-AMS-2700 TEST METHOD 102 - COPPER SULFATE TEST.

EXAMPLE OF
PART NOS.

KC152K8B-4A = UNION, BUTTWELD REDUCER, 1/2" X .049 WALL TUBE TO 1/4" X .035 WALL TUBE, TYPE 316 SS.
 KC152L6C-4A = UNION, BUTTWELD REDUCER, 3/8" X .058 WALL TUBE TO 1/4" X .035 WALL TUBE, AL6XN.

CUSTODIAN:

JOHN F. KENNEDY SPACE CENTER

PROCUREMENT SPEC.

KSC-F-124

COORDINATION STATUS

KSC DE

UNION, BUTTWELD REDUCER

STANDARD PART

KC152

SHEET 1 OF 3

KSC FORM 32-85 (CG 4792)

REVISED: ADDED CODE "L" MATERIAL AND NOTE 8 5-1-07

APPROVED: 5-1-90

NOTICE: WHEN GOVERNMENT DRAWINGS, SPECIFICATIONS OR OTHER DATA ARE USED FOR ANY PURPOSE OTHER THAN IN CONNECTION WITH A DEFINITELY RELATED GOVERNMENT PROCUREMENT OPERATION, THE UNITED STATES GOVERNMENT THEREBY INCURS NO RESPONSIBILITY NOR ANY OBLIGATION WHATSOEVER AND THE FACT THAT THE GOVERNMENT MAY HAVE FORMULATED, FURNISHED, OR IN ANY WAY SUPPLIED THE SAID DRAWINGS, SPECIFICATIONS, OR OTHER DATA IS NOT REGARDED BY IMPLICATION OR OTHERWISE AS IN ANY MANNER LICENSING THE HOLDER OR ANY OTHER PERSON OR CORPORATION, OR CONVEYING ANY RIGHTS OR PERMISSION TO MANUFACTURE, USE, OR SELL ANY PATENTED INVENTION THAT MAY IN ANY WAY BE RELATED THERETO.

GP425G AMEND 1

FED SUP CLASS
4730

NOTICE: WHEN GOVERNMENT DRAWINGS, SPECIFICATIONS OR OTHER DATA ARE USED FOR ANY PURPOSE OTHER THAN IN CONNECTION WITH A DEFINITELY RELATED GOVERNMENT PROCUREMENT OPERATION, THE UNITED STATES GOVERNMENT THEREBY INCURS NO RESPONSIBILITY FOR ANY OBLIGATION WHATSOEVER AND THE FACT THAT THE GOVERNMENT MAY HAVE FORMULATED, FURNISHED, OR IN ANY WAY SUPPLIED THE SAID DRAWINGS, SPECIFICATIONS, OR OTHER DATA IS NOT REGARDED BY IMPLICATION OR OTHERWISE AS IN ANY MANNER LICENSING THE HOLDER OR ANY OTHER PERSON OR CORPORATION, OR CONVEYING ANY RIGHTS OR PERMISSION TO MANUFACTURE, USE, OR SELL ANY PATENTED INVENTION THAT MAY IN ANY WAY BE RELATED THERETO.

CUSTODIAN:

JOHN F. KENNEDY SPACE CENTER

PROCUREMENT SPEC.
KSC-F-124

COORDINATION STATUS

UNION, BUTTWELD REDUCER

STANDARD PART

KC152

SHEET 2 OF 3

KSC DE

KSC FORM 32-85 (CG 4/92)

DASH NO.	TUBE SIZE LARGE END	TUBE SIZE SMALL END	A	B	C	D	E	F	G	H	J	K (REF)	L	M	N	P	S	T	U	V
316 STEEL	AL6XN		±.003	±.005 ±.000	±.003	±.005 ±.000	±.003	±.005 ±.000	±.005	±.005	±.005	(REF)	±.005	±.005	±.005	±.003	±.005 ±.000	±.003	±.005 ±.000	±.003
K6A-4A	3/8"x.035	1/4"x.035	.410	.380	.297	.383	.428	.350	.385	.536	1.285	.692	.656	.385	.350	.297	.258	.172	.255	.285
K6C-4A	3/8"x.058	1/4"x.035	.410	.380	.251	.383	.428	.350	.385	.549	1.285	.692	.656	.385	.350	.297	.258	.172	.255	.285
K8B-4A	1/2"x.049	1/4"x.035	.546	.506	.393	.509	.554	.350	.385	.595	1.384	.719	.656	.385	.350	.297	.258	.172	.255	.285
K8B-6A	3/8"x.049	3/8"x.035	.546	.506	.393	.509	.554	.350	.385	.606	1.409	.754	.718	.385	.350	.297	.258	.172	.255	.285
K8E-4A	1/2"x.072	1/4"x.035	.546	.506	.347	.509	.554	.350	.385	.614	1.383	.728	.656	.385	.350	.297	.258	.172	.255	.285
K8E-6C	1/2"x.072	3/8"x.058	.546	.506	.347	.509	.554	.350	.385	.574	1.409	.754	.718	.385	.350	.297	.258	.172	.255	.285
K12D-4A	3/4"x.065	1/4"x.035	.816	.756	.611	.759	.804	.500	.535	.803	1.669	.801	.656	.385	.350	.297	.258	.172	.255	.285
K12D-6A	3/4"x.065	3/8"x.035	.816	.756	.611	.759	.804	.500	.535	.803	1.695	.827	.718	.385	.350	.297	.258	.172	.255	.285
K12D-8B	3/4"x.065	1/2"x.049	.816	.756	.611	.759	.804	.500	.535	.794	1.720	.852	.780	.385	.350	.297	.258	.172	.255	.285
K12G-4A	3/4"x.109	1/4"x.035	.816	.756	.523	.759	.804	.500	.535	.817	1.669	.801	.756	.385	.350	.297	.258	.172	.255	.285
K12G-6C	3/4"x.109	3/8"x.058	.816	.756	.523	.759	.804	.500	.535	.777	1.695	.827	.718	.385	.350	.297	.258	.172	.255	.285
K12G-8E	3/4"x.109	1/2"x.072	.816	.756	.523	.759	.804	.500	.535	.795	1.720	.852	.780	.385	.350	.297	.258	.172	.255	.285
K16F-4A	1"x.095	1/4"x.035	1.066	1.006	.801	1.009	1.054	.500	.535	.794	1.741	.873	.656	.385	.350	.297	.258	.172	.255	.285
K16F-6A	1"x.095	3/8"x.035	1.066	1.006	.801	1.009	1.054	.500	.535	.820	1.767	.899	.718	.385	.350	.297	.258	.172	.255	.285
K16F-8B	1"x.095	1/2"x.049	1.066	1.006	.801	1.009	1.054	.500	.535	.785	1.792	.924	.780	.385	.350	.297	.258	.172	.255	.285
K16F-12D	1"x.095	3/4"x.065	1.066	1.006	.801	1.009	1.054	.500	.535	.802	1.808	.940	.868	.535	.500	.297	.258	.172	.255	.285
K16H-4A	1"x.120	1/4"x.035	1.066	1.006	.751	1.009	1.054	.500	.535	.787	1.741	.873	.656	.385	.350	.297	.258	.172	.255	.285
K16H-8E	1"x.120	1/2"x.072	1.066	1.006	.751	1.009	1.054	.500	.535	.765	1.792	.924	.780	.385	.350	.297	.258	.172	.255	.285
K16H-12G	1"x.120	3/4"x.109	1.066	1.006	.751	1.009	1.054	.500	.535	.743	1.808	.940	.868	.535	.500	.297	.258	.172	.255	.285
K20B-4A	1-1/4"x.049	1/4"x.035	1.330	1.256	1.143	1.259	1.304	.500	.535	.869	1.875	.945	.656	.385	.350	.297	.258	.172	.255	.285
K20B-12D	1-1/4"x.049	3/4"x.065	1.330	1.256	1.143	1.259	1.304	.500	.535	.851	1.942	1.012	.868	.535	.500	.297	.258	.172	.255	.285
K20B-16F	1-1/4"x.049	1"x.095	1.330	1.256	1.143	1.259	1.304	.500	.535	.834	1.870	.940	.868	.535	.500	.297	.258	.172	.255	.285
K20J-4A	1-1/4"x.134	1/4"x.035	1.330	1.256	.973	1.259	1.304	.500	.535	.845	1.875	.945	.656	.385	.350	.297	.258	.172	.255	.285
K20J-8E	1-1/4"x.134	1/2"x.072	1.330	1.256	.973	1.259	1.304	.500	.535	.823	1.720	.852	.780	.385	.350	.297	.258	.172	.255	.285
K20J-12G	1-1/4"x.134	3/4"x.109	1.330	1.256	.973	1.259	1.304	.500	.535	.801	1.942	1.012	.868	.535	.500	.297	.258	.172	.255	.285

REVISED: ADDED CODE "L" MATERIAL DASH NO. 5-1-07

APPROVED: 5-1-99

STANDARD PART

KC152

SHEET 2 OF 3

KSC FORM 32-85 (CG 4/92)

GP425G AMEND 1

FED SUP CLASS
4730

NOTICE: WHEN GOVERNMENT DRAWINGS, SPECIFICATIONS OR OTHER DATA ARE USED FOR ANY PURPOSE OTHER THAN IN CONNECTION WITH A DEFINITELY RELATED GOVERNMENT PROCUREMENT OPERATION, THE UNITED STATES GOVERNMENT THEREBY INCURS NO RESPONSIBILITY FOR ANY OBLIGATION WHATSOEVER AND THE FACT THAT THE GOVERNMENT MAY HAVE FORMULATED, FURNISHED, OR IN ANY WAY SUPPLIED THE SAID DRAWINGS, SPECIFICATIONS, OR OTHER DATA IS NOT REGARDED BY IMPLICATION OR OTHERWISE AS IN ANY MANNER LICENSING THE HOLDER OR ANY OTHER PERSON OR CORPORATION, OR CONVEYING ANY RIGHTS OR PERMISSION TO MANUFACTURE, USE, OR SELL ANY PATENTED INVENTION THAT MAY IN ANY WAY BE RELATED THERETO.

DASH NO.	TUBE SIZE LARGE END	TUBE SIZE SMALL END	A	B	C	D	E	F	G	H	J	K (REF)	L	M	N	P	S	T	U	V
316 STEEL			±.003	±.005 ±.003	±.003	±.005 ±.003	±.003	±.005 ±.003	±.005 ±.003	±.005 ±.003	±.005 ±.003	(REF)	±.005	±.005 ±.003	±.005 ±.003	±.003	±.005 ±.003	±.003	±.005 ±.003	±.003
K20J-16H	1-1/4"x.134	1"x.120	1.330	1.256	.973	1.259	1.304	.500	.535	.795	1.285	.692	.656	.385	.350	.297	.258	.172	.255	.285
K24B-4A	1-1/2"x.049	1/4"x.035	1.605	1.511	1.398	1.514	1.559	.500	.535	.873	1.285	.692	.656	.385	.350	.297	.258	.172	.255	.285
K24B-12D	1-1/2"x.049	3/4"x.065	1.605	1.511	1.398	1.514	1.559	.500	.535	.854	1.808	.940	.868	.535	.500	.804	.759	.611	.756	.816
K24B-16F	1-1/2"x.049	1"x.095	1.605	1.511	1.398	1.514	1.559	.500	.535	.837	1.870	.940	.868	.535	.500	1.054	1.009	.801	1.006	1.066
K24B-20B	1-1/2"x.049	1-1/4"x.049	1.605	1.511	1.398	1.514	1.559	.500	.535	.864	1.934	1.004	.930	.535	.500	1.304	1.259	1.143	1.256	.930
K24L-4A	1-1/2"x.188	1/4"x.035	1.605	1.511	1.110	1.514	1.559	.500	.535	.833	1.886	.956	.593	.385	.350	.297	.258	.172	.255	.285
K24L-16H	1-1/2"x.188	1"x.120	1.605	1.511	1.110	1.514	1.559	.500	.535	.810	1.944	1.014	.868	.535	.500	1.054	1.009	.751	1.006	1.066
K24L-20J	1-1/2"x.188	1-1/4"x.134	1.605	1.511	1.110	1.514	1.559	.500	.535	.822	1.934	1.004	.930	.535	.500	1.304	1.259	.973	1.256	1.330
K32D-4A	2"x.065	1/4"x.035	2.105	2.011	1.856	2.014	2.059	.500	.535	.868	2.093	1.163	.656	.385	.350	.297	.258	.172	.255	.285
K32D-20B	2"x.065	1-1/4"x.049	2.105	2.011	1.856	2.014	2.059	.500	.535	.859	2.078	1.148	.930	.535	.500	1.304	1.259	1.143	1.256	1.330
K32D-24B	2"x.065	1-1/2"x.049	2.105	2.011	1.856	2.014	2.059	.500	.535	.870	2.004	1.074	.930	.535	.500	1.559	1.514	1.398	1.511	1.605
K32L-4A	2"x.188	1/4"x.035	2.105	2.011	1.612	2.014	2.059	.500	.535	.832	1.285	.692	.656	.385	.350	.297	.258	.172	.255	.285
K32L-20J	2"x.188	1-1/4"x.134	2.105	2.011	1.612	2.014	2.059	.500	.535	.774	2.078	1.148	.930	.535	.500	1.304	1.259	.973	1.256	1.330
K32L-24L	2"x.188	1-1/2"x.188	2.105	2.011	1.612	2.014	2.059	.500	.535	.739	2.004	1.074	.930	.535	.500	1.559	1.514	1.110	1.511	1.605

CUSTODIAN:

JOHN F. KENNEDY SPACE CENTER

PROCUREMENT SPEC.
KSC-F-124

COORDINATION STATUS

UNION, BUTTWELD REDUCER

KSC DC

STANDARD PART

KC152

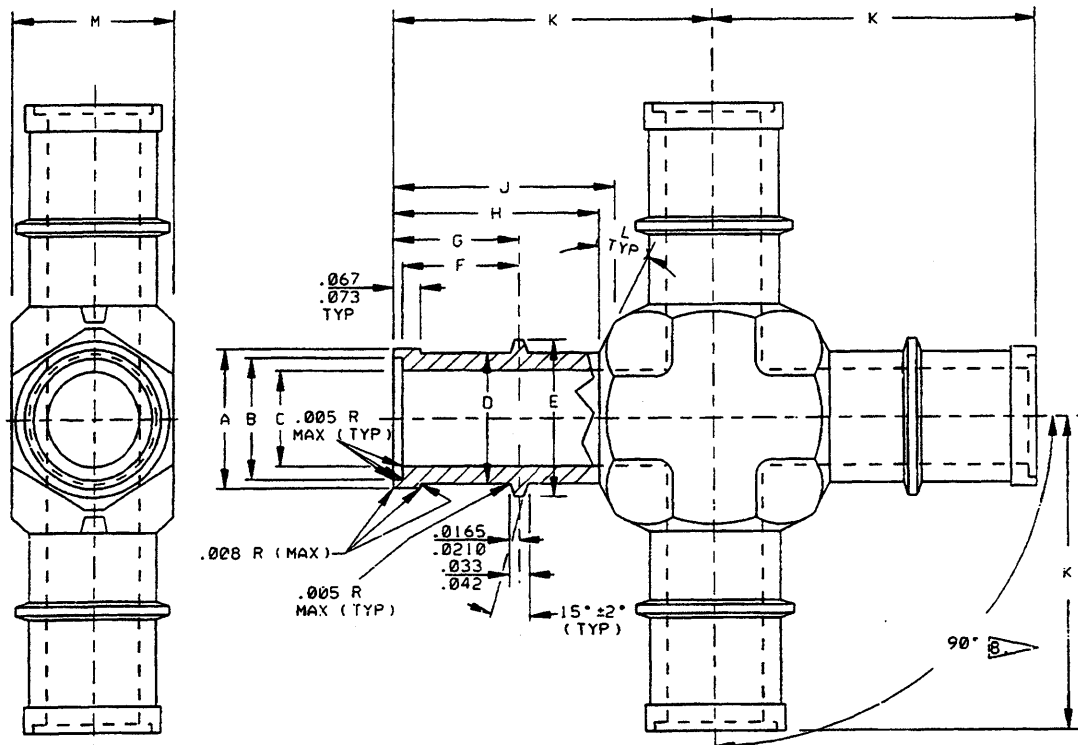
SHEET 3 OF 3

KSC FORM 32-65 (CG 4/92)

GP-425

FED SUP CLASS
4730

NOTICE: WHEN GOVERNMENT DRAWINGS, SPECIFICATIONS OR OTHER DATA ARE USED FOR ANY PURPOSE OTHER THAN IN CONNECTION WITH A DEFINITELY RELATED GOVERNMENT PROCUREMENT OPERATION, THE UNITED STATES GOVERNMENT THEREBY INCURS NO RESPONSIBILITY NOR ANY OBLIGATION WHATSOEVER AND THE FACT THAT THE GOVERNMENT MAY HAVE FORMULATED, FURNISHED, OR IN ANY WAY SUPPLIED THE SAID DRAWINGS, SPECIFICATIONS OR OTHER DATA IS NOT REGARDED BY IMPLICATION OR OTHERWISE AS IN ANY MANNER LICENSING THE HOLDER OR ANY OTHER PERSON OR CORPORATION, OR CONVEYING ANY RIGHTS OR PERMISSION TO MANUFACTURE, USE, OR SELL ANY PATENTED INVENTION THAT MAY IN ANY WAY BE RELATED THERE TO.



REVISED: ○

APPROVED: 5-1-90

CUSTODIAN:

JOHN F. KENNEDY SPACE CENTER

PROCUREMENT SPEC.

KSC-F-124

COORDINATION STATUS

KSC DE

CROSS, BUTTWELD TUBE

STANDARD PART

KC153

SHEET 1 OF 3

KSC FORM 32-85 (CG 4/92)

GP-425

FED SUP CLASS
4730

SCHEDULE: ADD "A" AFTER DASH NUMBER TO DENOTE .035" TUBE WALL.
 ADD "B" AFTER DASH NUMBER TO DENOTE .049" TUBE WALL.
 ADD "C" AFTER DASH NUMBER TO DENOTE .058" TUBE WALL.
 ADD "D" AFTER DASH NUMBER TO DENOTE .065" TUBE WALL.
 ADD "E" AFTER DASH NUMBER TO DENOTE .072" TUBE WALL.
 ADD "F" AFTER DASH NUMBER TO DENOTE .095" TUBE WALL.
 ADD "G" AFTER DASH NUMBER TO DENOTE .109" TUBE WALL.
 ADD "H" AFTER DASH NUMBER TO DENOTE .120" TUBE WALL.
 ADD "J" AFTER DASH NUMBER TO DENOTE .134" TUBE WALL.
 ADD "K" AFTER DASH NUMBER TO DENOTE .156" TUBE WALL.
 ADD "L" AFTER DASH NUMBER TO DENOTE .188" TUBE WALL.

MATERIAL: SEE PROCUREMENT SPECIFICATION.
 CORROSION RESISTANT STEEL (CLASS 316), CODE "K"

FINISH: SURFACE SHALL BE 125 RMS MAXIMUM PER ANSI B46.1 UNLESS OTHERWISE SPECIFIED.

- NOTES:
1. REMOVE BURRS AND SLIVERS. BREAK SHARP EDGES UNLESS OTHERWISE NOTED.
 2. DIMENSIONS IN INCHES. UNLESS OTHERWISE SPECIFIED, TOLERANCE DECIMALS $\pm .016$.
 3. FOR DESIGN FEATURE PURPOSES, THIS DRAWING TAKES PRECEDENCE OVER PROCUREMENT DOCUMENTS REFERENCED HEREIN.
 4. REFERENCED DOCUMENTS SHALL BE OF THE ISSUE IN EFFECT ON THE DATE OF INVITATION FOR BID.
 5. MARKING OF FITTINGS SHALL BE CONSISTANT WITH PROCUREMENT SPECIFICATION USING APPLICABLE KC STANDARD AND PART NUMBER DESIGNATIONS AS SHOWN ON THIS DRAWING.
 6. ALL DIAMETRAL DIMENSIONS SHALL BE CONCENTRIC WITH "C" BORE WITHIN .005 T.I.R.
 7. FITTINGS PROVIDED HEREIN SHALL BE WELDED TO CORRESPONDING TUBE SIZES USING AUTOMATIC WELDING EQUIPMENT (ASTRO-ARC CO. OR EQUIVALENT).



FOR TUBE SIZES UP TO AND INCLUDING .375" OD, TOLERANCE IS $\pm 1/2$ ". FOR ALL OTHERS, TOLERANCE IS $\pm 1/2$ ".

EXAMPLE OF
PART NOS. KC153K4A = CROSS, BUTTWELD TUBE, FOR 1/4" X .035 WALL TUBING.

DASH NO.	TUBE SIZE REF	A $\pm .003$	B $\pm .005$ $-.000$	C $\pm .003$	D $\pm .005$ $-.000$	E $\pm .003$	F $\pm .005$	G $\pm .005$	H $\pm .015$ $-.005$	J (REF)	K $\pm .016$	L (REF)	M (REF)	R $\pm .005$
K4A	1/4" X .035	.285	.255	.172	.258	.297	.350	.385	.656	.680	.920	15	.438	.030
K6A	3/8" X .035	.410	.380	.297	.383	.428	.350	.385	.718	.742	1.110	15	.563	.030
K6C	3/8" X .058	.410	.380	.251	.383	.428	.350	.385	.718	.742	1.110	15	.563	.030
K8B	1/2" X .049	.546	.506	.393	.509	.554	.350	.385	.780	.812	1.280	15	.750	.030
K8E	1/2" X .072	.546	.506	.347	.509	.554	.350	.385	.780	.812	1.280	15	.750	.030
K12D	3/4" X .065	.816	.756	.611	.759	.804	.500	.535	.868	.909	1.640	15	1.063	.030
K12G	3/4" X .109	.816	.756	.523	.759	.804	.500	.535	.868	.909	1.640	15	1.063	.030
K16F	1" X .095	1.066	1.006	.801	1.009	1.054	.500	.535	.868	.909	1.810	15	1.313	.030
K16H	1" X .120	1.066	1.006	.751	1.009	1.054	.500	.535	.868	.909	1.810	15	1.313	.030
K20B	1 1/4" X .049	1.330	1.256	1.143	1.259	1.304	.500	.535	.930	1.036	2.090	30	1.625	.060
K20J	1 1/4" X .134	1.330	1.256	.973	1.259	1.304	.500	.535	.930	1.036	2.090	30	1.625	.060
K24B	1 1/2" X .049	1.605	1.511	1.398	1.514	1.559	.500	.535	.930	1.034	2.280	30	1.875	.060
K24J	1 1/2" X .134	1.605	1.511	1.218	1.514	1.559	.500	.535	.930	1.034	2.280	30	1.875	.060
K24K	1 1/2" X .156	1.605	1.511	1.174	1.514	1.559	.500	.535	.930	1.034	2.280	30	1.875	.060
K24L	1 1/2" X .188	1.605	1.511	1.120	1.514	1.559	.500	.535	.930	1.034	2.280	30	1.875	.060
K32D	2" X .065	2.105	2.011	1.866	2.014	2.059	.500	.535	1.055	1.298	3.060	45	2.500	.375
K32L	2" X .188	2.105	2.011	1.620	2.014	2.059	.500	.535	1.055	1.298	3.060	45	2.500	.375

CUSTODIAN:

JOHN F. KENNEDY SPACE CENTER

PROCUREMENT SPEC.

KSC-F-124

COORDINATION STATUS

KSC DE

CROSS, BUTTWELD TUBE

STANDARD PART

KC153

SHEET 2 OF 3

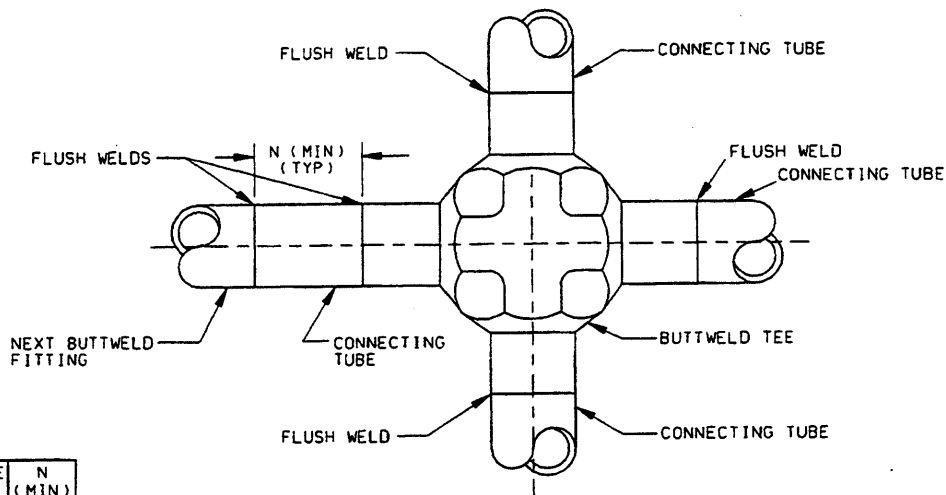
KSC FORM 32-85 (CG 4/92)

NOTICE: WHEN GOVERNMENT DRAWINGS, SPECIFICATIONS OR OTHER DATA ARE USED FOR ANY PURPOSE OTHER THAN IN CONNECTION WITH A DEFINITELY RELATED GOVERNMENT PROCUREMENT OPERATION, THE UNITED STATES GOVERNMENT THEREBY INCURS NO RESPONSIBILITY NOR ANY OBLIGATION WHATSOEVER AND THE FACT THAT THE GOVERNMENT MAY HAVE FORMULATED, FURNISHED, OR IN ANY WAY SUPPLIED THE SAID DRAWINGS, SPECIFICATIONS, OR OTHER DATA IS NOT REGARDED BY IMPLICATION OR OTHERWISE AS IN ANY MANNER LICENSING THE HOLDER OR ANY OTHER PERSON OR CORPORATION, OR CONVEYING ANY RIGHTS OR PERMISSION TO MANUFACTURE, USE, OR SELL ANY PATENTED INVENTION THAT MAY IN ANY WAY BE RELATED THERETO.

