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Engineering Standard Practice

Standard Notes and Drawings Call-Out of Production Process Standards - DHC-8 Series 400 Program

PRACTICE: **ESP 46-3**

ISSUE: **2**

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Standard Notes and Drawings Call-Out of Production Process Standards - DHC-8 Series 400 Program

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STANDARD NOTES AND DRAWINGS CALL-OUT OF PRODUCTION PROCESS STANDARDS - DHC-8 SERIES 400 PROGRAM

1 INTRODUCTION

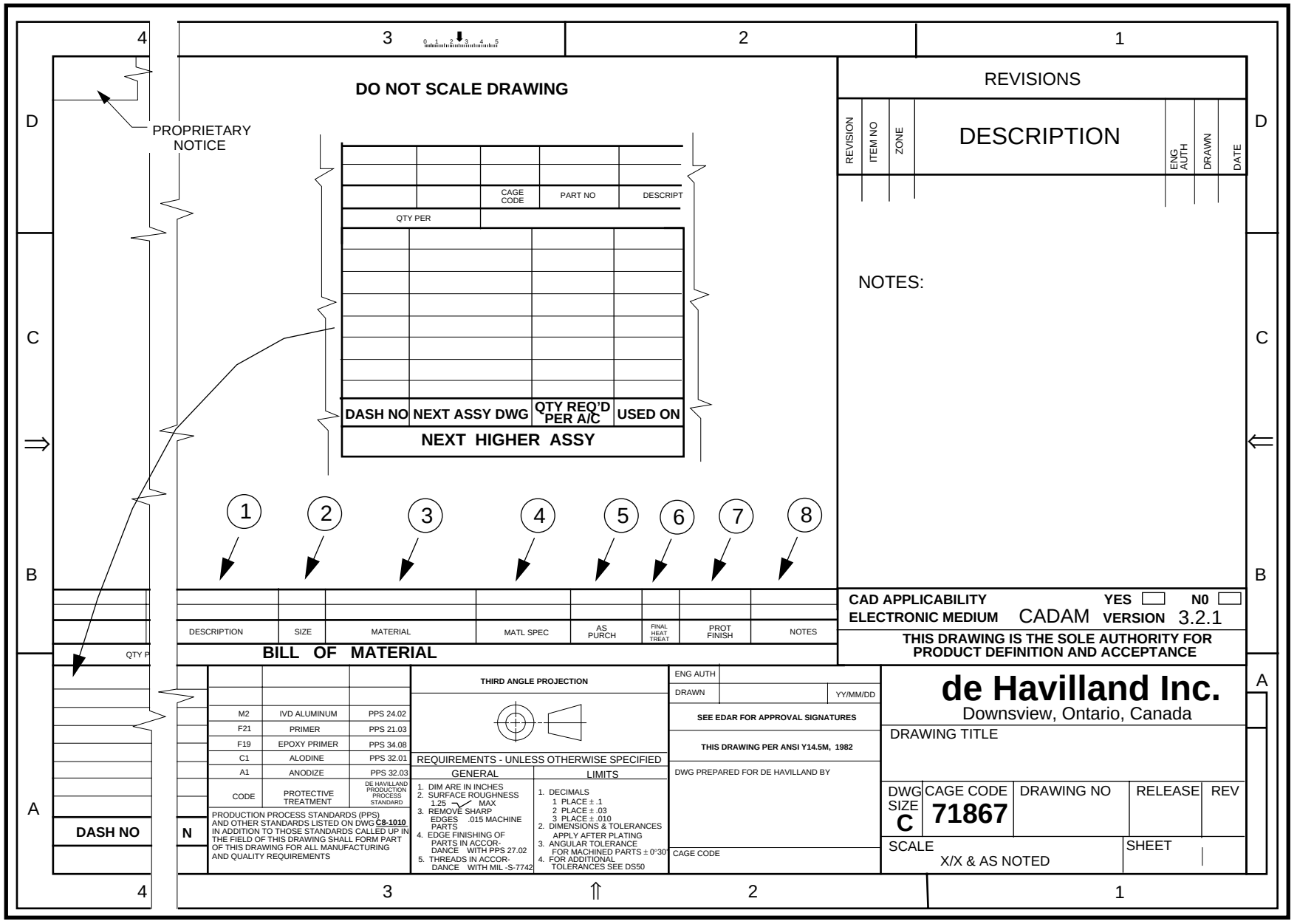
This Engineering Standard Practice (ESP) lists the standard drawing call-out and protective treatment notes for metallic materials. In addition, a list of standard notes covering common manufacturing processes applicable to metallic and non-metallic materials is provided.