REVISED: ○

APPROVED: 5-1-90

NASA

FED SUP CLASS
4730

TUBE SIZE REF	N (MIN)
1/4"	1.44
3/8"	1.44
1/2"	1.44
3/4"	1.44
1"	1.44
1 1/4"	1.63
1 1/2"	1.63
2" X .065	1.75
2" X .188	4.25

BUTTWELD CROSS APPLICATION DATA

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CUSTODIAN:

JOHN F. KENNEDY SPACE CENTER

PROCUREMENT SPEC.
KSC-F-124

COORDINATION STATUS

KSC DE

CROSS, BUTTWELD TUBE

STANDARD PART

KC153

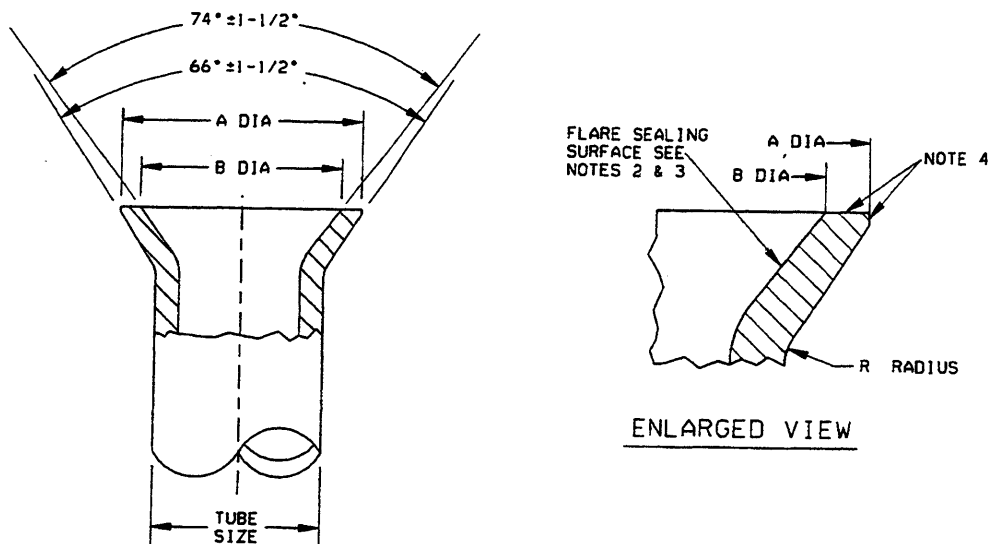
SHEET 3 OF 3

REVISED: ○

APPROVED: 5-1-90

KSC FORM 32-85 (CG 4/92)

GP-425

FED SUP CLASS
NONE

TUBE OD REF	A DIA	B DIA MIN	R TOL.	R RAD
1/8	.200	.140		
3/16	.302	.245		
1/4	.359	.300		.032
5/16	.421	.320		
3/8	.484	.440	±.015	.046
1/2	.656	.555		.062
5/8	.781	.665		
3/4	.937	.800		.078
1	1.187	1.080		.093
1 1/4	1.500	1.400		
1 1/2	1.721	1.600	+ .020 - .010	
1 3/4	2.106	1.850		.109
2	2.356	2.100		

- NOTES:
- THIS DESIGN STANDARD ESTABLISHES DIMENSIONS GOVERNING THE FORMING OF TUBE FLARES THAT ARE TO BE USED WITH STANDARD FLARED TUBE FITTINGS WITH SEAL RINGS.
 - THE MINIMUM FLARE SEALING SURFACE AS DEFINED BY DIAMETER B AND 74° ± 1-1/2° CONE SHALL BE CONCENTRIC WITH THE OUTSIDE DIAMETER OF THE TUBE WITHIN .007 FULL INDICATOR READING.
 - THE FLARE SEALING SURFACE SHALL NOT EXHIBIT CONCAVE AREAS EXCEEDING .001 OR CONVEX AREAS EXCEEDING .002. SURFACE ROUGHNESS SHALL NOT EXCEED 63/ IN ACCORDANCE WITH ANSI B46.1.
 - DEBURR EDGES OF TUBING BEFORE FLARING; RADIUS OR CHAMFER EDGE OF ID .010 MAX AND EDGE OF OD 20% TO 50% OF TUBING WALL THICKNESS. EDGES TO BE FREE OF CHATTER MARKS.
 - DIMENSIONS ARE IN INCHES.

REVISED: ① REV NOTE 2, 4-10-91

APPROVED: 8-12-65

CUSTODIAN:

JOHN F. KENNEDY SPACE CENTER

PROCUREMENT SPEC.

NONE

COORDINATION STATUS

KSC DE

TUBING, FLARED STANDARD DIMENSIONS FOR

DESIGN STANDARD

KC154

SHEET 1 OF 1

KSC FORM 32-85 (CG 4/92)

GP-425

NOTICE: WHEN GOVERNMENT DRAWINGS, SPECIFICATIONS OR OTHER DATA ARE USED FOR ANY PURPOSE OTHER THAN IN CONNECTION WITH A DEFINITELY RELATED GOVERNMENT PROCUREMENT OPERATION, THE UNITED STATES GOVERNMENT THEREBY INCURS NO RESPONSIBILITY NOR ANY OBLIGATION WHATSOEVER AND THE FACT THAT THE GOVERNMENT MAY HAVE FORMULATED, FURNISHED, OR IN ANY WAY SUPPLIED THE SAID DRAWINGS, SPECIFICATIONS, OR OTHER DATA IS NOT REGARDED BY IMPLICATION OR OTHERWISE AS IN ANY MANNER LICENSING THE HOLDER OR ANY OTHER PERSON OR CORPORATION, OR CONVEYING ANY RIGHTS OR PERMISSION TO MANUFACTURE, USE, OR SELL ANY PATENTED INVENTION THAT MAY IN ANY WAY BE RELATED THERETO.

		NASA	
		FED SUP CLASS 4730	
J (STUD, 2 REQ'D) CLEARANCE RADIUS G C B D A E 2 PC. - 2 BOLT VIEW A		J (STUD, 4 REQ'D) G C B D A E 2 PC. - 4 BOLT VIEW B	
CUSTODIAN: JOHN F. KENNEDY SPACE CENTER		APPROVED: 9-19-67 REVISED: (F) CHANGED APPROVED VENDOR ON SHEET 2. 10-2-92	
PROCUREMENT SPEC. NONE	CLAMP ASSEMBLY	STANDARD PART KC155	
COORDINATION STATUS KSC DE		SHEET 1 OF 3	

KSC FORM 32-85 (CG 4/92)

GP-425

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FED SUP CLASS
4730

- MATERIAL CODE:** CLAMP HALVES SHALL BE IN ACCORDANCE WITH MATERIAL CODES SHOWN ON SHEET 3.
- STUD MATERIAL FOR CARBON STEEL CLAMPS SHALL BE SA-193-B7.
STUD MATERIAL FOR STAINLESS STEEL CLAMPS SHALL BE SA-193-B8 FOR MATERIAL CODE C. MATERIAL CODE D SHALL HAVE STUD MATERIAL IN COMPLIANCE WITH THE DIMENSIONAL AND TOLERANCE SPECIFICATIONS OF SA-193 AND MATERIAL SPECIFICATION PER SB-574 ALLOY N10276.
- NUT MATERIAL FOR CARBON STEEL CLAMPS SHALL BE SA-194-GR2 OR 2H.
NUT MATERIAL FOR STAINLESS STEEL CLAMPS SHALL BE SA-194-GR8.
- TEMPERATURE RANGE:** SEE MATERIAL SPECIFICATION.
- NOTES:**
- ALL MATERIALS ARE PER ASTM SPECIFICATIONS
 - ALL DIMENSIONS ARE IN INCHES.
 - TOLERANCE: SEE KC161.
 - FOR DESIGN FEATURE PURPOSES, THIS DRAWING TAKES PRECEDENCE OVER PROCUREMENT DOCUMENTS REFERENCED HEREIN.
 - REFERENCED DOCUMENTS SHALL BE OF THE ISSUE IN EFFECT ON THE DATE OF INVITATION FOR BID.
 - PASSIVATE STAINLESS STEEL CLAMPS PER QQ-P-35 TYPE VI OR VII.
 - HUB SIZES 1/2GR4/5, 3/4GR4/5, AND 1GR11 ARE NOT TO BE USED FOR NEW DESIGN.
 - MATERIAL CODES B AND C FOR 5" CLAMP SIZE ARE SA351-CF8 (4 BOLT) (#48003).
 - SA-182-F316 CLAMPS ARE NON-STOCK SPECIAL ORDER ITEMS AND SHALL NOT BE USED FOR NEW DESIGN.
 - 1-1/2" CLAMP SIZE (-2) IS NOT INTERCHANGEABLE WITH 1" CLAMP SIZE (-8).
 - MATERIAL CODE B FOR 1" CLAMP SIZE IS SA-351-CA15. MATERIAL CODE C FOR 1" CLAMP SIZE IS SA-351-CF8M.
 - MATERIAL CODE C HAS STUDS PER SA-193-B8 AND SHOULD ONLY BE USED IN ENVIRONMENTS NOT SUBJECT TO EXTREME CORROSION.
 - MATERIAL CODE D HAS STUDS PER SB-574 ALLOY N10276 AND SHOULD ONLY BE USED IN ENVIRONMENTS SUBJECT TO EXTREME ACIDIC CORROSION.
 - A CLAMP ASSEMBLY SHALL CONSIST OF 2 CLAMP HALVES, 4 STUDS, AND 8 NUTS. EXCEPT 2PC. 2 BOLT CLAMP ASSEMBLIES SHALL HAVE 2 STUDS AND 4 NUTS.
 - DO NOT USE THIS STANDARD FOR ITEMS WHICH CANNOT BE IDENTIFIED BY THE LIMITATIONS CONTAINED HEREIN.
 - ALL PARTS NOT MANUFACTURED BY GRAY TOOL CO. MUST BE CERTIFIED BY THE MANUFACTURER TO BE INTERCHANGEABLE WITH THE GRAY TOOL PART NUMBER.

EXAMPLE OF
PART NOS.

BASIC PART NUMBER KC155-3A

└─ MATERIAL CODE
└─ DASH NUMBER

APPROVED SOURCE: COMMERCIAL PARTS CAN BE PURCHASED FROM: VETCO-GRAY INC. 10777 NW FWY
PO BOX 2291 HOUSTON, TX 77252-2291.

ALTERNATE SOURCES: OTECO EQUIPMENT COMPANY REFLANGE, INC.
2811 TROUT STREET
P.O. BOX 1849 5730 CENTRALCREST
HOUSTON, TX 77251-1849 HOUSTON, TX 77092

CUSTODIAN: JOHN F. KENNEDY SPACE CENTER			
PROCUREMENT SPEC. NONE	CLAMP ASSEMBLY	STANDARD PART	
COORDINATION STATUS KSC DE		KC155	
		SHEET 2 OF 3	

KSC FORM 32-85 (CG 4/92)

REVISED: (F) CHANGED APPROVED SOURCE: 10-2-92

APPROVED: 9-19-67



NOTICE: WHEN GOVERNMENT DRAWINGS, SPECIFICATIONS OR OTHER DATA ARE USED FOR ANY PURPOSE OTHER THAN IN CONNECTION WITH A DEFINITELY RELATED GOVERNMENT PROCUREMENT OPERATION, THE UNITED STATES GOVERNMENT THEREBY INCURS NO RESPONSIBILITY NOR ANY OBLIGATION WHATSOEVER AND THE FACT THAT THE GOVERNMENT MAY HAVE FORMULATED, FURNISHED, OR IN ANY WAY SUPPLIED THE SAID DRAWINGS, SPECIFICATIONS, OR OTHER DATA IS NOT REGARDED BY IMPLICATION OR OTHERWISE AS IN ANY MANNER LICENSING THE HOLDER OR ANY OTHER PERSON OR CORPORATION, OR CONVEYING ANY RIGHTS OR PERMISSION TO MANUFACTURE, USE, OR SELL ANY PATENTED INVENTION THAT MAY IN ANY WAY BE RELATED THERETO.

DASH NO.		HUB SIZE	CLAMP SIZE	DIMENSIONS											GRAYLOC			
				A	B	C	D	E	F	G	J	K	M	N	STK NO.	STK NO.	STK NO.	
1	1/20R4	1-1/2	1/2-3/4	1.188	2.625	2.812	3.425	1.000	2.125	2.250	.375	3.000	1.000	---	50019	---	48500	48500
	1/20R5																	
	3/40R4																	
	3/40R5																	
2	10R11	1-1/2	1-1/2	2.687	5.000	4.500	6.500	2.000	3.250	4.000	.625	5.000	3.125	1.625	49500	49533	48501	
	1-1/20R14																	
3	20R14	2	2	3.187	5.750	5.062	7.500	2.000	3.625	4.500	.750	5.250	3.500	1.812	49501	49534	48502	
	20R20																	
4	2-1/20R20	2 1/2-3	2 1/2-3	4.375	7.500	6.875	9.250	2.375	4.500	5.250	.750	6.000	3.500	1.812	49502	49535	48503	
	2-1/20R25																	
	30R25																	
	30R27																	
5	40R31	4	4	5.375	8.500	8.125	10.500	2.375	5.250	6.000	.875	7.000	4.062	2.062	49503	49536	48504	
	40R34																	
	40R40																	
6	50R52	5	5	6.875	10.250	9.750	12.375	3.000	6.125	7.375	1.000	8.000	4.438	2.313	50214	48003	48003	
	50R46																	
	50R40																	
7	60R52	6	6	8.375	12.625	12.000	15.000	3.500	6.625	8.750	1.125	9.375	4.812	2.437	49508	49537	48506	
	60R62																	
8	10R4	1	1	1.687	3.187	2.813	4.250	1.375	2.250	2.625	.500	3.500	2.313	1.250	49760	---	49761	
	10R5																	
	10R7																	
	10R11																	

FED SUP CLASS
47300

CUSTODIAN:

JOHN F. KENNEDY SPACE CENTER

PROCUREMENT SPEC.

NONE

COORDINATION STATUS

KSC DE

CLAMP ASSEMBLY

STANDARD PART

KC155

SHEET 3 OF 3

REVISED: (F) CHANGED APPROVED VENDOR ON SHEET 2. 10-2-92

APPROVED: 9-19-67

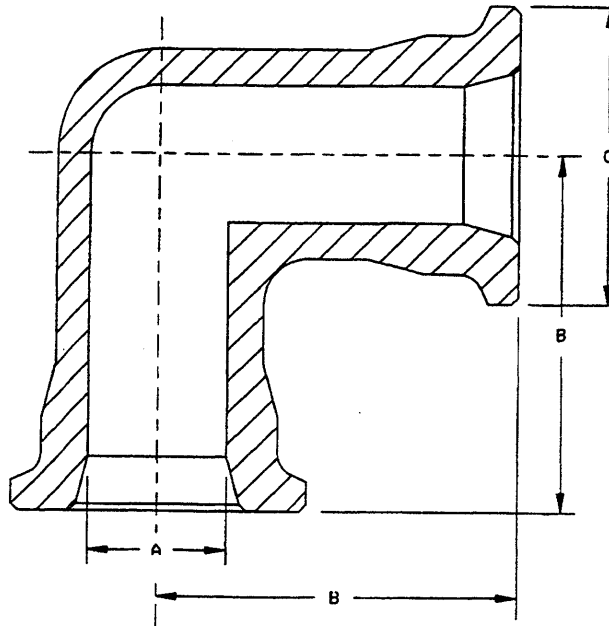
KSC FORM 32-85 (CG 4/92)

GP-425

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FED SUP CLASS
4730



MATERIAL CODE: SEE SHEET 2.

TEMPERATURE RANGE: SEE MATERIAL SPECIFICATION.

- NOTES:
1. ALL MATERIALS ARE PER ASTM SPECIFICATIONS
 2. ALL DIMENSIONS ARE IN INCHES.
 3. TOLERANCE: SEE KC161.
 4. FOR DESIGN FEATURE PURPOSES, THIS DRAWING TAKES PRECEDENCE OVER PROCUREMENT DOCUMENTS REFERENCED HEREIN.
 5. REFERENCED DOCUMENTS SHALL BE OF THE ISSUE IN EFFECT ON THE DATE OF INVITATION FOR BID.
 6. DASH NUMBERS 1 TO 5 ARE NOT TO BE USED FOR NEW DESIGN. SEE DASH NUMBERS 21 TO 24.
 7. DO NOT USE THIS STANDARD FOR ITEMS WHICH CANNOT BE IDENTIFIED BY THE LIMITATIONS CONTAINED HEREIN.
 8. ALL PARTS NOT MANUFACTURED BY GRAY TOOL CO. MUST BE CERTIFIED BY THE MANUFACTURER TO BE INTERCHANGEABLE WITH THE GRAY TOOL PART NUMBER.

EXAMPLE OF
PART NOS.

BASIC PART NUMBER KC156-3A

— MATERIAL CODE
— DASH NUMBER

APPROVED SOURCE: COMMERCIAL PARTS CAN BE PURCHASED FROM: VETCO-GRAY INC. 10777 NW FWY
PO BOX 2291 HOUSTON, TX 77252-2291

ALTERNATE SOURCES: OTECO EQUIPMENT COMPANY REFLANGE, INC.
2811 TROUT STREET 5730 CENTRALCREST
P.O. BOX 1849 HOUSTON, TX 77092
HOUSTON, TX 77251-1849

CUSTODIAN:

JOHN F. KENNEDY SPACE CENTER

PROCUREMENT SPEC.
NONE

COORDINATION STATUS

KSC DE

ELBOW, 90° PIPE HUB

STANDARD PART

KC156

SHEET 1 OF 2

KSC FORM 32-85 (CG 4/92)

REVISED: (E) CHANGED APPROVED SOURCE. 10-2-92

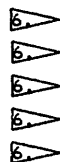
APPROVED: 9-19-67

GP-425

NASA

FED SUP CLASS
4730

NOTICE: WHEN GOVERNMENT DRAWINGS, SPECIFICATIONS OR OTHER DATA ARE USED FOR ANY PURPOSE OTHER THAN IN CONNECTION WITH A DEFINITELY RELATED GOVERNMENT PROCUREMENT OPERATION, THE UNITED STATES GOVERNMENT THEREBY INCURS NO RESPONSIBILITY NOR ANY OBLIGATION WHATSOEVER AND THE FACT THAT THE GOVERNMENT MAY HAVE FORMULATED, FURNISHED, OR IN ANY WAY SUPPLIED THE SAID DRAWINGS, SPECIFICATIONS, OR OTHER DATA IS NOT REGARDED BY IMPLICATION OR OTHERWISE AS IN ANY MANNER LICENSING THE HOLDER OR ANY OTHER PERSON OR CORPORATION, OR CONVEYING ANY RIGHTS OR PERMISSION TO MANUFACTURE, USE, OR SELL ANY PATENTED INVENTION THAT MAY IN ANY WAY BE RELATED THERETO.



DASH NO.	PIPE SIZE	HUB SIZE	DIMENSIONS			GRAYLOC STK NO.	GRAYLOC STK NO.
			A	B ±1/32	C		
1	1/2	1/2-3/4GR5	.625	2.000	1.562	54105	54152
2	1/2	1/2-3/4GR4	.500	2.000	1.562	54102	54149
3	3/4	3/4GR5	.625	2.000	1.562	54105	54152
4	3/4	3/4GR4	.500	2.000	1.562	54102	54149
5	1	1-1/4-1 1/2GRII	1.125	4.000	3.125	54106	54153
6	1 1/2	1 1/4-1 1/2GRI4	1.610	4.000	3.125	54107	54156
7	2	2GR20	2.063	4.000	3.625	54117	54129
8	2	2GRI4	1.610	4.000	3.625	54114	54162
9	2 1/2	2 1/2GR25	2.672	5.375	5.000	54119	54145
10	2 1/2	2 1/2GR20	2.063	5.375	5.000	54118	54163
11	3	3GR27	3.063	5.375	5.000	54122	54146
12	3	3GR25	2.672	5.375	5.000	54119	54145
13	4	4GR40	4.063	6.000	6.000	54125	54174
14	4	4GR34	3.688	6.000	6.000	54126	54172
15	4	4GR31	3.250	6.000	6.000	54127	54168
16	5	5GR52	5.313	8.000	7.500	54144	54213
17	5	5GR46	4.750	8.000	7.500	54382	54391
18	5	5GR40	4.063	8.000	7.500	54123	54147
19	6	6GR62	6.065	9.000	9.250	54130	54182
20	6	6GR52	5.313	9.000	9.250	54131	54181
						-A SA-148 GR90/60	-B SA-351 CF8M
21	1/2-3/4	1GR4	.500	3.000	2.000	54798	54804
22	1/2-3/4.1	1GR5	.625	3.000	2.000	54799	54805
23	3/4.1	1GR7	.906	3.000	2.000	54800	54414
24	1	1GRI1	1.125	3.000	2.000	54801	54807
						-A SA-105 GRI1	-B SA-182 F-316SS

FORCED

CAST

FORCED

REVISED: (E) CHANGED APPROVED VENDOR ON SHEET 1. 10-2-92

APPROVED: 9-19-67

CUSTODIAN:

JOHN F. KENNEDY SPACE CENTER

PROCUREMENT SPEC.

NONE

COORDINATION STATUS

KSC DE

ELBOW, 90° PIPE HUB

STANDARD PART

KC156

SHEET 2 OF 2

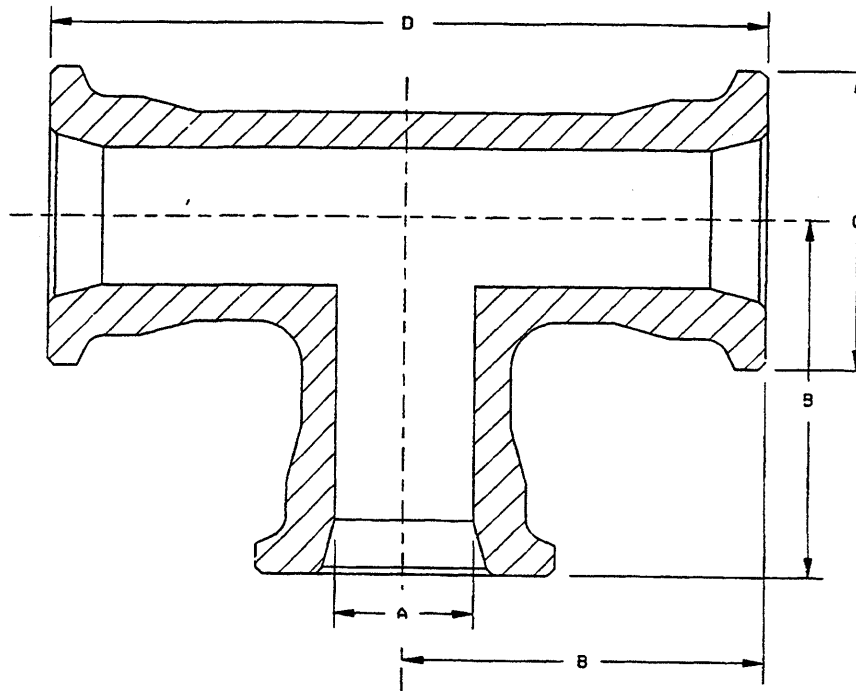
KSC FORM 32-85 (CG 4/92)

GP-425

NOTICE: WHEN GOVERNMENT DRAWINGS, SPECIFICATIONS OR OTHER DATA ARE USED FOR ANY PURPOSE OTHER THAN IN CONNECTION WITH A DEFINITELY RELATED GOVERNMENT PROCUREMENT OPERATION, THE UNITED STATES GOVERNMENT THEREBY INCURS NO RESPONSIBILITY NOR ANY OBLIGATION WHATSOEVER AND THE FACT THAT THE GOVERNMENT MAY HAVE FORMULATED, FURNISHED, OR IN ANY WAY SUPPLIED THE SAID DRAWINGS, SPECIFICATIONS, OR OTHER DATA IS NOT REGARDED BY IMPLICATION OR OTHERWISE AS IN ANY MANNER LICENSING THE HOLDER OR ANY OTHER PERSON OR CORPORATION, OR CONVEYING ANY RIGHTS OR PERMISSION TO MANUFACTURE, USE, OR SELL ANY PATENTED INVENTION THAT MAY IN ANY WAY BE RELATED THERETO.



FED SUP CLASS
4730



MATERIAL CODE: SEE SHEET 2.

TEMPERATURE RANGE: SEE MATERIAL SPECIFICATION.

- NOTES:
1. ALL MATERIALS ARE PER ASTM SPECIFICATIONS
 2. ALL DIMENSIONS ARE IN INCHES.
 3. TOLERANCE: SEE KC161.
 4. FOR DESIGN FEATURE PURPOSES, THIS DRAWING TAKES PRECEDENCE OVER PROCUREMENT DOCUMENTS REFERENCED HEREIN.
 5. REFERENCED DOCUMENTS SHALL BE OF THE ISSUE IN EFFECT ON THE DATE OF INVITATION FOR BID.
 6. DASH NUMBERS 1 TO 5 ARE NOT TO BE USED FOR NEW DESIGN. SEE DASH NUMBERS 21 TO 24.
 7. DO NOT USE THIS STANDARD FOR ITEMS WHICH CANNOT BE IDENTIFIED BY THE LIMITATIONS CONTAINED HEREIN.
 8. ALL PARTS NOT MANUFACTURED BY GRAY TOOL CO. MUST BE CERTIFIED BY THE MANUFACTURER TO BE INTERCHANGEABLE WITH THE GRAY TOOL PART NUMBER.

EXAMPLE OF
PART NOS.

BASIC PART NUMBER KC157-3A

└─ MATERIAL CODE
└─ DASH NUMBER

APPROVED SOURCE: COMMERCIAL PARTS CAN BE PURCHASED FROM: VETCO-GRAY INC. 10777 NW FWY
PO BOX 2291 HOUSTON, TX 77252-2291

ALTERNATE SOURCES: OTECO EQUIPMENT COMPANY REFLANGE, INC.
2811 TROUT STREET 5730 CENTRALCREST
P.O. BOX 1849 HOUSTON, TX 77092
HOUSTON, TX 77251-1849

CUSTODIAN: JOHN F. KENNEDY SPACE CENTER		STANDARD PART	
PROCUREMENT SPEC. NONE	TEE, PIPE HUB	KC157	
COORDINATION STATUS		SHEET 1 OF 2	
KSC DE			

KSC FORM 32-85 (CG 4/92)

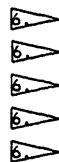
REVISED: (E) CHANGED APPROVED SOURCE. 10-2-92

APPROVED: 9-19-67

GP-425

FED SUP CLASS
4730

NOTICE: WHEN GOVERNMENT DRAWINGS, SPECIFICATIONS OR OTHER DATA ARE USED FOR ANY PURPOSE OTHER THAN IN CONNECTION WITH A DEFINITELY RELATED GOVERNMENT PROCUREMENT OPERATION, THE UNITED STATES GOVERNMENT THEREBY INCURS NO RESPONSIBILITY NOR ANY OBLIGATION WHATSOEVER AND THE FACT THAT THE GOVERNMENT MAY HAVE FORMULATED, FURNISHED, OR IN ANY WAY SUPPLIED THE SAID DRAWINGS, SPECIFICATIONS, OR OTHER DATA IS NOT REGARDED BY IMPLICATION OR OTHERWISE AS IN ANY MANNER LICENSING THE HOLDER OR ANY OTHER PERSON OR CORPORATION, OR CONVEYING ANY RIGHTS OR PERMISSION TO MANUFACTURE, USE, OR SELL ANY PATENTED INVENTION THAT MAY IN ANY WAY BE RELATED THERE TO.



DASH NO.	PIPE SIZE	HUB SIZE	DIMENSIONS				-A SA-105 GR11	-B SA-182 F-316SS
			A	B ±1/32	C	D ±1/16	GRAYLOC STK NO.	GRAYLOC STK NO.
1	1/2	1/2-3/4GR5	.625	2.000	1.562	4.000	54167	54239
2	1/2	1/2-3/4GR4	.500	2.000	1.562	4.000	54164	54238
3	3/4	3/4GR5	.625	2.000	1.562	4.000	54167	54239
4	3/4	3/4GR4	.500	2.000	1.562	4.000	54164	54238
5	1	1-1/4-1 1/2GR11	1.125	4.000	3.125	8.000	54169	54241
6	1 1/2	1 1/4-1 1/2GR14	1.610	4.000	3.125	8.000	54173	54242
7	2	2GR20	2.063	4.000	3.625	8.000	54179	54244
8	2	2GR14	1.610	4.000	3.625	8.000	54178	54243
9	2 1/2	2 1/2GR25	2.672	5.375	5.000	10.750	54196	54246
10	2 1/2	2 1/2GR20	2.063	5.375	5.000	10.750	54180	54245
11	3	3GR27	3.063	5.375	5.000	10.750	54197	54247
12	3	3GR25	2.672	5.375	5.000	10.750	54196	54246
13	4	4GR40	4.063	6.000	6.000	12.000	54358	54352
14	4	4GR34	3.688	6.000	6.000	12.000	54357	54316
15	4	4GR31	3.250	6.000	6.000	12.000	54356	54354
16	5	5GR52	5.313	8.000	7.500	16.000	54232	54373
17	5	5GR46	4.750	8.000	7.500	16.000	54363	54372
18	5	5GR40	4.063	8.000	7.500	16.000	54228	54233
19	6	6GR62	6.065	9.000	9.250	18.000	54206	54254
20	6	6GR52	5.313	9.000	9.250	18.000	54203	54253
							-A SA-148 GR90/60	-B SA-351 CF8M
21	1/2-3/4	1GR4	.500	3.000	2.000	6.000	54791	54795
22	1/2-3/4.1	1GR5	.625	3.000	2.000	6.000	54792	54796
23	3/4.1	1GR7	.906	3.000	2.000	6.000	54793	54412
24	1	1GR11	1.125	3.000	2.000	6.000	54794	54797
							-A SA-105 GR11	-B SA-182 F-316SS

FORGED

CAST

FORGED

REVISED: (E) CHANGED APPROVED SOURCE ON SHEET 1. 10-2-92

APPROVED: 9-19-67

CUSTODIAN: JOHN F. KENNEDY SPACE CENTER

PROCUREMENT SPEC.
NONE

COORDINATION STATUS

KSC DE

TEE, PIPE HUB

STANDARD PART

KC157

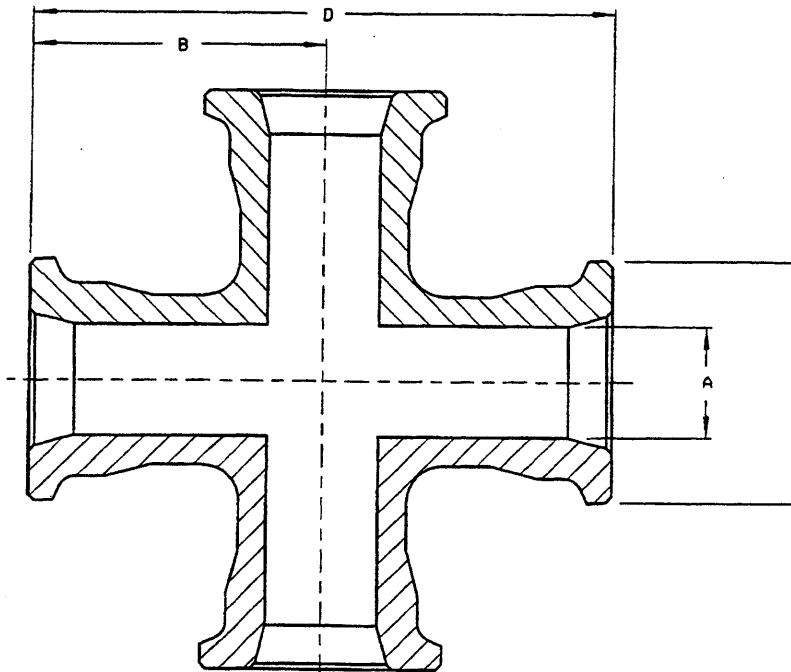
SHEET 2 OF 2

KSC FORM 32-85 (CG 4/92)

GP-425

NOTICE: WHEN GOVERNMENT DRAWINGS, SPECIFICATIONS OR OTHER DATA ARE USED FOR ANY PURPOSE OTHER THAN IN CONNECTION WITH A DEFINITELY RELATED GOVERNMENT PROCUREMENT OPERATION, THE UNITED STATES GOVERNMENT THEREBY INCURS NO RESPONSIBILITY NOR ANY OBLIGATION WHATSOEVER AND THE FACT THAT THE GOVERNMENT MAY HAVE FORMULATED, FURNISHED, OR IN ANY WAY SUPPLIED THE SAID DRAWINGS, SPECIFICATIONS, OR OTHER DATA IS NOT REGARDED BY IMPLICATION OR OTHERWISE AS IN ANY MANNER LICENSING THE HOLDER OR ANY OTHER PERSON OR CORPORATION, OR CONVEYING ANY RIGHTS OR PERMISSION TO MANUFACTURE, USE, OR SELL ANY PATENTED INVENTION THAT MAY IN ANY WAY BE RELATED THERE TO.


NASA

FED SUP CLASS
4730

MATERIAL CODE: SEE SHEET 2.

TEMPERATURE RANGE: SEE MATERIAL SPECIFICATION.

NOTES:

1. ALL MATERIALS ARE PER ASTM SPECIFICATIONS
2. ALL DIMENSIONS ARE IN INCHES.
3. TOLERANCE: SEE KC161.
4. FOR DESIGN FEATURE PURPOSES, THIS DRAWING TAKES PRECEDENCE OVER PROCUREMENT DOCUMENTS REFERENCED HEREIN.
5. REFERENCED DOCUMENTS SHALL BE OF THE ISSUE IN EFFECT ON THE DATE OF INVITATION FOR BID.
6.  DASH NUMBERS 1 TO 5 ARE NOT TO BE USED FOR NEW DESIGN. SEE DASH NUMBERS 21 TO 24.
7. DO NOT USE THIS STANDARD FOR ITEMS WHICH CANNOT BE IDENTIFIED BY THE LIMITATIONS CONTAINED HEREIN.
8. ALL PARTS NOT MANUFACTURED BY GRAY TOOL CO. MUST BE CERTIFIED BY THE MANUFACTURER TO BE INTERCHANGEABLE WITH THE GRAY TOOL PART NUMBER.

EXAMPLE OF
PART NOS.

BASIC PART NUMBER KC157-3A



MATERIAL CODE
DASH NUMBER

APPROVED SOURCE:

COMMERCIAL PARTS CAN BE PURCHASED FROM: VETCO-GRAY INC. 10777 NW FWY
PO BOX 2291 HOUSTON, TX 77252-2291

ALTERNATE SOURCES:

OTECO EQUIPMENT COMPANY REFLANGE, INC.
2811 TROUT STREET 5730 CENTRALCREST
P.O. BOX 1849 HOUSTON, TX 77092
HOUSTON, TX 77251-1849

CUSTODIAN:

JOHN F. KENNEDY SPACE CENTER


PROCUREMENT SPEC.
NONE

COORDINATION STATUS

KSC DE

CROSS, PIPE HUB

STANDARD PART

KC158 

SHEET 1 OF 2

REVISED: (E) CHANGED APPROVED SOURCE. 10-2-92

APPROVED: 9-19-67

KSC FORM 32-85 (CG 4/92)

GP-425

NASA

FED SUP CLASS
4730

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DASH NO.	PIPE SIZE	HUB SIZE	DIMENSIONS				GRAYLOC STK NO.	GRAYLOC STK NO.
			A	B ±1/32	C	D ±1/16		
1	1/2	1/2-3/4GR5	.625	2.000	1.562	4.000	54212	54262
2	1/2	1/2-3/4GR4	.500	2.000	1.562	4.000	54207	54257
3	3/4	3/4GR5	.625	2.000	1.562	4.000	54212	54262
4	3/4	3/4GR4	.500	2.000	1.562	4.000	54207	54257
5	1	1-1/4-1 1/2GR11	1.125	4.000	3.125	8.000	54208	54263
6	1 1/2	1 1/4-1 1/2GR14	1.610	4.000	3.125	8.000	54209	54264
7	2	2GR20	2.063	4.000	3.625	8.000	54210	54268
8	2	2GR14	1.610	4.000	3.625	8.000	54211	54267
9	2 1/2	2 1/2GR25	2.672	5.375	5.000	10.750	54221	54272
10	2 1/2	2 1/2GR20	2.063	5.375	5.000	10.750	54216	54269
11	3	3GR27	3.063	5.375	5.000	10.750	54220	54273
12	3	3GR25	2.672	5.375	5.000	10.750	54221	54272
13	4	4GR40	4.063	6.000	6.000	12.000	54225	54279
14	4	4GR34	3.688	6.000	6.000	12.000	54226	54278
15	4	4GR31	3.250	6.000	6.000	12.000	54227	54274
16	5	5GR52	5.313	8.000	7.500	16.000	54219	54307
17	5	5GR46	4.750	8.000	7.500	16.000	---	---
18	5	5GR40	4.063	8.000	7.500	16.000	54214	54222
19	6	6GR62	6.065	9.000	9.250	18.000	54230	54283
20	6	6GR52	5.313	9.000	9.250	18.000	54231	54282

-A
SA-105
GR11

-B
SA-182
F-316SS

-A
SA-148
GR90/60

-B
SA-351
CF8M

FORGED

CAST

FORGED

REVISED: (E) CHANGED APPROVED SOURCE ON SHEET 1. 10-2-92

APPROVED: 9-19-67

CUSTODIAN:

JOHN F. KENNEDY SPACE CENTER

PROCUREMENT SPEC.

NONE

COORDINATION STATUS

KSC DE

TEE, PIPE HUB

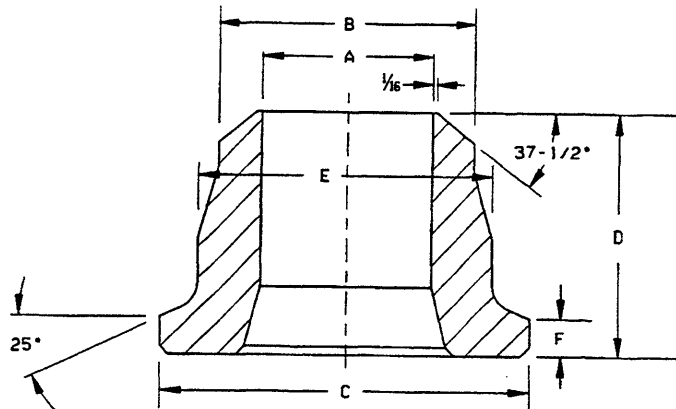
STANDARD PART

KC158

SHEET 2 OF 2

KSC FORM 32-85 (CG 4/92)

GP-425

FED SUP CLASS
4730

MATERIAL CODE: ADD A AFTER DASH NO. TO DENOTE SA-105-GR11.
ADD B AFTER DASH NO. TO DENOTE SA-182-F316L.
ADD D AFTER DASH NO. TO DENOTE SA-182-F316.

SCHEDULE CODE: ADD J AFTER MATERIAL CODE TO DENOTE SCHEDULE 40.
ADD K AFTER MATERIAL CODE TO DENOTE SCHEDULE 80.
ADD L AFTER MATERIAL CODE TO DENOTE SCHEDULE 160.
ADD M AFTER MATERIAL CODE TO DENOTE SCHEDULE XXS.

TEMPERATURE RANGE: SEE MATERIAL SPECIFICATION.

- NOTES:**
- ALL MATERIALS ARE PER ASTM SPECIFICATIONS
 - ALL DIMENSIONS ARE IN INCHES.
 - TOLERANCE: SEE KC161.
 - FOR DESIGN FEATURE PURPOSES, THIS DRAWING TAKES PRECEDENCE OVER PROCUREMENT DOCUMENTS REFERENCED HEREIN.
 - REFERENCED DOCUMENTS SHALL BE OF THE ISSUE IN EFFECT ON THE DATE OF INVITATION FOR BID.
 - DASH NUMBERS 1 TO 4 ARE NOT TO BE USED FOR NEW DESIGN. SEE DASH NUMBERS 13 TO 15.
 - KC DASH NO. 1A AND 2A MAY BE SA-107-61T GRADE 1030 INSTEAD OF SA-105-GR11.
 - DO NOT USE THIS STANDARD FOR ITEMS WHICH CANNOT BE IDENTIFIED BY THE LIMITATIONS CONTAINED HEREIN.
 - ALL PARTS NOT MANUFACTURED BY GRAY TOOL CO. MUST BE CERTIFIED BY THE MANUFACTURER TO BE INTERCHANGEABLE WITH THE GRAY TOOL PART NUMBER.

**EXAMPLE OF
PART NOS.**

BASIC PART NUMBER KC159-3AJ

— SCHEDULE CODE
— MATERIAL CODE
— DASH NUMBER

APPROVED SOURCE: COMMERCIAL PARTS CAN BE PURCHASED FROM: VETCO-GRAY INC. 10777 NW FWY
PO BOX 2291
HOUSTON, TX 77252-2291

ALTERNATE SOURCES: OTECO EQUIPMENT COMPANY REFLANGE, INC.
2811 TROUT STREET 5730 CENTRALCREST
P.O. BOX 1849 HOUSTON, TX 77092
HOUSTON, TX 77251-1849

REVISED: (E) CHANGED APPROVED SOURCE. 10-2-92

APPROVED: 9-19-67

CUSTODIAN:		JOHN F. KENNEDY SPACE CENTER	
PROCUREMENT SPEC.	HUB, BUTTWELD	STANDARD PART	
NONE		KC159	
COORDINATION STATUS		SHEET 1 OF 3	
KSC DE			

KSC FORM 32-85 (CG 4/92)

NOTICE: WHEN GOVERNMENT DRAWINGS, SPECIFICATIONS OR OTHER DATA ARE USED FOR ANY PURPOSE OTHER THAN IN CONNECTION WITH A DEFINITELY RELATED GOVERNMENT PROCUREMENT OPERATION, THE UNITED STATES GOVERNMENT THEREBY INCURS NO RESPONSIBILITY NOR ANY OBLIGATION WHATSOEVER AND THE FACT THAT THE GOVERNMENT MAY HAVE FORMULATED, FURNISHED, OR IN ANY WAY SUPPLIED THE SAID DRAWINGS, SPECIFICATIONS, OR OTHER DATA IS NOT REGARDED BY IMPLICATION OR OTHERWISE AS IN ANY MANNER LICENSING THE HOLDER OR ANY OTHER PERSON OR CORPORATION, OR CONVEYING ANY RIGHTS OR PERMISSION TO MANUFACTURE, USE, OR SELL ANY PATENTED INVENTION THAT MAY IN ANY WAY BE RELATED THERETO.

GP-425

FED SUP CLASS
4730

NOTICE: WHEN GOVERNMENT DRAWINGS, SPECIFICATIONS OR OTHER DATA ARE USED FOR ANY PURPOSE OTHER THAN IN CONNECTION WITH A DEFINITELY RELATED GOVERNMENT PROCUREMENT OPERATION, THE UNITED STATES GOVERNMENT THEREBY INCURS NO RESPONSIBILITY NOR ANY OBLIGATION WHATSOEVER AND THE FACT THAT THE GOVERNMENT MAY HAVE FORMULATED, FURNISHED, OR IN ANY WAY SUPPLIED THE SAID DRAWINGS, SPECIFICATIONS, OR OTHER DATA IS NOT REGARDED BY IMPLICATION OR OTHERWISE AS IN ANY MANNER LICENSING THE HOLDER OR ANY OTHER PERSON OR CORPORATION, OR CONVEYING ANY RIGHTS OR PERMISSION TO MANUFACTURE, USE, OR SELL ANY PATENTED INVENTION THAT MAY IN ANY WAY BE RELATED THERETO.

DASH NO.	PIPE SIZE	ANSI/ASME B36.10 SCHEDULE	HUB SIZE	DIMENSIONS						-A SA-105 GR11	-B SA-182 F-316L	-D SA-182 F-316
				A	B	C	D	E	F	GRAYLOC STK NO.	GRAYLOC STK NO.	GRAYLOC STK NO.
1	1/2	40	1/2GR5	.622	.840	1.562	1.500	1.063	.133	52076	52666	52796
		80		.546						52077	52667	52797
		160	1/2GR4	.466						52078	52668	52798
		XXS		.252						52079	52669	52800
2	3/4	160	3/4GR5	.614	1.050	1.562	1.500	1.063	.133	52083	52673	52803
		XXS	3/4GR4	.434						52084	52674	52804
3	1	40	1GR11	1.049	1.315	3.125	2.375	2.375	.500	52108	52700	52805
		80		.957						52109	52701	52806
		160		.815						52110	52702	52807
		XXS		.599						52111	52703	52808
4	1-1/4	40	1-1/4GR14	1.380	1.660	3.125	2.375	2.375	.437	52126	52705	52809
		80		1.278						52099	52706	52810
		160		1.160						52127	52707	52811
		XXS	1-1/4GR11	.896					.500	52094	52708	52812
5	1-1/2	40	1-1/2GR14	1.610	1.900	3.125	2.375	2.375	.437	52100	52710	52813
		80		1.500						52101	52711	52814
		160		1.337						52102	52712	52815
		XXS		1.100						52103	52713	52816
6	2	40	2GR20	2.067	2.375	3.625	2.750	2.875	.437	52104	52721	52821
		80		1.939						52105	52722	52822
		160		1.689						52115	52723	52823
		XXS	2GR14	1.503						52113	52724	52824
7	2-1/2	40	2-1/2GR25	2.469	2.875	5.000	3.250	4.000	.500	52215	52730	52825
		80		2.323						52216	52731	52826
		160	2-1/2GR20	2.125						52218	52732	52827
		XXS		1.771						52219	52733	52828
8	3	40	3GR27	3.068	3.500	5.000	3.250	4.000	.500	52204	52740	52844
		80		2.900						52205	52741	52845
		160	3GR25	2.624						52226	52742	52846
		XXS		2.300						52227	52743	52847
9	3-1/2	40	4GR34	3.548	4.000	6.000	3.625	5.000	.500	52240		52838
		80		3.364						52241		52839
		XXS	4GR31	2.728						52243		52841

REVISED: (E) CHANGED APPROVED SOURCE ON SHEET 1. 10-2-92

APPROVED: 9-19-67

CUSTODIAN: JOHN F. KENNEDY SPACE CENTER

PROCUREMENT SPEC.

NONE

COORDINATION STATUS

KSC DE

HUB, BUTTWELD

STANDARD PART

KC159

SHEET 2 OF 3

KSC FORM 32-85 (CG 4/92)

GP-425

FED SUP CLASS
4730

NOTICE: WHEN GOVERNMENT DRAWINGS, SPECIFICATIONS OR OTHER DATA ARE USED FOR ANY PURPOSE OTHER THAN IN CONNECTION WITH A DEFINITELY RELATED GOVERNMENT PROCUREMENT OPERATION, THE UNITED STATES GOVERNMENT THEREBY INCURS NO RESPONSIBILITY NOR ANY OBLIGATION WHATSOEVER AND THE FACT THAT THE GOVERNMENT MAY HAVE FORMULATED, FURNISHED, OR IN ANY WAY SUPPLIED THE SAID DRAWINGS, SPECIFICATIONS, OR OTHER DATA IS NOT REGARDED BY IMPLICATION OR OTHERWISE AS IN ANY MANNER LICENSING THE HOLDER OR ANY OTHER PERSON OR CORPORATION, OR CONVEYING ANY RIGHTS OR PERMISSION TO MANUFACTURE, USE, OR SELL ANY PATENTED INVENTION THAT MAY IN ANY WAY BE RELATED THERETO.

DASH NO.	PIPE SIZE	ANSI/ASME B36.10 SCHEDULE	HUB SIZE	DIMENSIONS						-A SA-105 GR11	-B SA-182 F-316L	-D SA-182 F-316
				A	B	C	D	E	F	GRAYLOC STK NO.	GRAYLOC STK NO.	GRAYLOC STK NO.
10	4	40	4GR40	4.026	4.500	6.000	3.625	5.000	.500	52302	52750	52851
		80		3.826						52303	52751	52852
		160	4GR34	3.438						52311	52752	52853
		XXS	4GR31	3.152						52314	52753	52854
11	5	40	5GR52	5.047	5.563	7.500	4.375	6.500	.625	52380		52867
		80		4.813						52381		52868
		160	5GR46	4.313						52385		52871
		XXS	5GR40	4.063						52383		52870
12	6	40	6GR62	6.065	6.625	9.250	4.625	7.750	.750	52400	52763	52874
		80		5.761						52401	52764	52875
		160	6GR52	5.189					.812	52413	52765	52876
		XXS		4.897						52414	52766	52877
13	1/2	40	1GR5	.622	.840	2.000	1.750	1.500	.313	52192		55955
		80		.546						52193		53439
		160	1GR4	.466						52194		53686
		XXS		.252						52195		53437
14	3/4	40	1GR7	.824	1.050	2.000	1.750	1.500	.313	52196		53440
		80		.742						52233		53218
		160	1GR5	.614						52198		53442
		XXS	1GR4	.434						52199		53447
15	1	40	1GR11	1.049	1.315	2.000	1.750	1.500	.313	53225		53231
		80		.957						53226		53232
		160	1GR7	.815						53227		53233
		XXS	1GR5	.599						53228		53234

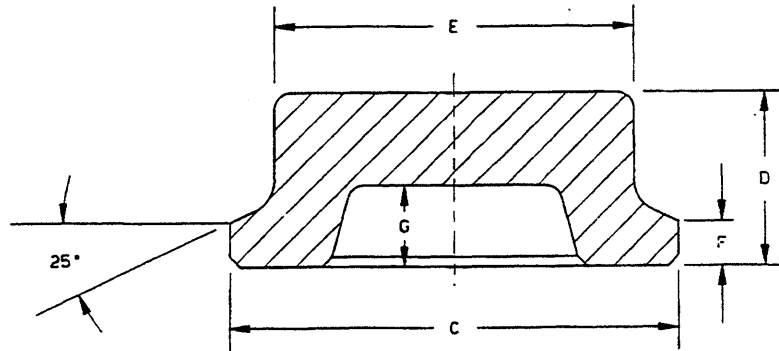
REVISED: (E) CHANGED APPROVED SOURCE ON SHEET 1. 10-2-92

APPROVED: 9-19-67

CUSTODIAN:		JOHN F. KENNEDY SPACE CENTER	
PROCUREMENT SPEC.	HUB, BUTTWELD	STANDARD PART	
NONE		KC159	
COORDINATION STATUS		SHEET 3 OF 3	
KSC DE			

KSC FORM 32-85 (CG 4/92)

GP-425

FED SUP CLASS
4730

MATERIAL CODE: SEE SHEET 2.

TEMPERATURE RANGE: SEE MATERIAL SPECIFICATION.

- NOTES:
1. ALL MATERIALS ARE PER ASTM SPECIFICATIONS
 2. ALL DIMENSIONS ARE IN INCHES.
 3. TOLERANCE: SEE KC161.
 4. FOR DESIGN FEATURE PURPOSES, THIS DRAWING TAKES PRECEDENCE OVER PROCUREMENT DOCUMENTS REFERENCED HEREIN.
 5. REFERENCED DOCUMENTS SHALL BE OF THE ISSUE IN EFFECT ON THE DATE OF INVITATION FOR BID.
 6. DASH NUMBERS 1 TO 3 ARE NOT TO BE USED FOR NEW DESIGN. SEE DASH NUMBERS 18 TO 21.
 7. DO NOT USE THIS STANDARD FOR ITEMS WHICH CANNOT BE IDENTIFIED BY THE LIMITATIONS CONTAINED HEREIN.
 8. ALL PARTS NOT MANUFACTURED BY GRAY TOOL CO. MUST BE CERTIFIED BY THE MANUFACTURER TO BE INTERCHANGEABLE WITH THE GRAY TOOL PART NUMBER.

EXAMPLE OF
PART NOS.

BASIC PART NUMBER KC160-3A

└─ MATERIAL CODE
└─ DASH NUMBER

APPROVED SOURCE: COMMERCIAL PARTS CAN BE PURCHASED FROM: VETCO-GRAY INC. 10777 NW FWY
P.O. BOX 2291, HOUSTON, TX 77001-2291.

ALTERNATE SOURCES: OTECO EQUIPMENT COMPANY REFLANGE, INC.
2811 TROUT STREET 5730 CENTRALCREST
P.O. BOX 1849 HOUSTON, TX 77092
HOUSTON, TX 77251-1849

REVISED: (E) CHANGED APPROVED SOURCE. 10-2-92

APPROVED: 9-19-67

NOTICE: WHEN GOVERNMENT DRAWINGS, SPECIFICATIONS OR OTHER DATA ARE USED FOR ANY PURPOSE OTHER THAN IN CONNECTION WITH A DEFINITELY RELATED GOVERNMENT PROCUREMENT OPERATION, THE UNITED STATES GOVERNMENT THEREBY INCURS NO RESPONSIBILITY NOR ANY OBLIGATION WHATSOEVER AND THE FACT THAT THE GOVERNMENT MAY HAVE FORMULATED, FURNISHED, OR IN ANY WAY SUPPLIED THE SAID DRAWINGS, SPECIFICATIONS, OR OTHER DATA IS NOT REGARDED BY IMPLICATION OR OTHERWISE AS IN ANY MANNER LICENSING THE HOLDER OR ANY OTHER PERSON OR CORPORATION, OR CONVEYING ANY RIGHTS OR PERMISSION TO MANUFACTURE, USE, OR SELL ANY PATENTED INVENTION THAT MAY IN ANY WAY BE RELATED THERETO.

CUSTODIAN: JOHN F. KENNEDY SPACE CENTER	
PROCUREMENT SPEC. NONE	STANDARD PART KC160
COORDINATION STATUS KSC DE	SHEET 1 OF 2

HUB, BLIND PIPE

KSC FORM 32-85 (CG 4/92)

GP-425

FED SUP CLASS
4730

NOTICE: WHEN GOVERNMENT DRAWINGS, SPECIFICATIONS OR OTHER DATA ARE USED FOR ANY PURPOSE OTHER THAN IN CONNECTION WITH A DEFINITELY RELATED GOVERNMENT PROCUREMENT OPERATION, THE UNITED STATES GOVERNMENT THEREBY INCURS NO RESPONSIBILITY NOR ANY OBLIGATION WHATSOEVER AND THE FACT THAT THE GOVERNMENT MAY HAVE FORMULATED, FURNISHED, OR IN ANY WAY SUPPLIED THE SAID DRAWINGS, SPECIFICATIONS, OR OTHER DATA IS NOT REGARDED BY IMPLICATION OR OTHERWISE AS IN ANY MANNER LICENSING THE HOLDER OR ANY OTHER PERSON OR CORPORATION, OR CONVEYING ANY RIGHTS OR PERMISSION TO MANUFACTURE, USE, OR SELL ANY PATENTED INVENTION THAT MAY IN ANY WAY BE RELATED THERETO.

6
6
6

DASH NO.	HUB SIZE	DIMENSIONS					-A SA-105* GRII	-B SA-182 F-316SS
		C	D	E	F	G	GRAYLOC STK NO.	GRAYLOC STK NO.
1	1/2-3/4GR4	1.562	1.250	1.063	.133	.438	59045	59378
2	1/2-3/4GR5	1.562	1.250	1.063	.133	.438	59047	59380
3	1-1 1/4-1 1/2GRII	3.125	2.125	2.375	.500	.562	59050	59300
4	1 1/4-1 1/2GRI4	3.125	2.125	2.375	.437	.688	59000	59305
5	2GR14	3.625	2.250	2.875	.437	.688	59053	59310
6	2GR20	3.625	2.250	2.875	.437	.688	59002	59315
7	2 1/2GR20	5.000	2.500	4.000	.500	.688	59022	59320
8	2 1/2GR25	5.000	2.500	4.000	.500	.688	59020	59325
9	3GR27	5.000	2.500	4.000	.500	.938	59006	59330
10	4GR31	6.000	2.375	5.000	.500	.938	59024	59345
11	4GR34	6.000	2.375	5.000	.500	1.062	59060	59340
12	4GR40	6.000	2.125	5.000	.500	1.000	59010	59335
13	5GR52	7.500	2.875	6.500	.625	1.000	58992	59354
14	5GR46	7.500	2.875	6.500	.625	1.000	59148	59279
15	5GR40	7.500	3.500	6.500	.625	1.000	58990	59347
16	6GR52	9.250	3.500	7.750	.812	1.000	59064	59350
17	6GR62	9.250	2.875	7.750	.750	1.000	59014	59349
18	1GR4	2.000	1.750	1.500	.313	.438	58955	59497
19	1GR5	2.000	1.750	1.500	.313	.438	58922	59525
20	1GR7	2.000	1.750	1.500	.313	.563	58915	59523
20	1GRII	2.000	1.750	1.500	.313	.563	59592	59524

* 1/2" AND 3/4" SIZES MAY BE FURNISHED FROM SA-107-GR 1030 UNLESS OTHERWISE SPECIFIED.

REVISED: (E) CHANGED APPROVED SOURCE ON SHEET 1. 10-2-92

APPROVED: 9-19-67

CUSTODIAN:

JOHN F. KENNEDY SPACE CENTER

PROCUREMENT SPEC.
NONE

COORDINATION STATUS

KSC DE

HUB, BLIND PIPE

STANDARD PART

KC160

SHEET 2 OF 2

KSC FORM 32-85 (CG 4/92)

FED SUP CLASS
NONE

GRAYLOC CLAMPS

DIMENSION	SIZE	TOLERANCE
A	1/2" THRU 3"	±.031
	4" THRU 6"	±.063
B	1/2" THRU 6"	±.063
C	FOR REFERENCE ONLY	
D	1" THRU 3"	±.250
	4" THRU 6"	±.375
E	1/2" THRU 3"	±.250
	4" THRU 6"	±.375
F,G,J,K	FOR REFERENCE ONLY	
M	1/2" THRU 3"	±.250
	4" THRU 6"	±.375
N	1/2" THRU 6"	±.031

GRAYLOC HUBS

DIMENSION	SIZE	TOLERANCE
A	1/2" THRU 3"	±.031
	4" THRU 6"	±.063
B	1/2" THRU 5"	+0.04-.031
	6"	+0.156-.031
C	1/2" THRU 6"	±.063
D	BUTT WELD 1/2" THRU 6"	±.063
	BLIND 1/2" THRU 5"	±.063
	BLIND 6"	+0.125
E	1/2" THRU 6"	±.063
F	1/2" THRU 6"	±.031
G	1/2" THRU 6"	+0.125
	1/2" THRU 6"	-0.063
25° CLAMPING SURFACE ON HUB	1/2" THRU 6"	±1°
BUTT WELD BEVEL IN ACCORDANCE WITH ANSI B16.25		

NOTE: TOLERANCE ON ANGLES, WHERE APPLICABLE SHALL BE ±1°.

GRAYLOC SEAL RINGS

DIMENSION	SIZE	TOLERANCE
A	4 THRU 34	±.031
	40 THRU 62	±.063
C	4 THRU 34	±.031
	40 THRU 62	±.125
D	FOR REFERENCE ONLY	
E	4 THRU 62	±.016
F	4 THRU 34	+0.031-.000
	40 THRU 62	+0.063-.000

GRAYLOC FITTINGS

DIMENSION	SIZE	TOLERANCE
A	1/2" THRU 3"	±.031
	4" THRU 6"	±.063
B	1/2" THRU 6"	±.031
C	1/2" THRU 6"	±.063
D	1/2" THRU 6"	±.063

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CUSTODIAN:

JOHN F. KENNEDY SPACE CENTER

PROCUREMENT SPEC.
NONE

COORDINATION STATUS

KSC DE

DIMENSION TOLERANCES FOR
HUB STYLE FLANGE FITTINGS

DESIGN STANDARD

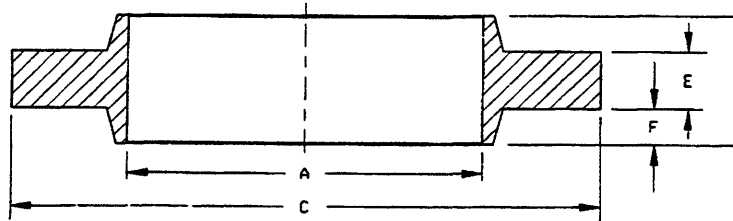
KC161

SHEET 1 OF 1

REVISED: (B) REV & REDRAWN 8-1-90

APPROVED: 1-6-69

GP-425

FED SUP CLASS
4730

MATERIAL CODE:

ADD A AFTER DASH NO. TO DENOTE AISI 1018 THRU 1030 TEFLON COATED.
 ADD B AFTER DASH NO. TO DENOTE TYPE 316 SS SILVER PLATED. DO NOT
 SPECIFY FOR NEW DESIGN.
 ADD D AFTER DASH NO. TO DENOTE AISI 630 TYPE 17-4PH, TEFLON COATED.

TEMPERATURE RANGE:

PARTS MADE FROM AISI 1018-1030 ARE TEFLON COATED 0.001 TO 0.003 THICK
 FOR SERVICE TEMPERATURES OF -50°F TO +350°F.
 PARTS MADE FROM 17-4PH, TEFLON COATED, ARE FOR SERVICE
 TEMPERATURES OF -452°F TO +450°F.

NOTES:

1. ALL MATERIALS ARE PER AISI SPECIFICATIONS
2. ALL DIMENSIONS ARE IN INCHES.
3. TOLERANCE: SEE KC161.
4. STOCK NUMBERS FOR UNCOATED RINGS OR FOR RINGS WITH DIFFERENT COATINGS THAN SPECIFIED BELOW WILL NOT CORRESPOND TO STOCK NUMBERS FOR STANDARD RINGS.
5. FOR DESIGN FEATURE PURPOSES, THIS DRAWING TAKES PRECEDENCE OVER PROCUREMENT DOCUMENTS REFERENCED HEREIN.
6. REFERENCED DOCUMENTS SHALL BE OF THE ISSUE IN EFFECT ON THE DATE OF INVITATION FOR BID.
7. DO NOT USE THIS STANDARD FOR ITEMS WHICH CANNOT BE IDENTIFIED BY THE LIMITATIONS CONTAINED HEREIN.
8. ALL PARTS NOT MANUFACTURED BY GRAY TOOL CO. MUST BE CERTIFIED BY THE MANUFACTURER TO BE INTERCHANGEABLE WITH THE GRAY TOOL PART NUMBER.

EXAMPLE OF
PART NOS.

BASIC PART NUMBER KC162-3A

└─ MATERIAL CODE
 └─ DASH NUMBER

APPROVED SOURCE:

COMMERCIAL PARTS CAN BE PURCHASED FROM: VETCO-GRAY INC. 10777 NW FWY
 P.O. BOX 2291, HOUSTON, TX 77001-2291.

ALTERNATE SOURCES:

OTECO EQUIPMENT COMPANY REFLANGE, INC.
 2811 TROUT STREET 5730 CENTRALCREST
 P.O. BOX 1849 HOUSTON, TX 77092
 HOUSTON, TX 77251-1849

REVISED: (E) CHANGED APPROVED SOURCE. 10-2-92

APPROVED: 9-19-67

CUSTODIAN:

JOHN F. KENNEDY SPACE CENTER

PROCUREMENT SPEC.

NONE

COORDINATION STATUS

KSC DE

RING, PIPE HUB SEAL

STANDARD PART

KC162

SHEET 1 OF 2

KSC FORM 32-85 (CG 4/92)

NOTICE: WHEN GOVERNMENT DRAWINGS, SPECIFICATIONS OR OTHER DATA ARE USED FOR ANY PURPOSE OTHER THAN IN CONNECTION WITH A DEFINITELY RELATED GOVERNMENT PROCUREMENT OPERATION, THE UNITED STATES GOVERNMENT THEREBY INCURS NO RESPONSIBILITY NOR ANY OBLIGATION WHATSOEVER AND THE FACT THAT THE GOVERNMENT MAY HAVE FORMULATED, FURNISHED, OR IN ANY WAY SUPPLIED THE SAID DRAWINGS, SPECIFICATIONS, OR OTHER DATA IS NOT REGARDED BY IMPLICATION OR OTHERWISE AS IN ANY MANNER LICENSING THE HOLDER OR ANY OTHER PERSON OR CORPORATION, OR CONVEYING ANY RIGHTS OR PERMISSION TO MANUFACTURE, USE, OR SELL ANY PATENTED INVENTION THAT MAY IN ANY WAY BE RELATED THERETO.

GP-425

FED SUP CLASS
4730

NOTICE: WHEN GOVERNMENT DRAWINGS, SPECIFICATIONS OR OTHER DATA ARE USED FOR ANY PURPOSE OTHER THAN IN CONNECTION WITH A DEFINITELY RELATED GOVERNMENT PROCUREMENT OPERATION, THE UNITED STATES GOVERNMENT THEREBY ASSUMES NO RESPONSIBILITY NOR ANY OBLIGATION WHATSOEVER AND THE FACT THAT THE GOVERNMENT MAY HAVE FORMULATED, FURNISHED, OR IN ANY WAY SUPPLIED THE SAID DRAWINGS, SPECIFICATIONS, OR OTHER DATA IS NOT REGARDED BY IMPLICATION OR OTHERWISE AS IN ANY MANNER LICENSING THE HOLDER OR ANY OTHER PERSON OR CORPORATION, OR CONVEYING ANY RIGHTS OR PERMISSION TO MANUFACTURE, USE, OR SELL ANY PATENTED INVENTION THAT MAY IN ANY WAY BE RELATED THERETO.

DASH NO.	RING SIZE	DIMENSIONS					MAT. CODE A	MAT. CODE B	MAT. CODE D
		A	C	D	E	F	GRAYLOC STK NO.	GRAYLOC STK NO.	GRAYLOC STK NO.
1	4	.500	1.000	.375	.125	.125	50554	50800	51230
2	5	.625	1.094	.375	.125	.125	50563	50801	51231
3	7	.906	1.375	.375	.125	.125	50701	50802	51232
4	11	1.125	1.734	.375	.125	.125	50551	50803	51233
5	13	1.500	2.375	.375	.125	.125	50698	50837	51234
6	14	1.610	2.625	.563	.250	.156	50553	50804	51235
7	20	2.063	3.250	.750	.250	.250	50557	50807	51236
8	25	2.672	4.000	.750	.250	.250	50570	50810	51237
9	27	3.063	4.250	.750	.250	.250	50622	50811	51238
10	31	3.250	4.500	.750	.250	.250	50561	50812	51239
11	34	3.688	5.000	.750	.250	.250	50562	50813	51240
12	40	4.063	5.500	1.000	.250	.375	66240	50814	51241
13	46	4.750	6.188	1.000	.250	.375	66041	66376	51245
14	52	5.313	6.625	1.000	.250	.375	50623	50815	51242
15	62	6.065	7.875	1.375	.375	.500	50566	50816	51243
16	23	2.375	3.500	.750	.250	.250	50569	66375	66175

REVISED: (F) CHANGED APPROVED SOURCE ON SHEET 1.10-2-92

APPROVED: 9-19-67

CUSTODIAN:

JOHN F. KENNEDY SPACE CENTER

PROCUREMENT SPEC.

NONE

COORDINATION STATUS

KSC DE

RING, PIPE HUB SEAL

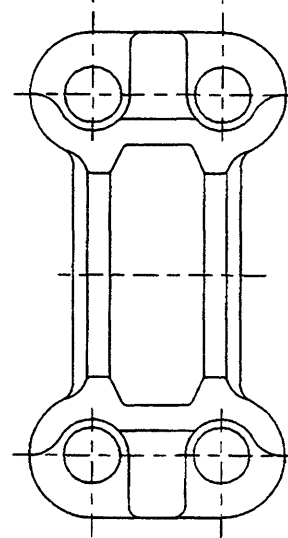
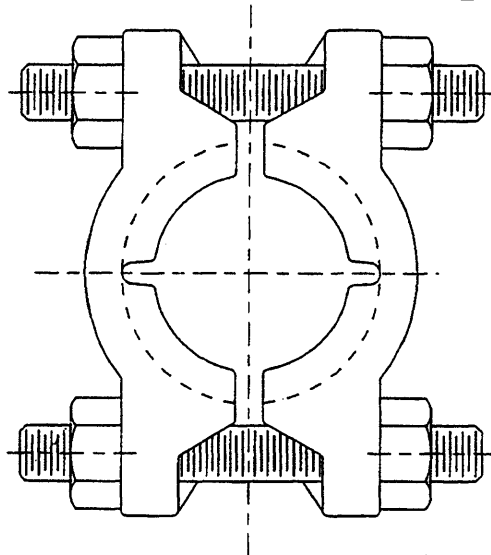
STANDARD PART

KC162

SHEET 2 OF 2

KSC FORM 32-85 (CG 4/92)

GP-425

FED SUP CLASS
NONE

GENERAL NOTES:

1. A COMPLETE KC163 PIPE CONNECTION ASSEMBLY CONSISTS OF THE FOLLOWING COMPONENTS:
(A) TWO KC HUBS OR A COMBINATION HUB AND FITTING.
(B) ONE KC162 SEAL RING.
(C) ONE KC155 CLAMP ASSEMBLY, 4 BOLT, OR 2 BOLT.
2. EXTREME CAUTION SHOULD BE EXERCISED TO PREVENT TIGHTENING OF THE STUD BOLTS WHILE THE ASSEMBLY IS UNDER PRESSURE OR MECHANICAL LOADS.
3. SPECIAL CARE SHOULD BE EXERCISED DURING ASSEMBLY OF THE CONNECTION SO THAT NO DAMAGE OCCURS TO THE SEALING SURFACES.
4. NO WELDING IS RECOMMENDED ON THE CLAMPS OR SEAL RINGS. THE SEAL SURFACE OF THE KC HUBS SHOULD BE PROTECTED DURING WELDING TO AVOID WELD SPLATTER AND OTHER DAMAGE. DURING STRESS RELIEVING THE SEAL SURFACES OF THE CARBON STEEL HUBS SHOULD BE PROTECTED AGAINST SCALING WITH A HIGH TEMPERATURE GRAPHITE PASTE, SIMILAR TO KEY-PASTE.
5. THIS IS A DESIGN STANDARD AND SHALL NOT BE USED AS A PART NUMBER.
6. GRAYLOC SIZES 1/2GR4/5, 3/4GR4/5, 1GR11, 1-1/4GR14, AND 1-1/4GR11 ARE NOT TO BE USED FOR NEW DESIGN.

ASSEMBLY NOTES:

1. ALL PROTECTIVE COATINGS AND FOREIGN MATTER MUST BE CLEANED FROM ALL SEALING SURFACES BEFORE INSTALLATION.
2. KC CONNECTIONS SHALL BE MADE UP WITH NO LUBRICATION APPLIED TO HUBS, FITTINGS, SEAL RINGS OR CLAMPS. LUBRICATION SHALL BE APPLIED TO BOLTS ONLY. CARE SHALL BE TAKEN TO PREVENT LUBE FROM ENTERING CONNECTION.
3. THE HUBS SHOULD BE ALIGNED BEFORE ASSEMBLY TO THE EXTENT THAT THE CLAMP SEGMENTS CAN PULL THE MATING HUBS UNIFORMLY AGAINST THE RING RIB USING THE RECOMMENDED BOLT PRELOAD SHOWN IN TABLE 1.
4. WHEN TIGHTENING, THE SPACING BETWEEN THE CLAMP EARS SHOULD BE APPROXIMATELY THE SAME.
5. TO PROPERLY PRELOAD THE KC CONNECTION AGAINST FLUID PRESSURE AND GASKET LOADS, THE FOLLOWING TORQUE VALUES ARE RECOMMENDED FOR THE VARIOUS SIZES OF STUDS AS LISTED IN TABLE 1 FOR APPROXIMATELY 20,000 PSI TENSILE STRESS IN THE STUDS.
6. THE TORQUE VALUES LISTED IN TABLE 1 ARE FOR WELL LUBRICATED STUDS ONLY.

REVISED: (C) REV & REDRAWN 8-1-90

APPROVED: 9-14-67

CUSTODIAN:		JOHN F. KENNEDY SPACE CENTER	
PROCUREMENT SPEC.	PIPE CONNECTION ASSY INSTALLATION OF	DESIGN STANDARD	
NONE		KC163	
COORDINATION STATUS		SHEET 1 OF 3	
KSC DE			

KSC FORM 32-85 (CG 4/92)

NOTICE: WHEN GOVERNMENT DRAWINGS, SPECIFICATIONS OR OTHER DATA ARE USED FOR ANY PURPOSE OTHER THAN IN CONNECTION WITH A DEFINITELY RELATED GOVERNMENT PROCUREMENT OPERATION, THE UNITED STATES GOVERNMENT THEREBY INCURS NO RESPONSIBILITY NOR ANY OBLIGATION WHATSOEVER AND THE FACT THAT THE GOVERNMENT MAY HAVE FORMULATED, FURNISHED, OR IN ANY WAY SUPPLIED THE SAID DRAWINGS, SPECIFICATIONS, OR OTHER DATA IS NOT REGARDED BY IMPLICATION OR OTHERWISE AS IN ANY MANNER LICENSING THE HOLDER OR ANY OTHER PERSON OR CORPORATION, OR CONVEYING ANY RIGHTS OR PERMISSION TO MANUFACTURE, USE, OR SELL ANY PATENTED INVENTION THAT MAY IN ANY WAY BE RELATED THERETO.

GP-425

NASA

FED SUP CLASS
NONE

NOTICE: WHEN GOVERNMENT DRAWINGS, SPECIFICATIONS OR OTHER DATA ARE USED FOR ANY PURPOSE OTHER THAN IN CONNECTION WITH A DEFINITELY RELATED GOVERNMENT PROCUREMENT OPERATION, THE UNITED STATES GOVERNMENT THEREBY INCURS NO RESPONSIBILITY NOR ANY OBLIGATION WHATSOEVER AND THE FACT THAT THE GOVERNMENT MAY HAVE FORMULATED, FURNISHED, OR IN ANY WAY SUPPLIED THE SAID DRAWINGS, SPECIFICATIONS, OR OTHER DATA IS NOT REGARDED BY IMPLICATION OR OTHERWISE AS IN ANY MANNER LICENSING THE HOLDER OR ANY OTHER PERSON OR CORPORATION, OR CONVEYING ANY RIGHTS OR PERMISSION TO MANUFACTURE, USE, OR SELL ANY PATENTED INVENTION THAT MAY IN ANY WAY BE RELATED THERETO.

PIPE SIZE (IN.)	SCHEDULE	HUB SIZE	KC159 BUTTWELD HUB	KC160 BLIND HUB	KC162 SEAL RING	KC156 ELBOW	KC157 TEE	KC158 CROSS	KC155 CLAMP	
1/2	40	1/2GR5	-1	-2	-2	-1	-1	-1	-1	
	80									
	160	1/2GR4		-1	-1	-2	-2	-2		
	XXS									
3/4	160	3/4GR5	-2	-2	-2	-3	-3	-3	-1	
	XXS	3/4GR4		-1	-1	-4	-4	-4		
1	ALL	1GR11	-3	-3	-4	-5	-5	-5	-2	
1/2	40	1GR5	-13	-19	-2	-22	-22	---	-8	
	80									
	160	1GR4		-18	-1	-21	-21	---		
	XXS									
3/4	40	1GR7	-14	-20	-3	-23	-23	---	-8	
	80									
	160	1GR5		-19	-2	-22	-22	---		
	XXS	1GR4		-18	-1	-21	-21	---		
1	40	1GR11	-15	-21	-4	-24	-24	---	-6	
	80									
	160	1GR7		-20	-3	-23	-23	---		
	XXS	1GR5		-19	-2	-22	-22	---		
1/4	40	1-1/4GR14	-4	-4	-6	-6	-6	-5	-2	
	80									
	160	1-1/4GR11		-3	-4	-5	-5	-5		
	XXS									
1 1/2	ALL	1-1/2GR14	-5	-4	-6	-6	-6	-6	-2	
2	40	2GR20	-6	-6	-7	-7	-7	-7	-3	
	80									
	160	2GR14		-5	-6	-8	-8	-8		
	XXS									
2 1/2	40	2-1/2GR25	-7	-8	-8	-9	-9	-9	-4	
	80									
	160	2-1/2GR20		-7	-7	-10	-10	-10		
	XXS									
3	40	3GR27	-8	-9	-9	-11	-11	-11	-4	
	80									
	160	3GR25		-8	-8	-12	-12	-12		
	XXS									

CUSTODIAN:

JOHN F. KENNEDY SPACE CENTER

PROCUREMENT SPEC.

NONE

COORDINATION STATUS

KSC DE

PIPE CONNECTION ASSY
INSTALLATION OF

DESIGN STANDARD

KC163

SHEET 2 OF 3

REVISED: (C) REV & REDRAWN 8-1-90

APPROVED: 9-14-67

KSC FORM 32-85 (CG 4/92)

GP-425

FED SUP CLASS
NONE

PIPE SIZE (IN.)	SCHEDULE	HUB SIZE	KC159 BUTTWELD HUB	KC160 BLIND HUB	KC162 SEAL RING	KC156 ELBOW	KC157 TEE	KC158 CROSS	KC155 CLAMP
3½	40	4GR34	-9	-11	-11	-14	-14	-14	-5
	80								
	XXS	4GR31		-10	-10	-15	-15	-15	
4	40	4GR40	-10	-12	-12	-13	-13	-13	-5
	80								
	160	4GR34		-11	-11	-14	-14	-14	
	XXS	4GR31		-10	-10	-15	-15	-15	
5	40	5GR52	-11	-13	-14	-16	-16	-16	-6
	80								
	160	5GR46		-14	-13	-17	-17	-17	
	XXS	5GR40		-15	-12	-18	-18	-18	
6	40	6GR62	-12	-17	-15	-19	-19	-19	-7
	80								
	160	6GR52		-16	-14	-20	-20	-20	
	XXS								

TABLE I

KC155 CLAMP ASSEMBLY, 4 BOLT

TORQUE REQUIREMENTS	
STUD SIZE	TORQUE RANGE (FT LBS)
½	15-20
¾	30-40
¾	50-65
¾	80-105
1	120-165
1½	180-235

TABLE II

KC155 CLAMP ASSEMBLY, 2 BOLT

TORQUE REQUIREMENTS	
STUD SIZE	TORQUE RANGE (FT LBS)
¾	6-8

ABOVE VALUES ARE FOR LUBRICATED STUDS

REVISED: (C) REV & REDRAWN 8-1-90

APPROVED: 9-14-67

CUSTODIAN:

JOHN F. KENNEDY SPACE CENTER

PROCUREMENT SPEC.
NONE

COORDINATION STATUS

KSC DE

PIPE CONNECTION ASSY
INSTALLATION OF

DESIGN STANDARD

KC163


SHEET 3 OF 3

KSC FORM 32-85 (CG 4/92)

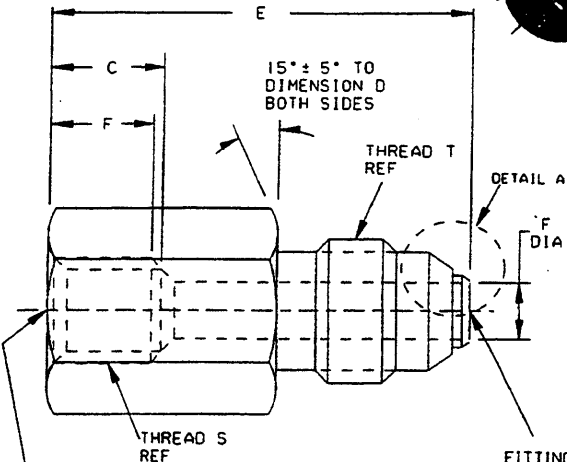
NOTICE: WHEN GOVERNMENT DRAWINGS, SPECIFICATIONS OR OTHER DATA ARE USED FOR ANY PURPOSE OTHER THAN IN CONNECTION WITH A DEFINITELY RELATED GOVERNMENT PROCUREMENT OPERATION, THE UNITED STATES GOVERNMENT THEREBY INCURS NO RESPONSIBILITY NOR ANY OBLIGATION WHATSOEVER AND THE FACT THAT THE GOVERNMENT MAY HAVE FORMULATED, FURNISHED, OR IN ANY WAY SUPPLIED THE SAID DRAWINGS, SPECIFICATIONS, OR OTHER DATA IS NOT REGARDED BY IMPLICATION OR OTHERWISE AS IN ANY MANNER LICENSING THE HOLDER OR ANY OTHER PERSON OR CORPORATION, OR CONVEYING ANY RIGHTS OR PERMISSION TO MANUFACTURE, USE, OR SELL ANY PATENTED INVENTION THAT MAY IN ANY WAY BE RELATED THERETO.

GP-425

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FED SUP CLASS
4730



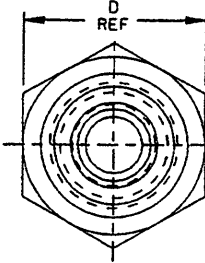
15° ± 5° TO
DIMENSION D
BOTH SIDES

THREAD T
REF

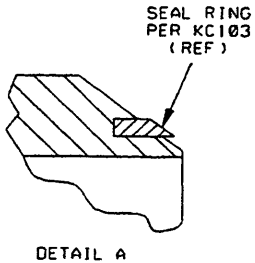
DETAIL A

F DIA

THREAD S
REF



D
REF



SEAL RING
PER KC103
(REF)

DETAIL A

INTERNALLY THREADED END IN ACCORDANCE WITH MS33649 FOR TUBE SIZE SPECIFIED EXCEPT AS OTHERWISE NOTED. SPOTFACE NOT A REQUIREMENT

FITTING END IN ACCORDANCE WITH KC105, STYLE E FOR TUBE SIZE SPECIFIED EXCEPT HEX AS NOTED

DASH NO.		INTERNALLY THREADED END				EXTERNALLY THREADED END		D HEX	E +.000 -.032	F DIA
		TUBE OD	THREAD S REF	C ±.016	F DIA 6	TUBE OD	THREAD T REF			
K4-8	D4-8	1/4	7/16-20	.609	.493	1/2	3/4-16	1.000	1.016	.172 ±.003 -.004
K6-12	D6-12	3/8	9/16-18		.482	3/4	1-1/16-12	1.375	1.266	.297 ±.004
K8-12	D8-12	1/2	3/4-16	.734	.593				1.641	.391 ±.004
K8-16	D8-16				.593	1	1-5/16-12	1.625 ±.016	1.688	
K12-16	D12-16	3/4	1-1/16-12	.922	.656				1.922	.609 ±.005


MATERIAL: SEE PROCUREMENT SPECIFICATION. ALUMINUM ALLOY, 2024-T6, CODE "D" CORROSION RESISTANT STEEL (CLASS 316), CODE "K"

FINISH: SEE PROCUREMENT SPECIFICATION.

SCREW THREAD: SEE PROCUREMENT SPECIFICATION.

NOTES:

- REMOVE BURRS AND SLIVERS. BREAK SHARP EDGES UNLESS OTHERWISE NOTED.
- DIMENSIONS IN INCHES. UNLESS OTHERWISE SPECIFIED, TOLERANCE DECIMALS ±.016.
- FOR DESIGN FEATURE PURPOSES, THIS DRAWING TAKES PRECEDENCE OVER PROCUREMENT DOCUMENTS REFERENCED HEREIN.
- REFERENCED DOCUMENTS SHALL BE OF THE ISSUE IN EFFECT ON THE DATE OF INVITATION FOR BID.
- MARKING OF FITTINGS SHALL BE CONSISTENT WITH PROCUREMENT SPECIFICATION USING APPLICABLE KC STANDARD AND PART NUMBER DESIGNATIONS AS SHOWN ON THIS DRAWING.

 F MIN IS THE FULL THREAD DEPTH REQUIREMENTS

EXAMPLE OF PART NOS.

KC164K4-8 = BUSHING: 1/4" TUBING, FOR INTERNAL THREADS, AND 1/2" TUBING, FOR EXTERNAL THREADS; CORROSION RESISTANT STEEL

KC164D6-12 = BUSHING: 3/8" TUBING, FOR INTERNAL THREADS, AND 3/4" TUBING, FOR EXTERNAL THREADS; ALUMINUM ALLOY

CUSTODIAN: JOHN F. KENNEDY SPACE CENTER

PROCUREMENT SPEC.
KSC-F-124

COORDINATION STATUS
KSC DE

**BUSHING - SCREW THREAD
REDUCER FOR SEAL RING**

STANDARD PART

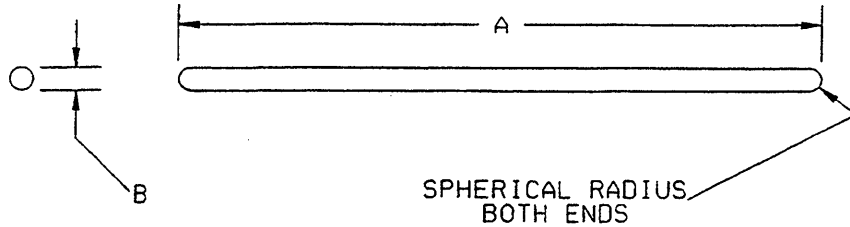
KC164

SHEET 1 OF 1

REVISED: (D) 8-1-90 (E) DASH NUMBER CHANGE 1-2-91 (F) ADDED DIM. F & NOTE 6 9-1-97
 APPROVED: 4-12-66

GP-425

NOTICE: WHEN GOVERNMENT DRAWINGS, SPECIFICATIONS OR OTHER DATA ARE USED FOR ANY PURPOSE OTHER THAN IN CONNECTION WITH A DEFINITELY RELATED GOVERNMENT PROCUREMENT OPERATION, THE UNITED STATES GOVERNMENT THEREBY INCURS NO RESPONSIBILITY NOR ANY OBLIGATION WHATSOEVER AND THE FACT THAT THE GOVERNMENT MAY HAVE FORMULATED, FURNISHED, OR IN ANY WAY SUPPLIED THE SAID DRAWINGS, SPECIFICATIONS, OR OTHER DATA IS NOT REGARDED BY IMPLICATION OR OTHERWISE AS IN ANY MANNER LICENSING THE HOLDER OR ANY OTHER PERSON OR CORPORATION, OR CONVEYING ANY RIGHTS OR PERMISSION TO MANUFACTURE, USE, OR SELL ANY PATENTED INVENTION THAT MAY IN ANY WAY BE RELATED THERETO.

FED SUP CLASS
NONE

DASH NO.	TUBE OD REF	A DIM $\pm .016$	B DIA (STOCK TOLERANCES)
-4	1/4	1.094	.080
-6	3/8	1.453	
-8	1/2	2.000	
-10	5/8	2.326	.091
-12	3/4	2.859	
-16	1	3.750	.125
-20	1 1/4	4.750	
-24	1 1/2	5.500	
-28	1 3/4	6.750	
-32	2	7.500	

MATERIAL: CORROSION RESISTANT STEEL WIRE, TYPE 302, 304, OR 305 PER ASTM A580 ANNEALED

FINISH: NONE

CODE: NONE

- NOTES:
1. DIMENSIONS ARE IN INCHES. UNLESS OTHERWISE SPECIFIED, TOLERANCE DECIMALS $\pm .016$.
 2. FOR DESIGN FEATURE PURPOSES, THIS DRAWING TAKES PRECEDENCE OVER PROCUREMENT DOCUMENTS SPECIFIED HEREIN.
 3. REFERENCE DOCUMENTS SHALL BE OF THE ISSUE IN EFFECT ON DATE OF INVITATION FOR BID.

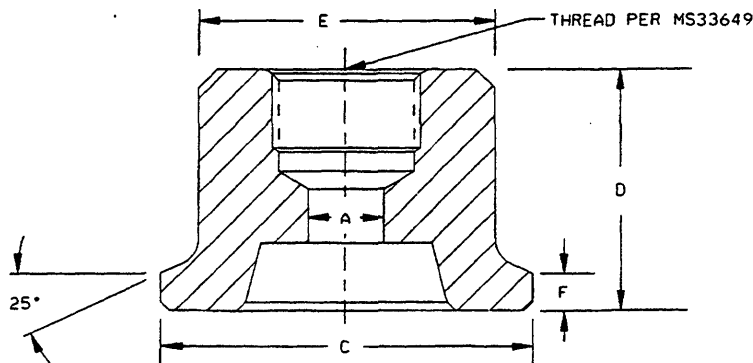
EXAMPLE OF PART NUMBER: KC165-4 = RETAINING WIRE FOR 1/4" OD TUBE SWIVEL FITTING.

REVISED: (E) REV & REDRAWN 8-1-90

APPROVED: 12-1-75

CUSTODIAN:		JOHN F. KENNEDY SPACE CENTER	
PROCUREMENT SPEC.	WIRE, RETAINING SWIVEL NUT	STANDARD PART	
NONE		KC165	
COORDINATION STATUS		SHEET 1 OF 1	
KSC DE			

NASA

FED SUP CLASS
4730

MATERIAL CODE: ADD A AFTER DASH NO. TO DENOTE SA-105-GR11.
ADD B AFTER DASH NO. TO DENOTE SA-182-F316.

TEMPERATURE RANGE: SEE MATERIAL SPECIFICATION.

- NOTES:
1. ALL MATERIALS ARE PER ASTM SPECIFICATIONS
 2. ALL DIMENSIONS ARE IN INCHES.
 3. TOLERANCE: SEE KC161.
 4. FOR DESIGN FEATURE PURPOSES, THIS DRAWING TAKES PRECEDENCE OVER PROCUREMENT DOCUMENTS REFERENCED HEREIN.
 5. REFERENCED DOCUMENTS SHALL BE OF THE ISSUE IN EFFECT ON THE DATE OF INVITATION FOR BID.
 6. HUB PRESSURE RATING IS THE LOWER OF EITHER THE VENDOR'S PRESSURE LIMIT ON THE HUB OR KSC'S PRESSURE LIMIT ON THE FITTING WHICH SCREWS INTO THE THREADED HOLE.
 7. THIS SIZE IS NOT TO BE USED FOR NEW DESIGN. SEE KC167 FOR NEW DESIGN.
 8. DO NOT USE THIS STANDARD FOR ITEMS WHICH CANNOT BE IDENTIFIED BY THE LIMITATIONS CONTAINED HEREIN.
 9. ALL PARTS NOT MANUFACTURED BY GRAY TOOL CO. MUST BE CERTIFIED BY THE MANUFACTURER TO BE INTERCHANGEABLE WITH THE GRAY TOOL PART NUMBER.

EXAMPLE OF
PART NOS.

BASIC PART NUMBER KC166-3A

└─ MATERIAL CODE
└─ DASH NUMBER

APPROVED SOURCE: COMMERCIAL PARTS CAN BE PURCHASED FROM: VETCO-GRAY 10777 NW FWY
P.O. BOX 2291, HOUSTON, TX 77001-2291.

ALTERNATE SOURCES: OTECO EQUIPMENT COMPANY REFLANGE, INC.
2811 TROUT STREET 5730 CENTRALCREST
P.O. BOX 1849 HOUSTON, TX 77092
HOUSTON, TX 77251-1849

REVISED: C CHANGED APPROVED SOURCE. 10-2-92

APPROVED: 2-6-76

NOTICE: WHEN GOVERNMENT DRAWINGS, SPECIFICATIONS OR OTHER DATA ARE USED FOR ANY PURPOSE OTHER THAN IN CONNECTION WITH A DEFINITELY RELATED GOVERNMENT PROCUREMENT OPERATION, THE UNITED STATES GOVERNMENT THEREBY INCURS NO RESPONSIBILITY NOR ANY OBLIGATION WHATSOEVER AND THE FACT THAT THE GOVERNMENT MAY HAVE FORMULATED, FURNISHED, OR IN ANY WAY SUPPLIED THE SAID DRAWINGS, SPECIFICATIONS, OR OTHER DATA IS NOT REGARDED BY IMPLICATION OR OTHERWISE AS IN ANY MANNER LICENSING THE HOLDER OR ANY OTHER PERSON OR CORPORATION, OR CONVEYING ANY RIGHTS OR PERMISSION TO MANUFACTURE, USE, OR SELL ANY PATENTED INVENTION THAT MAY IN ANY WAY BE RELATED THERETO.

CUSTODIAN: JOHN F. KENNEDY SPACE CENTER

PROCUREMENT SPEC.
NONE

COORDINATION STATUS

KSC DE

HUB, TAPPED BLIND

STANDARD PART





KC166

SHEET 1 OF 2

GP-425

FED SUP CLASS
4730

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DASH NO.	HUB SIZE	MS33649 THREAD SIZE	OPERATING PRESSURE RATING (PSIG)		DIMENSIONS						MATERIAL CODE	
			MAT'L CODE								-A SA-105 GRII	-B SA-182 F-316
			-A	-B	A	C	D	E	F	GRAYLOC STK NO.	GRAYLOC STK NO.	
-1	1GR4	-4	9600	9600	.172	2.000	1.750	1.500	.313	I-4708-1	I-4709-1	
-2		-6	6900	6900	.297					I-4708-5	I-4709-5	
-3		-8	7400	7400	.391					I-4708-9	I-4709-9	
 -4		-12	6500	6500						I-4708-13	I-4709-13	
-5	1GR5	-4	9600	9600	.172					I-4708-2	I-4709-2	
-6		-6	6900	6900	.297					I-4708-6	I-4709-6	
-7		-8	7400	7400	.391					I-4708-10	I-4709-10	
 -8		-12	6500	6500						I-4708-14	I-4709-14	
-9	1GR7	-4	8784	8180	.172					I-4708-3	I-4709-3	
-10		-6	6900	6900	.297					I-4708-7	I-4709-7	
-11		-8	7400	7400	.391					I-4708-11	I-4709-11	
 -12		-12	6500	6500						I-4708-15	I-4709-15	
-13	1GR11	-4	4264	4340	.172					I-4708-4	I-4709-4	
-14		-6	4264	4340	.297					I-4708-8	I-4709-8	
-15		-8	4264	4340	.391					I-4708-12	I-4709-12	
 -16		-12	4264	4340						I-4708-16	I-4709-16	

REVISED: (C) CHANGED APPROVED SOURCE ON SHEET 1. 10-2-92

APPROVED: 2-6-76

CUSTODIAN:

JOHN F. KENNEDY SPACE CENTER

PROCUREMENT SPEC.
NONE

COORDINATION STATUS

KSC DE

HUB, TAPPED BLIND

STANDARD PART

KC166

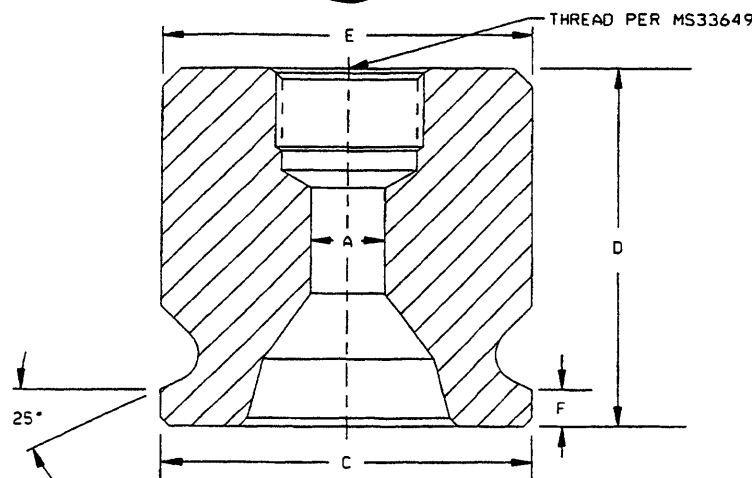
SHEET 2 OF 2

GP-425

NOTICE: WHEN GOVERNMENT DRAWINGS, SPECIFICATIONS OR OTHER DATA ARE USED FOR ANY PURPOSE OTHER THAN IN CONNECTION WITH A DEFINITELY RELATED GOVERNMENT PROCUREMENT OPERATION, THE UNITED STATES GOVERNMENT THEREBY INCURS NO RESPONSIBILITY NOR ANY OBLIGATION WHATSOEVER, AND THE FACT THAT THE GOVERNMENT MAY HAVE FORMULATED, FURNISHED, OR IN ANY WAY SUPPLIED THE SAID DRAWINGS, SPECIFICATIONS, OR OTHER DATA IS NOT REGARDED BY IMPLICATION OR OTHERWISE AS IN ANY MANNER LICENSING THE HOLDER OR ANY OTHER PERSON OR CORPORATION, OR CONVEYING ANY RIGHTS OR PERMISSION TO MANUFACTURE, USE, OR SELL ANY PATENTED INVENTION THAT MAY IN ANY WAY BE RELATED THERETO.



FED SUP CLASS
4730



MATERIAL CODE: ADD A AFTER DASH NO. TO DENOTE SA-105-GR11.
ADD B AFTER DASH NO. TO DENOTE SA-182-F316.

TEMPERATURE RANGE: SEE MATERIAL SPECIFICATION.

- NOTES:
1. ALL MATERIALS ARE PER ASTM SPECIFICATIONS
 2. ALL DIMENSIONS ARE IN INCHES.
 3. TOLERANCE: SEE KC161.
 4. FOR DESIGN FEATURE PURPOSES, THIS DRAWING TAKES PRECEDENCE OVER PROCUREMENT DOCUMENTS REFERENCED HEREIN.
 5. REFERENCED DOCUMENTS SHALL BE OF THE ISSUE IN EFFECT ON THE DATE OF INVITATION FOR BID.
 6. HUB PRESSURE RATING IS THE LOWER OF EITHER THE VENDOR'S PRESSURE LIMIT ON THE HUB OR KSC'S PRESSURE LIMIT ON THE FITTING WHICH SCREWS INTO THE THREADED HOLE.
 7. SEE KC166 FOR PREFERRED CONFIGURATION OF HUBS TAPPED WITH THREAD SIZES MS33649-4, -6, -8.
 8. DO NOT USE THIS STANDARD FOR ITEMS WHICH CANNOT BE IDENTIFIED BY THE LIMITATIONS CONTAINED HEREIN.
 9. ALL PARTS NOT MANUFACTURED BY GRAY TOOL CO. MUST BE CERTIFIED BY THE MANUFACTURER TO BE INTERCHANGEABLE WITH THE GRAY TOOL PART NUMBER.

EXAMPLE OF
PART NOS.

BASIC PART NUMBER KC167-3A

MATERIAL CODE
DASH NUMBER

APPROVED SOURCE: COMMERCIAL PARTS CAN BE PURCHASED FROM: VETCO-GRAY INC. 10777 NW FWY
P.O. BOX 2291, HOUSTON, TX 77001-2291.

ALTERNATE SOURCES: OTECO EQUIPMENT COMPANY REFLANGE, INC.
2811 TROUT STREET 5730 CENTRALCREST
P.O. BOX 1849 HOUSTON, TX 77092
HOUSTON, TX 77251-1849

REVISED: (C) CHANGED APPROVED SOURCE. 10-2-92













APPROVED: 2-6-76

CUSTODIAN: JOHN F. KENNEDY SPACE CENTER		STANDARD PART	
PROCUREMENT SPEC. NONE	HUB, TAPPED	KC167	
COORDINATION STATUS		SHEET 1 OF 3	
KSC DE			

GP-425

FED SUP CLASS
4730

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DASH NO.	HUB SIZE	MS33649 THREAD SIZE	OPERATING PRESSURE RATING (PSIG)		DIMENSIONS					MATERIAL CODE	
			MAT'L CODE							-A SA-105 GRII	-B SA-182 F-316
			-A	-B	A	C	D	E	F	GRAYLOC STK NO.	GRAYLOC STK NO.
 -1	1GR4	-4	9600	9600	.172	2.000	3.000	2.000	.313	1-4695-7	1-4725-7
 -2		-6	6900	6900	.297					1-4695-1	1-4725-1
 -3		-8	7400	7400	.391					1-4695-3	1-4725-3
-4		-12	6500	6500	.500					1-4695-5	1-4725-5
-5		-16	5300	5300	.500					1-4695-21	1-4725-21
 -6	1GR5	-4	9600	9600	.172					1-4695-8	1-4725-8
 -7		-6	6900	6900	.297					1-4695-2	1-4725-2
 -8		-8	7400	7400	.391					1-4695-4	1-4725-4
-9		-12	6500	6500	.609					1-4695-6	1-4725-6
-10		-16	5300	5300	.625					1-4695-22	1-4725-22
 -11	1GR7	-4	8784	8180	.172					1-4695-9	1-4725-9
 -12		-6	6900	6900	.297					1-4695-11	1-4725-11
 -13		-8	7400	7400	.391					1-4695-13	1-4725-13
-14		-12	6500	6500	.609					1-4695-19	1-4725-19
-15		-16	5300	5300	.844					1-4695-23	1-4725-23
 -16	1GRI1	-4	4264	4340	.172					1-4695-10	1-4725-10
 -17		-6	4264	4340	.297					1-4695-12	1-4725-12
 -18		-8	4264	4340	.391					1-4695-14	1-4725-14
-19		-12	4264	4340	.609					1-4695-20	1-4725-20
-20		-16	4264	4340	.844					1-4695-24	1-4725-24
-21	1½GR14	-4	6547	6040	.172	3.125	3.250	3.125	.437	1-4695-25	1-4725-25
-22		-6	6547	6040	.297					1-4695-26	1-4725-26
-23		-3	6547	6040	.391					1-4695-27	1-4725-27
-24		-12	6500	6040	.609					1-4695-29	1-4725-29
-25		-16	5300	5300	.844					1-4695-30	1-4725-30

REVISED: (C) CHANGED APPROVED SOURCE ON SHEET 1. 10-2-92

APPROVED: 2-6-76

CUSTODIAN: JOHN F. KENNEDY SPACE CENTER		
PROCUREMENT SPEC. NONE	HUB, TAPPED	STANDARD PART
COORDINATION STATUS		KC167
KSC DE		SHEET 2 OF 3

GP-425

FED SUP CLASS
4730

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DASH NO.	HUB SIZE	MS33649 THREAD SIZE	OPERATING PRESSURE RATING (PSIG)		DIMENSIONS					MATERIAL CODE	
			MAT'L CODE							-A SA-105 GRII	-B SA-182 F-316
			-A	-B	A	C	D	E	F	GRAYLOC STK NO.	GRAYLOC STK NO.
-26	2GR20	-4	4870	4640	.172	3.625	3.500	3.625	.437	I-4695-31	I-4725-31
-27		-6	4870	4640	.297					I-4695-32	I-4725-32
-28		-8	4870	4640	.391					I-4695-33	I-4725-33
-29		-12	4870	4640	.609					I-4695-35	I-4725-35
-30		-16	4870	4640	.844					I-4695-36	I-4725-36
-31		-20	4870	4640	1.078					I-4695-55	I-4725-55
-32		-24	4600	4600	1.312					I-4695-56	I-4725-56
-33		-32	4600	4600	1.781					I-4695-58	I-4725-58
-34	2½- 3GR25	-4	6617	6000	.172	5.000	4.250	5.000	.500	I-4695-37	I-4725-37
-35		-6	6617	6000	.297					I-4695-38	I-4725-38
-36		-8	6617	6000	.391					I-4695-39	I-4725-39
-37		-12	6500	6000	.609					I-4695-41	I-4725-41
-38		-16	5300	5300	.844					I-4695-42	I-4725-42
-39		-20	5200	5200	1.078					I-4695-59	I-4725-59
-40		-24	4600	4600	1.312					I-4695-60	I-4725-60
-41		-32	4600	4600	1.781					I-4695-62	I-4725-62
-42	4GR31	-4	7969	7120	.172	6.000	5.000	6.000	.590	I-4695-43	I-4725-43
-43		-6	6900	6900	.297					I-4695-44	I-4725-44
-44		-8	7400	7120	.391					I-4695-45	I-4725-45
-45		-12	6500	6500	.609					I-4695-47	I-4725-47
-46		-16	5300	5300	.844					I-4695-48	I-4725-48
-47		-20	5200	5200	1.078					I-4695-63	I-4725-63
-48		-24	4600	4600	1.312					I-4695-64	I-4725-64
-49		-32	4600	4600	1.781					I-4695-66	I-4725-66
-50	6GR52	-4	5944	5080	.172	9.250	5.500	9.250	.812	I-4695-49	I-4725-49
-51		-6	5944	5080	.297					I-4695-50	I-4725-50
-52		-8	5944	5080	.391					I-4695-51	I-4725-51
-53		-12	5944	5080	.609					I-4695-53	I-4725-53
-54		-16	5300	5080	.844					I-4695-54	I-4725-54
-55		-20	5200	5080	1.078					I-4695-67	I-4725-67
-56		-24	4600	4600	1.312					I-4695-68	I-4725-68
-57		-32	4600	4600	1.781					I-4695-70	I-4725-70

REVISED: (C) CHANGED APPROVED SOURCE ON SHEET 1. 10-2-92

APPROVED: 2-6-76

CUSTODIAN:

JOHN F. KENNEDY SPACE CENTER

PROCUREMENT SPEC.
NONE

COORDINATION STATUS

KSC DE

HUB, TAPPED

STANDARD PART

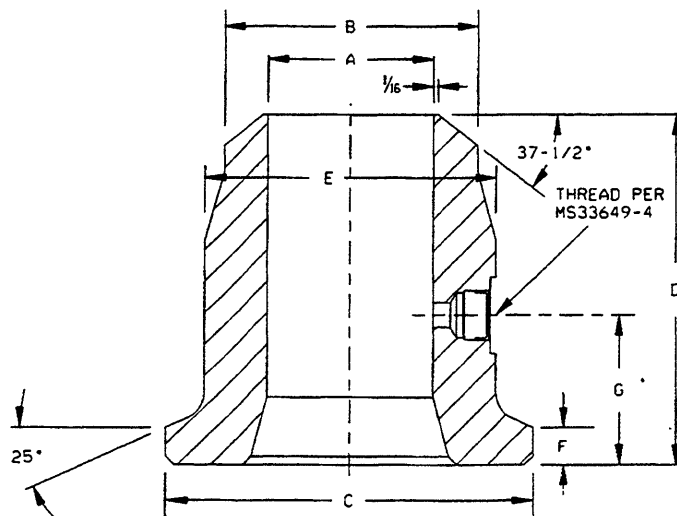
KC167

SHEET 3 OF 3

GP-425

NOTICE: WHEN GOVERNMENT DRAWINGS, SPECIFICATIONS OR OTHER DATA ARE USED FOR ANY PURPOSE OTHER THAN IN CONNECTION WITH A DEFINITELY RELATED GOVERNMENT PROCUREMENT OPERATION, THE UNITED STATES GOVERNMENT THEREBY INCURS NO RESPONSIBILITY NOR ANY OBLIGATION WHATSOEVER AND THE FACT THAT THE GOVERNMENT MAY HAVE FORMULATED, FURNISHED, OR IN ANY WAY SUPPLIED THE SAID DRAWINGS, SPECIFICATIONS, OR OTHER DATA IS NOT REGARDED BY IMPLICATION OR OTHERWISE AS IN ANY MANNER LICENSING THE HOLDER OR ANY OTHER PERSON OR CORPORATION, OR CONVEYING ANY RIGHTS OR PERMISSION TO MANUFACTURE, USE, OR SELL ANY PATENTED INVENTION THAT MAY IN ANY WAY BE RELATED THERETO.

NASA

FED SUP CLASS
4730

MATERIAL CODE: ADD A AFTER DASH NO. TO DENOTE SA-105-GR11.
ADD B AFTER DASH NO. TO DENOTE SA-182-F316.

TEMPERATURE RANGE: SEE MATERIAL SPECIFICATION.

- NOTES:
- ALL MATERIALS ARE PER ASTM SPECIFICATIONS
 - ALL DIMENSIONS ARE IN INCHES.
 - TOLERANCE: SEE KC161.
 - FOR DESIGN FEATURE PURPOSES, THIS DRAWING TAKES PRECEDENCE OVER PROCUREMENT DOCUMENTS REFERENCED HEREIN.
 - REFERENCED DOCUMENTS SHALL BE OF THE ISSUE IN EFFECT ON THE DATE OF INVITATION FOR BID.
 - HUB PRESSURE RATING IS THE LOWER OF EITHER THE VENDOR'S PRESSURE LIMIT ON THE HUB OR KSC'S PRESSURE LIMIT ON THE FITTING WHICH SCREWS INTO THE THREADED HOLE.
 - THIS PIPE SIZE DOES NOT HAVE A STANDARD VENDOR HUB.
 - DO NOT USE THIS STANDARD FOR ITEMS WHICH CANNOT BE IDENTIFIED BY THE LIMITATIONS CONTAINED HEREIN.
 - ALL PARTS NOT MANUFACTURED BY GRAY TOOL CO. MUST BE CERTIFIED BY THE MANUFACTURER TO BE INTERCHANGEABLE WITH THE GRAY TOOL PART NUMBER.

EXAMPLE OF
PART NOS.

BASIC PART NUMBER KC168-3A

MATERIAL CODE
DASH NUMBER

APPROVED SOURCE: COMMERCIAL PARTS CAN BE PURCHASED FROM: VETCO-GRAY INC. 10777 NW FWY
P.O. BOX 2291, HOUSTON, TX 77001-2291.

ALTERNATE SOURCES: OTECO EQUIPMENT COMPANY REFLANGE, INC.
2811 TROUT STREET 5730 CENTRALCREST
P.O. BOX 1849 HOUSTON, TX 77092
HOUSTON, TX 77251-1849

REVISED: (D) CHANGED APPROVED SOURCE. 10-2-92



APPROVED: 2-6-76

CUSTODIAN: JOHN F. KENNEDY SPACE CENTER		STANDARD PART	
PROCUREMENT SPEC. NONE	HUB, PRESSURE TAPPED	KC168	
COORDINATION STATUS		SHEET 1 OF 3	
KSC DE			

GP-425

FED SUP CLASS
4730

NOTICE: WHEN GOVERNMENT DRAWINGS, SPECIFICATIONS OR OTHER DATA ARE USED FOR ANY PURPOSE OTHER THAN IN CONNECTION WITH A DEFINITELY RELATED GOVERNMENT PROCUREMENT OPERATION, THE UNITED STATES GOVERNMENT THEREBY INCURS NO RESPONSIBILITY NOR ANY OBLIGATION WHATSOEVER AND THE FACT THAT THE GOVERNMENT MAY HAVE FORMULATED, FURNISHED, OR IN ANY WAY SUPPLIED THE SAID DRAWINGS, SPECIFICATIONS, OR OTHER DATA IS NOT REGARDED BY IMPLICATION OR OTHERWISE AS IN ANY MANNER LICENSING THE HOLDER OR ANY OTHER PERSON OR CORPORATION, OR CONVEYING ANY RIGHTS OR PERMISSION TO MANUFACTURE, USE, OR SELL ANY PATENTED INVENTION THAT MAY IN ANY WAY BE RELATED THERETO.

DASH NO.	PIPE SIZE	PIPE SCHED.	HUB SIZE	OPERATING PRESSURE RATING (PSIG)		DIMENSIONS								MATERIAL CODE		
				MAT'L CODE										-A SA-105 GR11	-B SA-182 F-316	
				-A	-B	A	B	C	D	E	F	G	GRAYLOC STK NO.	GRAYLOC STK NO.		
-1	1/2	40	1GR5	9600	9600	.622	.840							I-4839-A1	I-4839-B1	
-2		80				.546								I-4839-A2	I-4839-B2	
-3		160	1GR4			.466								I-4839-A3	I-4839-B3	
-4		XXS				.252								I-4839-A4	I-4839-B4	
-5	3/4	40	1GR7	8784	8180	.824	1.050	2.000		2.688	.313	2.188	I-4839-A5	I-4839-B5		
-6		80				.742							I-4839-A6	I-4839-B6		
-7		160	1GR4			9600							9600	.614	I-4839-A7	I-4839-B7
-8		XXS												1GR5	.434	I-4839-A8
-9	1	40	1GR11	4211	4340	1.049	1.315		4.313				I-4839-A9	I-4839-B9		
-10		80				.957							I-4839-A10	I-4839-B10		
-11		160	1GR7			8784							8180	.815	I-4839-A11	I-4839-B11
-12		XXS													1GR5	9600
-13	1 1/2	40	1 1/2 GR14	6547	6040	1.610	1.900	3.125		3.250		2.313	I-4839-A17	I-4839-B17		
-14		80				1.500							I-4839-A18	I-4839-B18		
-15		160				1.338							I-4839-A19	I-4839-B19		
-16		XXS				1.100							I-4839-A20	I-4839-B20		
-17	2	40	2GR20	4870	4640	2.067	2.375	3.625	4.500	3.688		.437	I-4839-A21	I-4839-B21		
-18		80				1.939							I-4839-A22	I-4839-B22		
-19		160				1.689							I-4839-A23	I-4839-B23		
-20		XXS				2GR14							9600	9600	1.503	I-4839-A24
-21	2 1/2	40	2 1/2-3GR25	6617	6000	2.469	2.875	5.000	5.000	5.000	.500	2.375	I-4839-A25	I-4839-B25		
-22		80	2.323	I-4839-A26	I-4839-B26											
-23		160	2 1/2-3GR20	9600	9600	2.125							I-4839-A27	I-4839-B27		
-24		XXS	2.771	I-4839-A28	I-4839-B28											
-25	3	40	2 1/2-3GR27	3635	3480	3.068	3.500	5.000	5.000	5.000	.500		I-4839-A29	I-4839-B29		
-26		80	2.900	I-4839-A30	I-4839-B30											
-27		160	2 1/2-3GR25	6617	6000	2.626							I-4839-A31	I-4839-B31		
-28		XXS	2.300	I-4839-A32	I-4839-B32											
-29	3 1/2	40	4GR34	4637	4340	3.548	4.000	6.000	5.375	6.000	.500	2.688	I-4839-A33	I-4839-B33		
-30		80	3.364	I-4839-A34	I-4839-B34											
-31		XXS	4GR27			2.728							I-4839-A35	I-4839-B35		

REVISED: (D) CHANGED APPROVED SOURCE ON SHEET 1. 10-2-92

APPROVED: 2-6-76

CUSTODIAN:

JOHN F. KENNEDY SPACE CENTER

PROCUREMENT SPEC.
NONE

STANDARD PART

COORDINATION STATUS

HUB, PRESSURE TAPPED

KC168

KSC DE

SHEET 2 OF 3

GP-425

FED SUP CLASS
4730

NOTICE: WHEN GOVERNMENT DRAWINGS, SPECIFICATIONS OR OTHER DATA ARE USED FOR ANY PURPOSE OTHER THAN IN CONNECTION WITH A DEFINITELY RELATED GOVERNMENT PROCUREMENT OPERATION, THE UNITED STATES GOVERNMENT THEREBY INCURS NO RESPONSIBILITY NOR ANY OBLIGATION WHATSOEVER AND THE FACT THAT THE GOVERNMENT MAY HAVE FORMULATED, FURNISHED, OR IN ANY WAY SUPPLIED THE SAID DRAWINGS, SPECIFICATIONS, OR OTHER DATA IS NOT REGARDED BY IMPLICATION OR OTHERWISE AS IN ANY MANNER LICENSING THE HOLDER OR ANY OTHER PERSON OR CORPORATION, OR CONVEYING ANY RIGHTS OR PERMISSION TO MANUFACTURE, USE, OR SELL ANY PATENTED INVENTION THAT MAY IN ANY WAY BE RELATED THERETO.

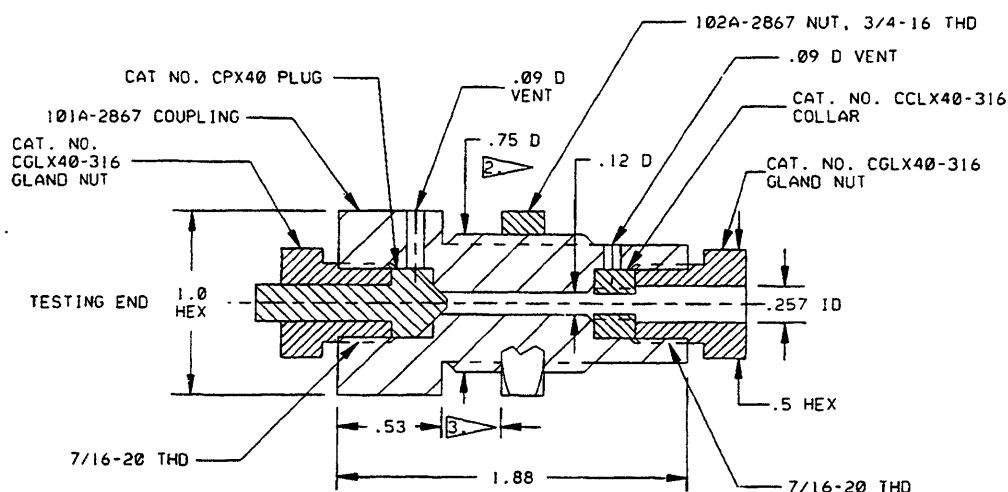
DASH NO.	PIPE SIZE	PIPE SCHED.	HUB SIZE	OPERATING PRESSURE RATING (PSIG)		DIMENSIONS								MATERIAL CODE	
				MAT'L CODE		A	B	C	D	E	F	G	-A SA-105 GR11	-B SA-182 F-316	
				-A	-B								GRAYLOC STK NO.	GRAYLOC STK NO.	
-32	4	40	4GR40	2493	2460	4.026	4.500	6.000	5.000	6.000	.500	2.688	I-4839-A36	I-4839-B36	
-33		80			3.826	I-4839-A37							I-4839-B37		
-34		160	4GR34	4637	4340	3.438							I-4839-A38	I-4839-B38	
-35		XXS	4GR31	7969	7120	3.152							I-4839-A39	I-4839-B39	
-36	5	40	5GR52	2703	2580	5.047	5.563	7.500	5.250	7.500	.625	2.938	I-4839-A40	I-4839-B40	
-37		80			4.813	I-4839-A41							I-4839-B41		
-38		160	5GR46	5149	4720	4.313							I-4839-A42	I-4839-B42	
-39		XXS	5GR40	7839	6700	4.063							I-4839-A43	I-4839-B43	
-40	6	40	6GR62	3192	2960	6.065	6.625	9.250	6.000	9.250	.750	3.250	I-4839-A44	I-4839-B44	
-41		80			5.761	I-4839-A45							I-4839-B45		
-42		160	6GR52	5944	5080	5.189							I-4839-A46	I-4839-B46	
-43		XXS			4.897	I-4839-A47							I-4839-B47		

CUSTODIAN:		JOHN F. KENNEDY SPACE CENTER	
PROCUREMENT SPEC.	HUB, PRESSURE TAPPED	STANDARD PART	
NONE		KC168	
COORDINATION STATUS		SHEET 3 OF 3	
KSC DE			

REVISED: (D) CHANGED APPROVED SOURCE ON SHEET 1. 10-2-92

APPROVED: 2-6-76

GP-425

FED SUP CLASS
4730

MATERIAL: ALL MATERIAL SHALL BE CLASS 316 STAINLESS STEEL.

FINISH: PASSIVATE.

NOTES: 1. REMOVE BURRS AND SLIVERS. BREAK SHARP EDGES UNLESS OTHERWISE NOTED.



ALL DIMENSIONS ARE REFERENCE ONLY.



1/8 D HOLE REQUIRED FOR PANEL MOUNTING.

4. 0.38 MAXIMUM PANEL THICKNESS.

5. TORQUE GLAND NUTS TO 20 FT LBS.

6. CONFIGURATION SHOWN IS THAT OF TEST PORT BUT ASSEMBLY MAY BE USED AS HIGH PRESSURE BULKHEAD COUPLING.

7. WHEN COUPLING IS USED AS TEST PORT, FLUID PRESSURE IS BLED DOWN THRU VENT BY LOOSENING GLAND NUT NOT MORE THAN ONE TURN.

8. ASSEMBLY WEIGHT FOR KC169 IS APPROXIMATELY 0.30 LBS.

9. COUPLING ASSEMBLY IS SIMILAR TO AUTOCLAVE ENGINEERS INCLUDING CATALOG NO. 20BFX4466-316 EXCEPT FOR PLUG. THIS STANDARD INCLUDES ALL PARTS ILLUSTRATED ABOVE.

USE LIMITS: 1. 20,000 PSIG MAXIMUM PRESSURE.

2. TO BE USED WITH 1/4" X .109 STAINLESS STEEL TUBING.

SUGGESTED
SOURCE:COMMERCIAL PARTS CAN BE PURCHASED FROM
AUTOCLAVE ENGINEERS, 2930 WEST 22ND STREET,
P.O. BOX 4007
ERIE, PA 16512

REVISED: (A) REV & REDRAWN 8-1-90

APPROVED: 7-13-76

NOTICE: WHEN GOVERNMENT DRAWINGS, SPECIFICATIONS OR OTHER DATA ARE USED FOR ANY PURPOSE OTHER THAN IN CONNECTION WITH A DEFINITELY RELATED GOVERNMENT PROCUREMENT OPERATION, THE UNITED STATES GOVERNMENT THEREBY INCURS NO RESPONSIBILITY NOR ANY OBLIGATION WHATSOEVER AND THE FACT THAT THE GOVERNMENT MAY HAVE FORMULATED, FURNISHED, OR IN ANY WAY SUPPLIED THE SAID DRAWINGS, SPECIFICATIONS, OR OTHER DATA IS NOT REGARDED BY IMPLICATION OR OTHERWISE AS IN ANY MANNER LICENSING THE HOLDER OR ANY OTHER PERSON OR CORPORATION, OR CONVEYING ANY RIGHTS OR PERMISSION TO MANUFACTURE, USE, OR SELL ANY PATENTED INVENTION THAT MAY IN ANY WAY BE RELATED THERE TO.

CUSTODIAN:

JOHN F. KENNEDY SPACE CENTER

PROCUREMENT SPEC.

NONE

COORDINATION STATUS

KSC DE

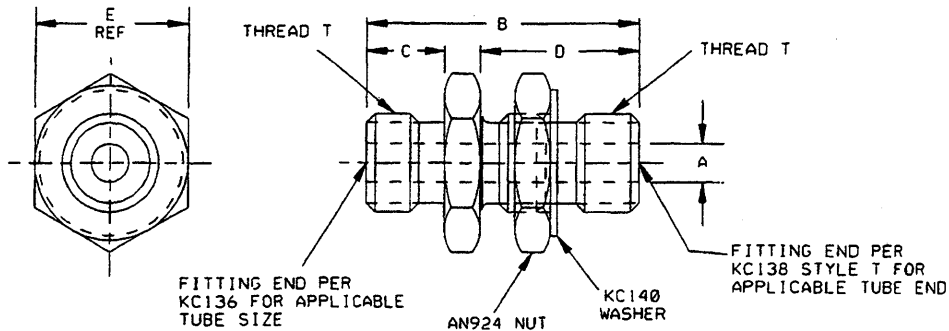
COUPLING ASSEMBLY, BLKHD
SUPER PRESSURE PORT

STANDARD PART

KC169

SHEET 1 OF 1

GP-425

FED SUP CLASS
4730

DASH NO.		TUBE OD REF	THREAD T REF	A REF	B +.000 -.060	C REF	D REF	E REF	BULKHEAD NUT		WASHER	
CRE STEEL	AL ALLOY								FOR CRE STEEL ASSY *	FOR AL ALLOY ASSY	FOR CRE STEEL ASSY	FOR AL ALLOY ASSY
K4	D4	1/4	7/16-20	.172	1.252	.389	.703	.688	AN924-K4	AN924-D4	KC140C4	KC140D4
K6	D6	3/8	9/16-18	.297	1.436	.420	.766	.813	AN924-K6	AN924-D6	KC140C6	KC140D6
K8	D8	1/2	3/4-16	.391	1.636	.521	.875	1.000	AN924-K8	AN924-D8	KC140C8	KC140D8
K10	D10	5/8	7/8-14	.484	1.873	.567	1.016	1.125	AN924-K10	AN924-D10	KC140C10	KC140D10
K12	D12	3/4	1-1/16-12	.609	2.172	.636	1.156	1.375	AN924-K12	AN924-D12	KC140C12	KC140D12
K16	D16	1	1-5/16-12	.844	2.208	.672		1.625	AN924-K16	AN924-D16	KC140C16	KC140D16
K20	D20	1 1/4	1-5/8-12	1.078	2.208	.672		1.875	AN924-K20	AN924-D20	KC140C20	KC140D20
K24	D24	1 1/2	1-7/8-12	1.312	2.256	.720		2.125	AN924-K24	AN924-D24	KC140C24	KC140D24
K28	D28	1 3/4	2-1/4-12	1.547	2.308	.772		2.500	AN924-K28	AN924-D28	KC140C28	KC140D28
K32	D32	2	2-1/2-12	1.781	2.423	.887		2.750	AN924-K32	AN924-D32	KC140C32	KC140D32

MATERIAL:

SEE PROCUREMENT SPECIFICATION.
ALUMINUM ALLOY, 2014-T6, CODE "D"
CORROSION RESISTANT STEEL (CLASS 316), CODE "K" (WAS CODE "C")
*AN924 CRES NUTS MAY BE EITHER 304, CODE "J" OR 316, CODE "K".

FINISH:

SEE PROCUREMENT SPECIFICATION.

SCREW THREAD:

SEE PROCUREMENT SPECIFICATION.

NOTES:

1. REMOVE BURRS AND SLIVERS. BREAK SHARP EDGES UNLESS OTHERWISE NOTED.
2. DIMENSIONS IN INCHES. UNLESS OTHERWISE SPECIFIED, TOLERANCE DECIMALS $\pm .016$.
3. FOR DESIGN FEATURE PURPOSES, THIS DRAWING TAKES PRECEDENCE OVER PROCUREMENT DOCUMENTS REFERENCED HEREIN.
4. REFERENCED DOCUMENTS SHALL BE OF THE ISSUE IN EFFECT ON THE DATE OF INVITATION FOR BID.
5. MARKING OF FITTINGS SHALL BE CONSISTENT WITH PROCUREMENT SPECIFICATION USING APPLICABLE KC STANDARD AND PART NUMBER DESIGNATIONS AS SHOWN ON THIS DRAWING.

EXAMPLE OF
PART NOS.

KC170K8 = UNION, ADJUSTABLE END, 1/2" OD TUBING, CORROSION RESISTANT STEEL
KC170D12 = UNION, ADJUSTABLE END, 3/4" OD TUBING, ALUMINUM ALLOY

CUSTODIAN:

JOHN F. KENNEDY SPACE CENTER

PROCUREMENT SPEC.

KSC-F-124

COORDINATION STATUS

KSC DE

UNION, ADJUSTABLE END

STANDARD PART

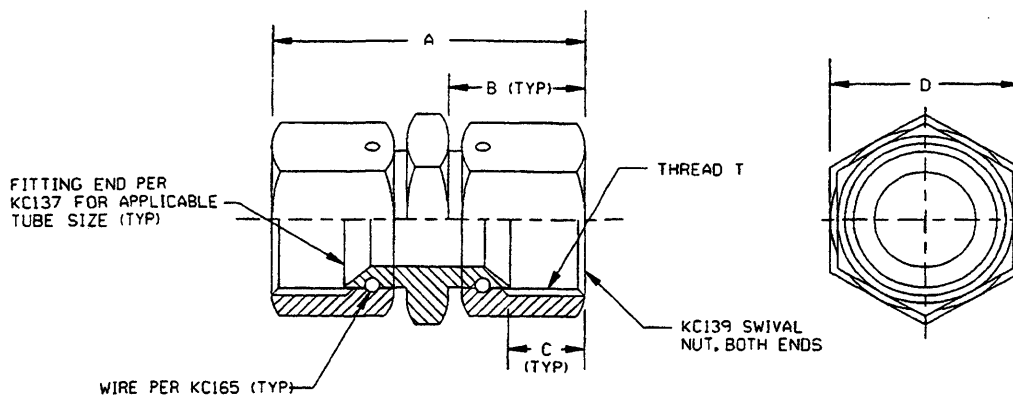
KC170

SHEET 1 OF 1

REVISED: (B) REV NUT MAT'L, 4-10-91

APPROVED: 11-1-83

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FED SUP CLASS
4730

DASH NUMBER		TUBE OD REF	THREAD T REF	A REF	B ±.031	C REF	D REF	SWIVEL NUT		RETAINING WIRE
CRE STEEL	AL ALLOY							FOR CRE STEEL ASSY	FOR AL ALLOY ASSY	
K4	D4	¼	7/16-20	1.61	.73	.36	⅞	KC139K4	KC139D4	KC165-4
K6	D6	⅜	9/16-18	1.97	.85	.39	1⅞	KC139K6	KC139D6	KC165-6
K8	D8	½	3/4-16	2.05	.90	.44	1	KC139K8	KC139D8	KC165-8
K10	D10	⅝	7/8-14	2.25	.97	.51	1⅞	KC139K10	KC139D10	KC165-10
K12	D12	¾	1-1/16-12	2.49	1.09	.58	1⅞	KC139K12	KC139D12	KC165-12
K16	D16	1	1-5/16-12	2.74	1.19	.61	1⅞	KC139K16	KC139D16	KC165-16
K20	D20	1¼	1-5/8-12	2.99	1.31	.64	1⅞	KC139K20	KC139D20	KC165-20
K24	D24	1½	1-7/8-12	3.10	1.37	.65	2⅞	KC139K24	KC139D24	KC165-24
K28	D28	1¾	2-1/4-12	3.83	1.72	.89	2½	KC139K28	KC139D28	KC165-28
K32	D32	2	2-1/2-12	3.97	1.78	.95	2¾	KC139K32	KC139D32	KC165-32

MATERIAL: SEE PROCUREMENT SPECIFICATION.
ALUMINUM ALLOY, 2024-T6, CODE "D"
CORROSION RESISTANT STEEL (CLASS 316), CODE "K"

FINISH: SEE PROCUREMENT SPECIFICATION.

SCREW THREAD: SEE PROCUREMENT SPECIFICATION.

- NOTES:
1. REMOVE BURRS AND SLIVERS. BREAK SHARP EDGES UNLESS OTHERWISE NOTED.
 2. DIMENSIONS IN INCHES. UNLESS OTHERWISE SPECIFIED, TOLERANCE DECIMALS ±.016.
 3. FOR DESIGN FEATURE PURPOSES, THIS DRAWING TAKES PRECEDENCE OVER PROCUREMENT DOCUMENTS REFERENCED HEREIN.
 4. REFERENCED DOCUMENTS SHALL BE OF THE ISSUE IN EFFECT ON THE DATE OF INVITATION FOR BID.
 5. MARKING OF FITTINGS SHALL BE CONSISTENT WITH PROCUREMENT SPECIFICATION USING APPLICABLE KC STANDARD AND PART NUMBER DESIGNATIONS AS SHOWN ON THIS DRAWING.

EXAMPLE OF PART NOS. KC171K4 = UNION ASSEMBLY, ¼" OD TUBING, CORROSION RESISTANT STEEL
KC171D8 = UNION ASSEMBLY, ½" OD TUBING, ALUMINUM ALLOY

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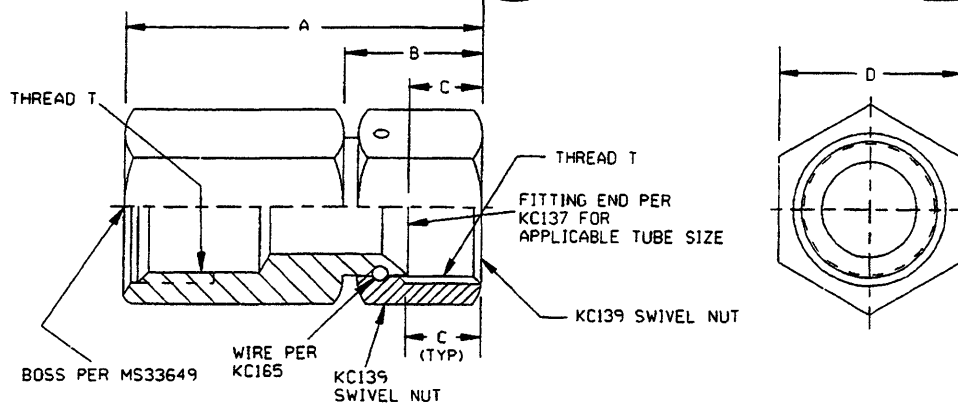
CUSTODIAN: JOHN F. KENNEDY SPACE CENTER	
PROCUREMENT SPEC. KSC-F-124	UNION ASSEMBLY, DOUBLE SWIVEL NUT
COORDINATION STATUS KSC DE	
STANDARD PART KC171	
SHEET 1 OF 1	

REVISED: (A) REV & REDRAWN 8-1-90

APPROVED: 11-1-83

GP-425

NOTICE: WHEN GOVERNMENT DRAWINGS, SPECIFICATIONS OR OTHER DATA ARE USED FOR ANY PURPOSE OTHER THAN IN CONNECTION WITH A DEFINITELY RELATED GOVERNMENT PROCUREMENT OPERATION, THE UNITED STATES GOVERNMENT THEREBY INCURS NO RESPONSIBILITY NOR ANY OBLIGATION WHATSOEVER AND THE FACT THAT THE GOVERNMENT MAY HAVE FORMULATED, FURNISHED, OR IN ANY WAY SUPPLIED THE SAID DRAWINGS, SPECIFICATIONS, OR OTHER DATA IS NOT REGARDED BY IMPLICATION OR OTHERWISE AS IN ANY MANNER LICENSING THE HOLDER OR ANY OTHER PERSON OR CORPORATION, OR CONVEYING ANY RIGHTS OR PERMISSION TO MANUFACTURE, USE, OR SELL ANY PATENTED INVENTION THAT MAY IN ANY WAY BE RELATED THERETO.

FED SUP CLASS
4730

DASH NUMBER		TUBE OD REF	THREAD T REF	A +.000 -.060	B REF	C REF	D REF	SWIVEL NUT		RETAINING WIRE
CRE STEEL	AL ALLOY							FOR CRE STEEL ASSY	FOR AL ALLOY ASSY	
K4	D4	¼	7/16-20	1.61	.73	.36	⅞	KC139K4	KC139D4	KC165-4
K6	D6	⅜	9/16-18	1.72	.85	.39	⅞	KC139K6	KC139D6	KC165-6
K8	D8	½	3/4-16	1.96	.90	.44	1	KC139K8	KC139D8	KC165-8
K10	D10	⅝	7/8-14	2.15	.97	.51	1⅛	KC139K10	KC139D10	KC165-10
K12	D12	¾	1-1/16-12	2.41	1.09	.58	1⅜	KC139K12	KC139D12	KC165-12
K16	D16	1	1-5/16-12	2.59	1.19	.61	1⅝	KC139K16	KC139D16	KC165-16
K20	D20	1¼	1-5/8-12	2.81	1.31	.64	1⅞	KC139K20	KC139D20	KC165-20
K24	D24	1½	1-7/8-12	3.06	1.37	.65	2¼	KC139K24	KC139D24	KC165-24
K28	D28	1¾	2-1/4-12	3.83	1.72	.89	2⅝	KC139K28	KC139D28	KC165-28
K32	D32	2	2-1/2-12	3.88	1.78	.95	2⅞	KC139K32	KC139D32	KC165-32

MATERIAL: SEE PROCUREMENT SPECIFICATION.
ALUMINUM ALLOY, 2024-T6, CODE "D"
CORROSION RESISTANT STEEL (CLASS 316), CODE "X"

FINISH: SEE PROCUREMENT SPECIFICATION.

SCREW THREAD: SEE PROCUREMENT SPECIFICATION.

- NOTES:
1. REMOVE BURRS AND SLIVERS. BREAK SHARP EDGES UNLESS OTHERWISE NOTED.
 2. DIMENSIONS IN INCHES. UNLESS OTHERWISE SPECIFIED, TOLERANCE DECIMALS $\pm .016$.
 3. FOR DESIGN FEATURE PURPOSES, THIS DRAWING TAKES PRECEDENCE OVER PROCUREMENT DOCUMENTS REFERENCED HEREIN.
 4. REFERENCED DOCUMENTS SHALL BE OF THE ISSUE IN EFFECT ON THE DATE OF INVITATION FOR BID.
 5. MARKING OF FITTINGS SHALL BE CONSISTENT WITH PROCUREMENT SPECIFICATION USING APPLICABLE KC STANDARD AND PART NUMBER DESIGNATIONS AS SHOWN ON THIS DRAWING.

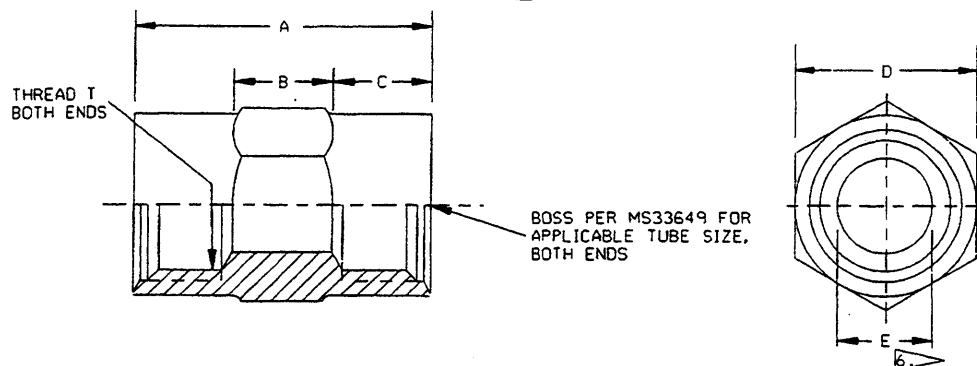
EXAMPLE OF
PART NOS. KC172K4 = ADAPTER, SWIVEL NUT, 1/4" OD TUBING, CORROSION RESISTANT STEEL
KC172D8 = ADAPTER, SWIVEL NUT, 1/2" OD TUBING, ALUMINUM ALLOY

CUSTODIAN:		JOHN F. KENNEDY SPACE CENTER	
PROCUREMENT SPEC.	ADAPTER, SWIVEL NUT	STANDARD PART	
KSC-F-124		KC172	
COORDINATION STATUS		SHEET 1 OF 1	
KSC DE			

REVISED: (A) REV & REDRAWN 8-1-90

APPROVED: 11-1-83

NASA

FED SUP CLASS
4730

DASH NUMBER	TUBE OD REF	THREAD T REF	A +0.030 -0.000	B REF	C ±.010	D REF	E MIN
CRE STEEL	AL ALLOY						
K4	D4	1/4	7/16-20	1.188	.375	.406	.168
K6	D6	3/8	9/16-18	1.188	.375	.406	.293
K8	D8	1/2	3/4-16	1.434	.437	.500	.387
K10	D10	5/8	7/8-14	1.563	.500	.594	.480
K12	D12	3/4	1-1/16-12	1.813	.625	.594	.604
K16	D16	1	1-5/16-12	1.875	.687	.594	.839
K20	D20	1 1/4	1-5/8-12	2.000	.750	.625	1.073
K24	D24	1 1/2	1-7/8-12	2.250	.812	.719	1.307
K28	D28	1 3/4	2-1/4-12	2.500	.875	.750	1.542
K32	D32	2	2-1/2-12	2.750	1.000	.875	1.776

MATERIAL: SEE PROCUREMENT SPECIFICATION.
ALUMINUM ALLOY, 2024-T6, CODE "D"
CORROSION RESISTANT STEEL (CLASS 316), CODE "K"

FINISH: SEE PROCUREMENT SPECIFICATION.

SCREW THREAD: SEE PROCUREMENT SPECIFICATION.

- NOTES:
1. REMOVE BURRS AND SLIVERS. BREAK SHARP EDGES UNLESS OTHERWISE NOTED.
 2. DIMENSIONS IN INCHES. UNLESS OTHERWISE SPECIFIED, TOLERANCE DECIMALS ±.016.
 3. FOR DESIGN FEATURE PURPOSES, THIS DRAWING TAKES PRECEDENCE OVER PROCUREMENT DOCUMENTS REFERENCED HEREIN.
 4. REFERENCED DOCUMENTS SHALL BE OF THE ISSUE IN EFFECT ON THE DATE OF INVITATION FOR BID.
 5. MARKING OF FITTINGS SHALL BE CONSISTENT WITH PROCUREMENT SPECIFICATION USING APPLICABLE KC STANDARD AND PART NUMBER DESIGNATIONS AS SHOWN ON THIS DRAWING.



AT THE OPTION OF THE MANUFACTURER, DRILL THRU UP TO THE MINOR DIAMETER OF THE APPLICABLE THREAD SIZE CALLED FOR BY MIL-S-8879 AND IN COMPLIANCE WITH MS33649.

EXAMPLE OF
PART NOS.

KC173K4 = COUPLING, TUBE, 1/4" OD TUBING, CORROSION RESISTANT STEEL
KC173D8 = COUPLING, TUBE, 1/2" OD TUBING, ALUMINUM ALLOY

REVISED: (A) REV 2 REDRAWN 8-1-90

APPROVED: 11-1-83

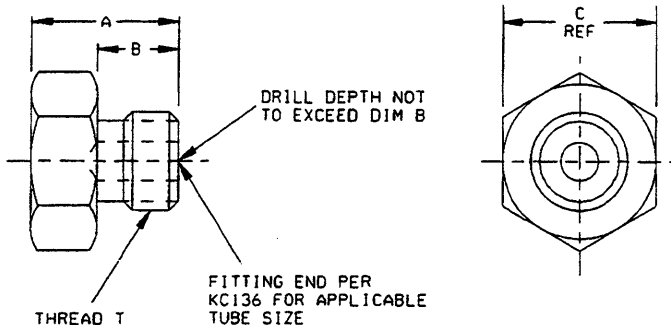
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CUSTODIAN: JOHN F. KENNEDY SPACE CENTER		
PROCUREMENT SPEC. KSC-F-124	COUPLING, TUBE	STANDARD PART
COORDINATION STATUS		KC173
KSC DE		SHEET 1 OF 1

GP-425

NOTICE: WHEN GOVERNMENT DRAWINGS, SPECIFICATIONS OR OTHER DATA ARE USED FOR ANY PURPOSE OTHER THAN IN CONNECTION WITH A DEFINITELY RELATED GOVERNMENT PROCUREMENT OPERATION, THE UNITED STATES GOVERNMENT THEREBY INCURS NO RESPONSIBILITY NOR ANY OBLIGATION WHATSOEVER AND THE FACT THAT THE GOVERNMENT MAY HAVE FORMULATED, FURNISHED, OR IN ANY WAY SUPPLIED THE SAID DRAWINGS, SPECIFICATIONS, OR OTHER DATA IS NOT REGARDED BY IMPLICATION OR OTHERWISE AS IN ANY MANNER LICENSING THE HOLDER OR ANY OTHER PERSON OR CORPORATION, OR CONVEYING ANY RIGHTS OR PERMISSION TO MANUFACTURE, USE, OR SELL ANY PATENTED INVENTION THAT MAY IN ANY WAY BE RELATED THERETO.

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4730

DASH NO.		TUBE OD REF	THREAD T REF	A ±.016	B REF	C REF
CRE STEEL	AL ALLOY					
K4	D4	1/4	7/16-20	.67	.389	.688
K6	D6	3/8	9/16-18	.73	.420	.813
K8	D8	1/2	3/4-16	.80	.521	1.000
K10	D10	5/8	7/8-14	.93	.567	1.125
K12	D12	3/4	1-1/16-12	1.09	.636	1.375
K16	D16	1	1-5/16-12	1.12	.672	1.625
K20	D20	1 1/4	1-5/8-12	1.20	.672	1.875
K24	D24	1 1/2	1-7/8-12	1.27	.720	2.125
K26	D28	1 3/4	2-1/4-12	1.35	.772	2.500
K32	D32	2	2-1/2-12	1.43	.887	2.750

MATERIAL: SEE PROCUREMENT SPECIFICATION.
ALUMINUM ALLOY, 2024-T6, CODE "D"
CORROSION RESISTANT STEEL (CLASS 316), CODE "K"

FINISH: SEE PROCUREMENT SPECIFICATION.

SCREW THREAD: SEE PROCUREMENT SPECIFICATION.

- NOTES:
1. REMOVE BURRS AND SLIVERS. BREAK SHARP EDGES UNLESS OTHERWISE NOTED.
 2. DIMENSIONS IN INCHES. UNLESS OTHERWISE SPECIFIED, TOLERANCE DECIMALS ±.016.
 3. FOR DESIGN FEATURE PURPOSES, THIS DRAWING TAKES PRECEDENCE OVER PROCUREMENT DOCUMENTS REFERENCED HEREIN.
 4. REFERENCED DOCUMENTS SHALL BE OF THE ISSUE IN EFFECT ON THE DATE OF INVITATION FOR BID.
 5. MARKING OF FITTINGS SHALL BE CONSISTENT WITH PROCUREMENT SPECIFICATION USING APPLICABLE KC STANDARD AND PART NUMBER DESIGNATIONS AS SHOWN ON THIS DRAWING.

EXAMPLE OF
PART NOS. KC174K8 = PLUG, 1/2" OD TUBING, CORROSION RESISTANT STEEL
KC174D12 = PLUG, 3/4" OD TUBING, ALUMINUM ALLOY

CUSTODIAN: JOHN F. KENNEDY SPACE CENTER

PROCUREMENT SPEC.

KSC-F-124

COORDINATION STATUS

KSC DE

PLUG, HEX HEAD

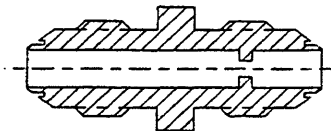
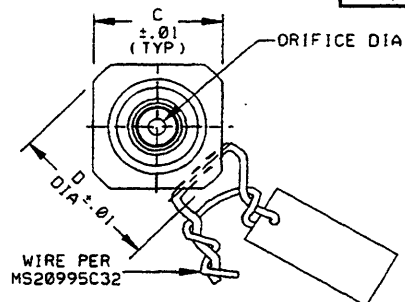
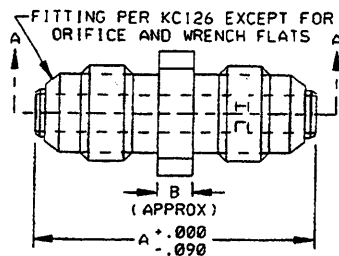
STANDARD PART

KC174

SHEET 1 OF 1

REVISED: (B) 8-1-90 (C) 1-2-91 (D) REV A DIM FOR -12, 4-10-91

APPROVED: 11-1-83

FED SUP CLASS
4730

SECTION A-A

- MATERIAL:** SEE PROCUREMENT SPECIFICATION.
CORROSION RESISTANT STEEL (CLASS 316), CODE "K".
- OPERATING PRESSURE:** 6600 PSIG (MAXIMUM) FOR ALL SIZES EXCEPT 6500 PSIG (MAXIMUM) FOR 1" SIZE FITTINGS.
- FINISH:** SEE PROCUREMENT SPECIFICATION.
- SCREW THREAD:** SEE PROCUREMENT SPECIFICATION.
- NOTES:**
1. REMOVE BURRS AND SLIVERS. BREAK SHARP EDGES UNLESS OTHERWISE NOTED.
 2. DIMENSIONS IN INCHES. UNLESS OTHERWISE SPECIFIED, TOLERANCE DECIMALS $\pm .016$.
 3. FOR DESIGN FEATURE PURPOSES, THIS DRAWING TAKES PRECEDENCE OVER PROCUREMENT DOCUMENTS REFERENCED HEREIN.
 4. REFERENCED DOCUMENTS SHALL BE OF THE ISSUE IN EFFECT ON THE DATE OF INVITATION FOR BID.
 5. MARKING OF FITTINGS SHALL BE CONSISTANT WITH PROCUREMENT SPECIFICATION USING APPLICABLE KC STANDARD PART NUMBER DESIGNATIONS AND ORIFICE DIAMETER AS SHOWN ON THIS DRAWING AND SHALL BE LEGIBLY STAMPED OR EMBOSSED ON A STAINLESS STEEL TAG APPROXIMATELY 1" X 2" X .017". THE TAG SHALL BE LOCKWIRED TO EACH FITTING AS SHOWN.
 6. CLEAN, PROTECT & INSPECT PER KSC-C-123, LEVEL 300A, TEST METHOD 1, PRIOR TO INSTALLATION IN FLUID SYSTEMS. CERTIFICATION REQUIRED.
 7. THIS DRAWING SUPERCEDES KENNEDY SPACE CENTER DRAWINGS 79K80236 AND 79K80239. FITTINGS PER 79K80239 ARE EQUIVALENT TO THOSE OF KC175 AND SHALL BE USED UNTIL EXISTING SUPPLY IS DEPLETED.
 8. ALL ORIFICES SHALL BE FLOW TESTED WITH NITROGEN AND CERTIFIED IN ACCORDANCE WITH FLAG NOTE 9. CERTIFICATION MUST INCLUDE FLOW RATE, TEMPERATURE, AND PRESSURE.

EXAMPLE OF
PART NOS.KC175K4-.030 • ORIFICE, UNION, $\frac{1}{4}$ " OD TUBING, .030" DIAMETER

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CUSTODIAN:		JOHN F. KENNEDY SPACE CENTER	
PROCUREMENT SPEC.	ORIFICE, UNION, FLARED TUBE FOR SEAL RING		STANDARD PART
KSC-F-124			KC175
COORDINATION STATUS			SHEET 1 OF 4
KSC DE			

APPROVED: 1-2-91 REVISED: (C) ADDED SUPERCEDES COLUMN TO SHTS 2 THRU 4. CHANGED NOTES 6 & 7 9-1-97

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FLOW RATES ARE CALCULATED FOR AIR OR NITROGEN BY USE OF THE EQUATION:
 $\text{FLOW (SCFM)} = 16.5 \times \text{ORIFICE AREA (SQ. IN.)} \times 1000 \text{ PSIA UPSTREAM PRESSURE AT } 70^\circ\text{F.}$
 THIS EQUATION IS LIMITED TO THE CONDITION WHERE
 DOWNSTREAM PRESSURE IS 53% OF UPSTREAM PRESSURE OR LESS.

TOLERANCE ON GIVEN FLOW RATES:

FOR ORIFICE DIAMETERS .0055 TO .030 TOLERANCE IS $\pm 20\%$
 FOR ORIFICE DIAMETERS .031 TO .090 TOLERANCE IS $\pm 15\%$
 FOR ORIFICE DIAMETERS .091 & ABOVE, TOLERANCE IS $\pm 10\%$.

TO DETERMINE FLOW RATES FOR UPSTREAM PRESSURES OTHER THAN 1000 PSIA,
 MULTIPLY GIVEN FLOW RATES BY:

$$\frac{\text{NEW UPSTREAM PRESSURE PSIA}}{1000 \text{ PSIA}}$$

GIVEN FLOW RATES ARE WITHIN TOLERANCE OVER AN UPSTREAM TEMPERATURE SPAN
 OF $\pm 30^\circ\text{F.}$ TO DETERMINE FLOW RATES FOR TEMPERATURES OTHER THAN 70°F.
 MULTIPLY GIVEN FLOW RATES BY:

$$\sqrt{\frac{530}{460 + \text{NEW TEMP } ^\circ\text{F}}}$$

TO OBTAIN FLOW RATES FOR : HELIUM - MULTIPLY GIVEN FLOW RATE BY 2.69
 HYDROGEN - MULTIPLY GIVEN FLOW RATE BY 3.8
 OXYGEN - MULTIPLY GIVEN FLOW RATE BY 0.95

DASH NO. CRE STEEL	TUBE OD REF	FLOW RATE SCFM 	A DIM	B DIM	C DIM	D DIM	SUPERCEDES P/N
K4	1/4	BLANK	1.265	.16	.68	.81	79K80236-1, 79K80239-1
K4-.0055	1/4	.39	1.265	.16	.68	.81	79K80236-2, 79K80239-2
K4-.006	1/4	.46	1.265	.16	.68	.81	79K80236-3, 79K80239-3
K4-.007	1/4	.63	1.265	.16	.68	.81	79K80236-4, 79K80239-4
K4-.008	1/4	.83	1.265	.16	.68	.81	79K80236-5, 79K80239-5
K4-.009	1/4	1.05	1.265	.16	.68	.81	79K80236-6, 79K80239-6
K4-.010	1/4	1.30	1.265	.16	.68	.81	79K80236-7, 79K80239-7
K4-.0125	1/4	2.02	1.265	.16	.68	.81	79K80236-8, 79K80239-8
K4-.015	1/4	2.92	1.265	.16	.68	.81	79K80236-9, 79K80239-9
K4-.0175	1/4	3.97	1.265	.16	.68	.81	79K80236-10, 79K80239-10
K4-.020	1/4	5.18	1.265	.16	.68	.81	79K80236-11, 79K80239-11
K4-.025	1/4	8.10	1.265	.16	.68	.81	79K80236-12, 79K80239-12
K4-.030	1/4	11.66	1.265	.16	.68	.81	79K80236-13, 79K80239-13
K4-.035	1/4	15.87	1.265	.16	.68	.81	79K80236-14, 79K80239-14
K4-.040	1/4	20.73	1.265	.16	.68	.81	79K80236-15, 79K80239-15
K4-.045	1/4	26.24	1.265	.16	.68	.81	79K80236-16, 79K80239-16
K4-.050	1/4	32.40	1.265	.16	.68	.81	79K80236-17, 79K80239-17
K4-.055	1/4	39.20	1.265	.16	.68	.81	79K80236-18, 79K80239-18
K4-.060	1/4	46.65	1.265	.16	.68	.81	79K80236-19, 79K80239-19
K4-.065	1/4	54.75	1.265	.16	.68	.81	79K80236-20, 79K80239-20
K4-.070	1/4	63.50	1.265	.16	.68	.81	79K80236-21, 79K80239-21
K4-.075	1/4	72.89	1.265	.16	.68	.81	79K80236-22, 79K80239-22
K4-.080	1/4	82.94	1.265	.16	.68	.81	79K80236-23, 79K80239-23

CUSTODIAN:

JOHN F. KENNEDY SPACE CENTER

PROCUREMENT SPEC.

KSC-F-124

COORDINATION STATUS

KSC DE

ORIFICE, UNION,
 FLARED TUBE FOR SEAL RING

STANDARD PART

KC175

SHEET 2 OF 4


APPROVED: 11-16-92 REVISED: (C) ADDED SUPERCEDES COLUMN. 9-1-97

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GP-425

FED SUP CLASS
4730

NOTICE: WHEN GOVERNMENT DRAWINGS, SPECIFICATIONS OR OTHER DATA ARE USED FOR ANY PURPOSE OTHER THAN IN CONNECTION WITH A DEFINITELY RELATED GOVERNMENT PROCUREMENT OPERATION, THE UNITED STATES GOVERNMENT THEREBY INCURS NO RESPONSIBILITY NOR ANY OBLIGATION WHATSOEVER AND THE FACT THAT THE GOVERNMENT MAY HAVE FORMULATED, FURNISHED, OR IN ANY WAY SUPPLIED THE SAID DRAWINGS, SPECIFICATIONS, OR OTHER DATA IS NOT REGARDED BY IMPLICATION OR OTHERWISE AS IN ANY MANNER LICENSING THE HOLDER OR ANY OTHER PERSON OR CORPORATION, OR CONVEYING ANY RIGHTS OR PERMISSION TO MANUFACTURE, USE, OR SELL ANY PATENTED INVENTION THAT MAY IN ANY WAY BE RELATED THERETO.

DASH NO. CRE STEEL	TUBE OD REF	FLOW RATE SCFM 	A DIM	B DIM	C DIM	D DIM	SUPERCEDES P/N
K4-.085	1/4	93.63	1.265	.16	.68	.81	79K80236-24, 79K80239-24
K4-.090	1/4	105	1.265	.16	.68	.81	79K80236-25, 79K80239-25
K4-.095	1/4	117	1.265	.16	.68	.81	79K80236-26, 79K80239-26
K6	3/8	BLANK	1.390	.27	.81	.93	79K80236-32, 79K80239-32
K6-.010	3/8	1.30	1.390	.27	.81	.93	79K80236-33, 79K80239-33
K6-.018	3/8	4.20	1.390	.27	.81	.93	79K80236-34, 79K80239-34
K6-.026	3/8	8.76	1.390	.27	.81	.93	79K80236-35, 79K80239-35
K6-.034	3/8	14.98	1.390	.27	.81	.93	79K80236-36, 79K80239-36
K6-.042	3/8	22.86	1.390	.27	.81	.93	79K80236-37, 79K80239-37
K6-.050	3/8	32.40	1.390	.27	.81	.93	79K80236-38, 79K80239-38
K6-.058	3/8	43.59	1.390	.27	.81	.93	79K80236-39, 79K80239-39
K6-.066	3/8	56.45	1.390	.27	.81	.93	79K80236-40, 79K80239-40
K6-.074	3/8	70.96	1.390	.27	.81	.93	79K80236-41, 79K80239-41
K6-.082	3/8	87.14	1.390	.27	.81	.93	79K80236-42, 79K80239-42
K6-.090	3/8	105	1.390	.27	.81	.93	79K80236-43, 79K80239-43
K6-.098	3/8	124	1.390	.27	.81	.93	79K80236-44, 79K80239-44
K6-.106	3/8	146	1.390	.27	.81	.93	79K80236-45, 79K80239-45
K6-.114	3/8	168	1.390	.27	.81	.93	79K80236-46, 79K80239-46
K6-.122	3/8	193	1.390	.27	.81	.93	79K80236-47, 79K80239-47
K6-.130	3/8	219	1.390	.27	.81	.93	79K80236-48, 79K80239-48
K6-.138	3/8	249	1.390	.27	.81	.93	79K80236-49, 79K80239-49
K6-.146	3/8	276	1.390	.27	.81	.93	79K80236-50, 79K80239-50
K6-.154	3/8	307	1.390	.27	.81	.93	79K80236-51, 79K80239-51
K6-.162	3/8	340	1.390	.27	.81	.93	79K80236-52, 79K80239-52
K6-.170	3/8	375	1.390	.27	.81	.93	79K80236-53, 79K80239-53
K6-.178	3/8	411	1.390	.27	.81	.93	79K80236-54, 79K80239-54
K6-.186	3/8	448	1.390	.27	.81	.93	79K80236-55, 79K80239-55
K6-.188	3/8	458	1.390	.27	.81	.93	79K80236-56, 79K80239-56
K8	1/2	BLANK	1.578	.26	1.00	1.12	79K80236-62, 79K80239-62
K8-.010	1/2	1.30	1.578	.26	1.00	1.12	79K80236-63, 79K80239-63
K8-.020	1/2	5.18	1.578	.26	1.00	1.12	79K80236-64, 79K80239-64
K8-.030	1/2	11.66	1.578	.26	1.00	1.12	79K80236-65, 79K80239-65
K8-.040	1/2	20.73	1.578	.26	1.00	1.12	79K80236-66, 79K80239-66
K8-.050	1/2	32.40	1.578	.26	1.00	1.12	79K80236-67, 79K80239-67
K8-.060	1/2	46.65	1.578	.26	1.00	1.12	79K80236-68, 79K80239-68
K8-.070	1/2	63.50	1.578	.26	1.00	1.12	79K80236-69, 79K80239-69
K8-.080	1/2	82.94	1.578	.26	1.00	1.12	79K80236-70, 79K80239-70
K8-.090	1/2	105	1.578	.26	1.00	1.12	79K80236-71, 79K80239-71

APPROVED: 11-16-92. REVISED: (C) ADDED SUPERCEDES COLUMN. 9-1-97

CUSTODIAN:

JOHN F. KENNEDY SPACE CENTER

PROCUREMENT SPEC.
KSC-F-124

COORDINATION STATUS

KSC DE

ORIFICE, UNION,
FLARED TUBE FOR SEAL RING

STANDARD PART


KC175

SHEET 3 OF 4

GP-425

FED SUP CLASS
4730

NOTICE: WHEN GOVERNMENT DRAWINGS, SPECIFICATIONS OR OTHER DATA ARE USED FOR ANY PURPOSE OTHER THAN IN CONNECTION WITH A DEFINITELY RELATED GOVERNMENT PROCUREMENT OPERATION, THE UNITED STATES GOVERNMENT THEREBY INCURS NO RESPONSIBILITY NOR ANY OBLIGATION WHATSOEVER AND THE FACT THAT THE GOVERNMENT MAY HAVE FORMULATED, FURNISHED, OR IN ANY WAY SUPPLIED THE SAID DRAWINGS, SPECIFICATIONS, OR OTHER DATA IS NOT REGARDED BY IMPLICATION OR OTHERWISE AS IN ANY MANNER LICENSING THE HOLDER OR ANY OTHER PERSON OR CORPORATION, OR CONVEYING ANY RIGHTS OR PERMISSION TO MANUFACTURE, USE, OR SELL ANY PATENTED INVENTION THAT MAY IN ANY WAY BE RELATED THERETO.

DASH NO. CRE STEEL	TUBE OD REF	FLOW RATE SCFM 	A DIM	B DIM	C DIM	D DIM	SUPERCEDES P/N
K8-.100	1/2	130	1.578	.26	1.00	1.12	79K80236-72, 79K80239-72
K8-.110	1/2	157	1.578	.26	1.00	1.12	79K80236-73, 79K80239-73
K8-.120	1/2	187	1.578	.26	1.00	1.12	79K80236-74, 79K80239-74
K8-.130	1/2	219	1.578	.26	1.00	1.12	79K80236-75, 79K80239-75
K8-.140	1/2	254	1.578	.26	1.00	1.12	79K80236-76, 79K80239-76
K8-.150	1/2	292	1.578	.26	1.00	1.12	79K80236-77, 79K80239-77
K8-.160	1/2	332	1.578	.26	1.00	1.12	79K80236-78, 79K80239-78
K8-.170	1/2	375	1.578	.26	1.00	1.12	79K80236-79, 79K80239-79
K8-.180	1/2	420	1.578	.26	1.00	1.12	79K80236-80, 79K80239-80
K8-.190	1/2	468	1.578	.26	1.00	1.12	79K80236-81, 79K80239-81
K8-.200	1/2	518	1.578	.26	1.00	1.12	79K80236-82, 79K80239-82
K8-.210	1/2	571	1.578	.26	1.00	1.12	79K80236-83, 79K80239-83
K8-.220	1/2	627	1.578	.26	1.00	1.12	79K80236-84, 79K80239-84
K8-.230	1/2	686	1.578	.26	1.00	1.12	79K80236-85, 79K80239-85
K8-.240	1/2	746	1.578	.26	1.00	1.12	79K80236-86, 79K80239-86
K8-.250	1/2	810	1.578	.26	1.00	1.12	79K80236-87, 79K80239-87
K12	3/4	BLANK	2.125	.39	1.37	1.56	79K80236-93, 79K80239-93
K12-.100	3/4	130	2.125	.39	1.37	1.56	79K80236-94, 79K80239-94
K12-.120	3/4	187	2.125	.39	1.37	1.56	79K80236-95, 79K80239-95
K12-.140	3/4	254	2.125	.39	1.37	1.56	79K80236-96, 79K80239-96
K12-.160	3/4	332	2.125	.39	1.37	1.56	79K80236-97, 79K80239-97
K12-.180	3/4	420	2.125	.39	1.37	1.56	79K80236-98, 79K80239-98
K12-.200	3/4	518	2.125	.39	1.37	1.56	79K80236-99, 79K80239-99
K12-.220	3/4	627	2.125	.39	1.37	1.56	79K80236-100, 79K80239-100
K12-.240	3/4	746	2.125	.39	1.37	1.56	79K80236-101, 79K80239-101
K12-.260	3/4	874	2.125	.39	1.37	1.56	79K80236-102, 79K80239-102
K12-.280	3/4	1014	2.125	.39	1.37	1.56	79K80236-103, 79K80239-103
K12-.300	3/4	1164	2.125	.39	1.37	1.56	79K80236-104, 79K80239-104
K16	1	BLANK	2.203	.38	1.62	1.87	79K80236-110, 79K80239-110
K16-.100	1	130	2.203	.38	1.62	1.87	79K80236-111, 79K80239-111
K16-.140	1	254	2.203	.38	1.62	1.87	79K80236-112, 79K80239-112
K16-.180	1	420	2.203	.38	1.62	1.87	79K80236-113, 79K80239-113
K16-.220	1	627	2.203	.38	1.62	1.87	79K80236-114, 79K80239-114
K16-.260	1	874	2.203	.38	1.62	1.87	79K80236-115, 79K80239-115
K16-.300	1	1164	2.203	.38	1.62	1.87	79K80236-116, 79K80239-116
K16-.340	1	1495	2.203	.38	1.62	1.87	79K80236-117, 79K80239-117
K16-.380	1	1868	2.203	.38	1.62	1.87	79K80236-118, 79K80239-118
K16-.420	1	2282	2.203	.38	1.62	1.87	79K80236-119, 79K80239-119

APPROVED: 11-16-92 REVISED: (C) ADDED SUPERCEDES COLUMN, 9-1-97

CUSTODIAN:

JOHN F. KENNEDY SPACE CENTER

PROCUREMENT SPEC.
KSC-F-124

COORDINATION STATUS

KSC DE

ORIFICE, UNION,
FLARED TUBE FOR SEAL RING

STANDARD PART

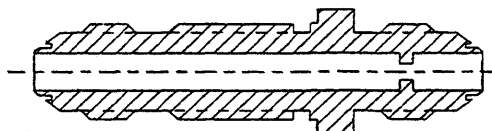
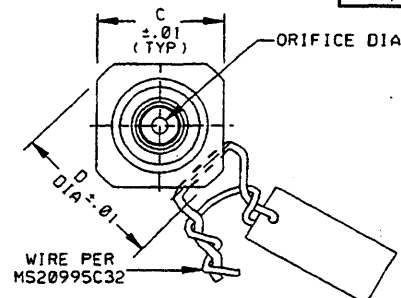
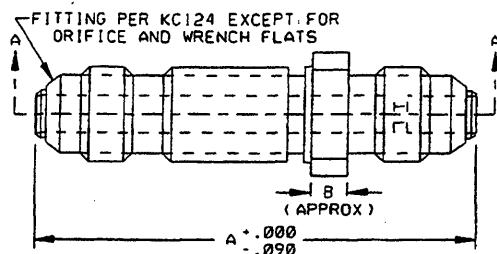
KC175

SHEET 4 OF 4

NOTICE: WHEN GOVERNMENT DRAWINGS, SPECIFICATIONS OR OTHER DATA ARE USED FOR ANY PURPOSE OTHER THAN IN CONNECTION WITH A DEFINITELY RELATED GOVERNMENT PROCUREMENT OPERATION, THE UNITED STATES GOVERNMENT THEREBY INCURS NO RESPONSIBILITY NOR ANY OBLIGATION WHATSOEVER AND THE FACT THAT THE GOVERNMENT MAY HAVE FORMULATED, FURNISHED, OR IN ANY WAY SUPPLIED THE SAID DRAWINGS, SPECIFICATIONS, OR OTHER DATA IS NOT REGARDED BY IMPLICATION OR OTHERWISE AS IN ANY MANNER LICENSING THE HOLDER OR ANY OTHER PERSON OR CORPORATION, OR CONVEYING ANY RIGHTS OR PERMISSION TO MANUFACTURE, USE, OR SELL ANY PATENTED INVENTION THAT MAY IN ANY WAY BE RELATED THERE TO.



FED SUP CLASS
4730



SECTION A-A

- MATERIAL:** SEE PROCUREMENT SPECIFICATION.
CORROSION RESISTANT STEEL (CLASS 316), CODE "K".
- OPERATING PRESSURE:** 6600 PSIG (MAXIMUM) FOR ALL SIZES EXCEPT 6500 PSIG (MAXIMUM) FOR 1" SIZE FITTINGS.
- FINISH:** SEE PROCUREMENT SPECIFICATION.
- SCREW THREAD:** SEE PROCUREMENT SPECIFICATION.
- NOTES:**
1. REMOVE BURRS AND SLIVERS. BREAK SHARP EDGES UNLESS OTHERWISE NOTED.
 2. DIMENSIONS IN INCHES. UNLESS OTHERWISE SPECIFIED, TOLERANCE DECIMALS $\pm .016$.
 3. FOR DESIGN FEATURE PURPOSES, THIS DRAWING TAKES PRECEDENCE OVER PROCUREMENT DOCUMENTS REFERENCED HEREIN.
 4. REFERENCED DOCUMENTS SHALL BE OF THE ISSUE IN EFFECT ON THE DATE OF INVITATION FOR BID.
 5. MARKING OF FITTINGS SHALL BE CONSISTANT WITH PROCUREMENT SPECIFICATION USING APPLICABLE KC STANDARD PART NUMBER DESIGNATIONS AND ORIFICE DIAMETER AS SHOWN ON THIS DRAWING AND SHALL BE LEGIBLY STAMPED OR EMBOSSED ON A STAINLESS STEEL TAG APPROXIMATELY 1" X 2" X .017". THE TAG SHALL BE LOCKWIRED TO EACH FITTING AS SHOWN.
 6. CLEAN, PROTECT & INSPECT PER KSC-C-123, LEVEL 300A, TEST METHOD 1, PRIOR TO INSTALLATION IN FLUID SYSTEMS. CERTIFICATION REQUIRED.
 7. THIS DRAWING SUPERCEDES KENNEDY SPACE CENTER DRAWINGS 79K80237 AND 79K80240. FITTINGS PER 79K80237 AND 79K80240 ARE EQUIVALENT TO THOSE OF KC176 AND SHALL BE USED UNTIL EXISTING SUPPLY IS DEPLETED.
 8. ALL ORIFICES SHALL BE FLOW TESTED WITH NITROGEN AND CERTIFIED IN ACCORDANCE WITH FLAG NOTE 9. CERTIFICATION MUST INCLUDE FLOW RATE, TEMPERATURE, AND PRESSURE.

EXAMPLE OF
PART NOS.

KC176K4-.030 = ORIFICE, UNION, BLKHD, $\frac{1}{4}$ " OD TUBING, .030" DIAMETER

CUSTODIAN: JOHN F. KENNEDY SPACE CENTER		
PROCUREMENT SPEC. KSC-F-124	ORIFICE, UNION, BLKHD, FLARED TUBE FOR SEAL RING	STANDARD PART
COORDINATION STATUS		KC176
KSC DE		SHEET 1 OF 4

APPROVED: 11-16-92 REVISED: (B) ADDED SUPERCEDES COLUMN TO SHTS 2 THRU 4. CHANGED NOTES 6 & 7. 9-1-97

GP-425

FED SUP CLASS
4730

FLOW RATES ARE CALCULATED FOR AIR OR NITROGEN BY USE OF THE EQUATION:
 $FLOW (SCFM) = 16.5 \times ORIFICE \text{ AREA (SQ. IN.)} \times 1000 \text{ PSIA UPSTREAM PRESSURE AT } 70^{\circ}F.$
 THIS EQUATION IS LIMITED TO THE CONDITION WHERE
 DOWNSTREAM PRESSURE IS 53% OF UPSTREAM PRESSURE OR LESS.

TOLERANCE ON GIVEN FLOW RATES:

FOR ORIFICE DIAMETERS .0055 TO .030 TOLERANCE IS $\pm 20\%$
 FOR ORIFICE DIAMETERS .031 TO .090 TOLERANCE IS $\pm 15\%$
 FOR ORIFICE DIAMETERS .091 & ABOVE, TOLERANCE IS $\pm 10\%$.

TO DETERMINE FLOW RATES FOR UPSTREAM PRESSURES OTHER THAN 1000 PSIA,
 MULTIPLY GIVEN FLOW RATES BY:

$$\frac{\text{NEW UPSTREAM PRESSURE PSIA}}{1000 \text{ PSIA}}$$

GIVEN FLOW RATES ARE WITHIN TOLERANCE OVER AN UPSTREAM TEMPERATURE SPAN
 OF $\pm 30^{\circ}F.$ TO DETERMINE FLOW RATES FOR TEMPERATURES OTHER THAN $70^{\circ}F.$
 MULTIPLY GIVEN FLOW RATES BY:

$$\sqrt{\frac{530}{460 + \text{NEW TEMP } ^{\circ}F}}$$

TO OBTAIN FLOW RATES FOR : HELIUM - MULTIPLY GIVEN FLOW RATE BY 2.69
 HYDROGEN - MULTIPLY GIVEN FLOW RATE BY 3.8
 OXYGEN - MULTIPLY GIVEN FLOW RATE BY 0.95

DASH NO. CRE STEEL	TUBE OD REF	FLOW RATE SCFM 	A DIM	B DIM	C DIM	D DIM	SUPERCEDES P/N
K4	1/4	BLANK	2.062	.16	.68	.81	79K80237-1, 79K80240-1
K4-.0055	1/4	.39	2.062	.16	.68	.81	79K80237-2, 79K80240-2
K4-.006	1/4	.46	2.062	.16	.68	.81	79K80237-3, 79K80240-3
K4-.007	1/4	.63	2.062	.16	.68	.81	79K80237-4, 79K80240-4
K4-.008	1/4	.83	2.062	.16	.68	.81	79K80237-5, 79K80240-5
K4-.009	1/4	1.05	2.062	.16	.68	.81	79K80237-6, 79K80240-6
K4-.010	1/4	1.30	2.062	.16	.68	.81	79K80237-7, 79K80240-7
K4-.0125	1/4	2.02	2.062	.16	.68	.81	79K80237-8, 79K80240-8
K4-.015	1/4	2.92	2.062	.16	.68	.81	79K80237-9, 79K80240-9
K4-.0175	1/4	3.97	2.062	.16	.68	.81	79K80237-10, 79K80240-10
K4-.020	1/4	5.18	2.062	.16	.68	.81	79K80237-11, 79K80240-11
K4-.025	1/4	8.10	2.062	.16	.68	.81	79K80237-12, 79K80240-12
K4-.030	1/4	11.66	2.062	.16	.68	.81	79K80237-13, 79K80240-13
K4-.035	1/4	15.87	2.062	.16	.68	.81	79K80237-14, 79K80240-14
K4-.040	1/4	20.73	2.062	.16	.68	.81	79K80237-15, 79K80240-15
K4-.045	1/4	26.24	2.062	.16	.68	.81	79K80237-16, 79K80240-16
K4-.050	1/4	32.40	2.062	.16	.68	.81	79K80237-17, 79K80240-17
K4-.055	1/4	39.20	2.062	.16	.68	.81	79K80237-18, 79K80240-18
K4-.060	1/4	46.65	2.062	.16	.68	.81	79K80237-19, 79K80240-19
K4-.065	1/4	54.75	2.062	.16	.68	.81	79K80237-20, 79K80240-20
K4-.070	1/4	63.50	2.062	.16	.68	.81	79K80237-21, 79K80240-21
K4-.075	1/4	72.89	2.062	.16	.68	.81	79K80237-22, 79K80240-22
K4-.080	1/4	82.94	2.062	.16	.68	.81	79K80237-23, 79K80240-23

REVISED: (6) ADDED SUPERCEDES COLUMN. 9-1-97

APPROVED: 11-16-92


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CUSTODIAN: JOHN F. KENNEDY SPACE CENTER		
PROCUREMENT SPEC. KSC-F-124	ORIFICE, UNION, BLKHD FLARED TUBE FOR SEAL RING	STANDARD PART
COORDINATION STATUS		KC176
KSC DE		SHEET 2 OF 4

GP-425

FED SUP CLASS
4730

NOTICE: WHEN GOVERNMENT DRAWINGS, SPECIFICATIONS OR OTHER DATA ARE USED FOR ANY PURPOSE OTHER THAN IN CONNECTION WITH A DEFINITELY RELATED GOVERNMENT PROCUREMENT OPERATION, THE UNITED STATES GOVERNMENT THEREBY INCURS NO RESPONSIBILITY NOR ANY OBLIGATION WHATSOEVER AND THE FACT THAT THE GOVERNMENT MAY HAVE FORMULATED, FURNISHED, OR IN ANY WAY SUPPLIED THE SAID DRAWINGS, SPECIFICATIONS, OR OTHER DATA IS NOT REGARDED BY IMPLICATION OR OTHERWISE AS IN ANY MANNER LICENSING THE HOLDER OR ANY OTHER PERSON OR CORPORATION, OR CONVEYING ANY RIGHTS OR PERMISSION TO MANUFACTURE, USE, OR SELL ANY PATENTED INVENTION THAT MAY IN ANY WAY BE RELATED THERETO.

DASH NO. CRE STEEL	TUBE OD REF	FLOW RATE SCFM 	A DIM	B DIM	C DIM	D DIM	SUPERCEDES P/N
K4-.085	1/4	93.63	2.062	.16	.68	.81	79K80237-24, 79K80240-24
K4-.090	1/4	105	2.062	.16	.68	.81	79K80237-25, 79K80240-25
K4-.095	1/4	117	2.062	.16	.68	.81	79K80237-26, 79K80240-26
K6	3/8	BLANK	2.234	.27	.81	.93	79K80237-32, 79K80240-32
K6-.010	3/8	1.30	2.234	.27	.81	.93	79K80237-33, 79K80240-33
K6-.018	3/8	4.20	2.234	.27	.81	.93	79K80237-34, 79K80240-34
K6-.026	3/8	8.76	2.234	.27	.81	.93	79K80237-35, 79K80240-35
K6-.034	3/8	14.98	2.234	.27	.81	.93	79K80237-36, 79K80240-36
K6-.042	3/8	22.86	2.234	.27	.81	.93	79K80237-37, 79K80240-37
K6-.050	3/8	32.40	2.234	.27	.81	.93	79K80237-38, 79K80240-38
K6-.058	3/8	43.59	2.234	.27	.81	.93	79K80237-39, 79K80240-39
K6-.066	3/8	56.45	2.234	.27	.81	.93	79K80237-40, 79K80240-40
K6-.074	3/8	70.96	2.234	.27	.81	.93	79K80237-41, 79K80240-41
K6-.082	3/8	87.14	2.234	.27	.81	.93	79K80237-42, 79K80240-42
K6-.090	3/8	105	2.234	.27	.81	.93	79K80237-43, 79K80240-43
K6-.098	3/8	124	2.234	.27	.81	.93	79K80237-44, 79K80240-44
K6-.106	3/8	146	2.234	.27	.81	.93	79K80237-45, 79K80240-45
K6-.114	3/8	168	2.234	.27	.81	.93	79K80237-46, 79K80240-46
K6-.122	3/8	193	2.234	.27	.81	.93	79K80237-47, 79K80240-47
K6-.130	3/8	219	2.234	.27	.81	.93	79K80237-48, 79K80240-48
K6-.138	3/8	249	2.234	.27	.81	.93	79K80237-49, 79K80240-49
K6-.146	3/8	276	2.234	.27	.81	.93	79K80237-50, 79K80240-50
K6-.154	3/8	307	2.234	.27	.81	.93	79K80237-51, 79K80240-51
K6-.162	3/8	340	2.234	.27	.81	.93	79K80237-52, 79K80240-52
K6-.170	3/8	375	2.234	.27	.81	.93	79K80237-53, 79K80240-53
K6-.178	3/8	411	2.234	.27	.81	.93	79K80237-54, 79K80240-54
K6-.186	3/8	448	2.234	.27	.81	.93	79K80237-55, 79K80240-55
K6-.188	3/8	458	2.234	.27	.81	.93	79K80237-56, 79K80240-56
K8	1/2	BLANK	2.468	.26	1.00	1.12	79K80237-62, 79K80240-62
K8-.010	1/2	1.30	2.468	.26	1.00	1.12	79K80237-63, 79K80240-63
K8-.020	1/2	5.18	2.468	.26	1.00	1.12	79K80237-64, 79K80240-64
K8-.030	1/2	11.66	2.468	.26	1.00	1.12	79K80237-65, 79K80240-65
K8-.040	1/2	20.73	2.468	.26	1.00	1.12	79K80237-66, 79K80240-66
K8-.050	1/2	32.40	2.468	.26	1.00	1.12	79K80237-67, 79K80240-67
K8-.060	1/2	46.65	2.468	.26	1.00	1.12	79K80237-68, 79K80240-68
K8-.070	1/2	63.50	2.468	.26	1.00	1.12	79K80237-69, 79K80240-69
K8-.080	1/2	82.94	2.468	.26	1.00	1.12	79K80237-70, 79K80240-70
K8-.090	1/2	105	2.468	.26	1.00	1.12	79K80237-71, 79K80240-71

CUSTODIAN:

JOHN F. KENNEDY SPACE CENTER

PROCUREMENT SPEC.
KSC-F-124

COORDINATION STATUS

KSC DE

ORIFICE, UNION, BLKHD
FLARED TUBE FOR SEAL RING

STANDARD PART

KC176

SHEET 3 OF 4


REVISED: (B) ADDED SUPERCEDES COLUMN. 9-1-97

APPROVED: 11-16-92

GP-425

FED SUP CLASS
4730

NOTICE: WHEN GOVERNMENT DRAWINGS, SPECIFICATIONS OR OTHER DATA ARE USED FOR ANY PURPOSE OTHER THAN IN CONNECTION WITH A DEFINITELY RELATED GOVERNMENT PROCUREMENT OPERATION, THE UNITED STATES GOVERNMENT THEREBY INCURS NO RESPONSIBILITY NOR ANY OBLIGATION WHATSOEVER AND THE FACT THAT THE GOVERNMENT MAY HAVE FORMULATED, FURNISHED, OR IN ANY WAY SUPPLIED THE SAID DRAWINGS, SPECIFICATIONS, OR OTHER DATA IS NOT REGARDED BY IMPLICATION OR OTHERWISE AS IN ANY MANNER LICENSING THE HOLDER OR ANY OTHER PERSON OR CORPORATION, OR CONVEYING ANY RIGHTS OR PERMISSION TO MANUFACTURE, USE, OR SELL ANY PATENTED INVENTION THAT MAY IN ANY WAY BE RELATED THERETO.

DASH NO. CRE STEEL	TUBE OD REF	FLOW RATE SCFM 	A DIM	B DIM	C DIM	D DIM	SUPERCEDES P/N
K8-.100	1/2	130	2.468	.26	1.00	1.12	79K80237-72, 79K80240-72
K8-.110	1/2	157	2.468	.26	1.00	1.12	79K80237-73, 79K80240-73
K8-.120	1/2	187	2.468	.26	1.00	1.12	79K80237-74, 79K80240-74
K6-.130	1/2	219	2.468	.26	1.00	1.12	79K80237-75, 79K80240-75
K8-.140	1/2	254	2.468	.26	1.00	1.12	79K80237-76, 79K80240-76
K8-.150	1/2	292	2.468	.26	1.00	1.12	79K80237-77, 79K80240-77
K8-.160	1/2	332	2.468	.26	1.00	1.12	79K80237-78, 79K80240-78
K8-.170	1/2	375	2.468	.26	1.00	1.12	79K80237-79, 79K80240-79
K8-.180	1/2	420	2.468	.26	1.00	1.12	79K80237-80, 79K80240-80
K8-.190	1/2	468	2.468	.26	1.00	1.12	79K80237-81, 79K80240-81
K8-.200	1/2	518	2.468	.26	1.00	1.12	79K80237-82, 79K80240-82
K8-.210	1/2	571	2.468	.26	1.00	1.12	79K80237-83, 79K80240-83
K8-.220	1/2	627	2.468	.26	1.00	1.12	79K80237-84, 79K80240-84
K8-.230	1/2	686	2.468	.26	1.00	1.12	79K80237-85, 79K80240-85
K8-.240	1/2	746	2.468	.26	1.00	1.12	79K80237-86, 79K80240-86
K8-.250	1/2	810	2.468	.26	1.00	1.12	79K80237-87, 79K80240-87
K12	3/4	BLANK	3.046	.39	1.37	1.56	79K80237-93, 79K80240-93
K12-.100	3/4	130	3.046	.39	1.37	1.56	79K80237-94, 79K80240-94
K12-.120	3/4	187	3.046	.39	1.37	1.56	79K80237-95, 79K80240-95
K12-.140	3/4	254	3.046	.39	1.37	1.56	79K80237-96, 79K80240-96
K12-.160	3/4	332	3.046	.39	1.37	1.56	79K80237-97, 79K80240-97
K12-.180	3/4	420	3.046	.39	1.37	1.56	79K80237-98, 79K80240-98
K12-.200	3/4	518	3.046	.39	1.37	1.56	79K80237-99, 79K80240-99
K12-.220	3/4	627	3.046	.39	1.37	1.56	79K80237-100, 79K80240-100
K12-.240	3/4	746	3.046	.39	1.37	1.56	79K80237-101, 79K80240-101
K12-.260	3/4	874	3.046	.39	1.37	1.56	79K80237-102, 79K80240-102
K12-.280	3/4	1014	3.046	.39	1.37	1.56	79K80237-103, 79K80240-103
K12-.300	3/4	1164	3.046	.39	1.37	1.56	79K80237-104, 79K80240-104
K16	1	BLANK	3.093	.38	1.62	1.87	79K80237-110, 79K80240-110
K16-.100	1	130	3.093	.38	1.62	1.87	79K80237-111, 79K80240-111
K16-.140	1	254	3.093	.38	1.62	1.87	79K80237-112, 79K80240-112
K16-.180	1	420	3.093	.38	1.62	1.87	79K80237-113, 79K80240-113
K16-.220	1	627	3.093	.38	1.62	1.87	79K80237-114, 79K80240-114
K16-.260	1	874	3.093	.38	1.62	1.87	79K80237-115, 79K80240-115
K16-.300	1	1164	3.093	.38	1.62	1.87	79K80237-116, 79K80240-116
K16-.340	1	1495	3.093	.38	1.62	1.87	79K80237-117, 79K80240-117
K16-.380	1	1868	3.093	.38	1.62	1.87	79K80237-118, 79K80240-118
K16-.420	1	2282	3.093	.38	1.62	1.87	79K80237-119, 79K80240-119

REVISED: (B) ADDED SUPERCEDES COLUMN, 9-1-97

APPROVED: 11-16-92

CUSTODIAN:

JOHN F. KENNEDY SPACE CENTER

PROCUREMENT SPEC.
KSC-F-124

COORDINATION STATUS

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ORIFICE, UNION, BLKHD
FLARED TUBE FOR SEAL RING

STANDARD PART

KC176

SHEET 4 OF 4

STANDARDIZATION DOCUMENT IMPROVEMENT PROPOSAL

INSTRUCTIONS

1. The preparing activity must complete blocks 1, 2, 3, and 8. In block 1, both the document number and revision letter should be given.
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I RECOMMEND A CHANGE:

1. DOCUMENT NUMBER
GP-425, Rev. G

2. DOCUMENT DATE
September 8, 1997

3. DOCUMENT TITLE

Fluid Fitting Engineering Standards

4. NATURE OF CHANGE *(Identify paragraph number and include proposed rewrite, if possible. Attach extra sheets as needed.)*

5. REASON FOR RECOMMENDATION

6. SUBMITTER

a. NAME *(Last, First, Middle Initial)*

b. ORGANIZATION

c. ADDRESS *(Include Zip Code)*

d. TELEPHONE *(Include Area Code)*

7. DATE SUBMITTED

8. PREPARING ACTIVITY

a. NAME

Director of Engineering Development

d. TELEPHONE *(Include Area Code)*

(407) 867-2565

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National Aeronautics and Space Administration, Mail Code: DE
Kennedy Space Center, FL 32899