The notes make reference to the corresponding Production Process Standards (PPS's) that shall be called out on the engineering drawings.

2 SCOPE

This ESP shall apply to all de Havilland drawings for the DASH 8 - 400 program. Production Process Standards (PPS's) listed in this document, in addition to those listed on Drawing C8-1010, shall form part of all applicable drawings for manufacturing and quality assurance requirements.

FIGURE 1. Drawing Bill of Material Call-Out



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3 HOW TO USE THIS DOCUMENT

Tables 1 through 6 list the required standard drawing call-out notes for various processes for various tempers and strength ranges of DHI approved metallic materials. The procurement department must be consulted for questions on material availability and cost.

These notes are intended as a guideline for designers.

Table 7 contains the standard notes for common manufacturing processes to be called out on the drawing. It is important that these notes be followed verbatim wherever possible to avoid confusion and to simplify planning and checking functions.

3.1 DESCRIPTION column (1)

(Ref Figure 1)

This column describes the form of the raw material:

-Sheet (Bare or Clad	Adhesive
-Plate	Ply
-Bar	Core
-Forging	Screen
-Casting	

-Extrusion (specify cross section; for example extrusion Z-section)

-Tube, etc.

Tables 1 through 6 list materials and typical available forms.

3.2 SIZE column (2)

This column specifies the thickness of sheet or plate, dimensions of bars. In case of tube size call-out, outside diameters and wall thickness shall be specified on the drawing as a note. This section shall be left blank for extrusions, forgings, and castings. ESP 98 lists the preferred metalic raw material sizes..

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3.3 MATERIAL column (3)

The material note refers to the raw material stock used to produce the part, for example:

7075 Plate

Clad 2024 Sht

6061 Extrusion

3.4 MATERIAL SPEC column (4)

The section specifies proper specification (for example, Military, Federal, AMS or de Havilland's) to which raw material is procured. Consult Tables 1 through 6 and ESP 80-1, and DTRD-8-010 for material specifications used on DASH 8-400 program.

3.5 AS PURCH column (5)

This section specifies the heat treat condition of material as purchased.

Tables 1 through 6 list heat treat condition of as purchased materials.

3.6 FINAL HEAT TREAT column (6)

This column shall contain the final heat treat (H.T.) condition of the material. The approved H.T. treat conditions are listed in the **FINAL HEAT TREAT** column in Tables 1 through 6.

3.7 PROT FINISH column (7)

For protective finish codes, please refer to ESP 64-1.

3.8 NOTES column (8)

This column contains the applicable **STANDARD PROCESS NOTES**, most of which will be taken from Table 7. The most common applicable notes associated with a specific material are contained on the **COMMENTS** column on Tables 1 through 6.

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TABLE 1. STANDARD DRAWING CALL-OUT FOR METALLIC MATERIALS ALLUMINUM ALLOYS

Description	Material	Material Specification	Heat Treat as Purchased	Final Heat Treat	Comments
Clad Sheet	2024	QQ-A-250/5	-O -T3	-T42 -T3, -T42	Material must not be left in 'O' condition as final temper Note 21 (For chem. milling)
Bare Sheet	5052	QQ-A-250/8	-H32 -H34	H32 H34	
Bare Sheet	6061	QQ-A-250/11	-O* -T4 -T6	-T42, -T62 -T4, -T6 -T6, -T62	If welded Note 44
Clad Sheet	7075	QQ-A-250/13 QQ-A-250/18***	-O* -T6	-T62** -T6, -T62	* Material must not be left in 'O' condition as final temper. ** Note 4 (for parts with bend radius less than 5t. Note 21 (For chem. milling) ***For metal bonding (Clad on one side only)
Plate	2024	QQ-A-250/4	-T351	-T351	RESTRICTED USE because of poor resistance to stress corrosion cracking/Exfoliation corrosion.
Plate	6061	QQ-Q-250/11	-T451 -T651	-T451, -T651 -T651	If welded Note 44
Plate	7050	AMS 4050	-T7451	-T7451	Notes 16, 18*, 67
Plate	7075	QQ-A-250/12	-T7351	-T7351	Notes 16, 18*, 67
Plate	7150	AMS 4252	-T7751	-T7751	Notes 16, 18*, 67

* See ESP 68 to determine when to specify

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TABLE 1. STANDARD DRAWING CALL-OUT FOR METALLIC MATERIALS ALLUMINUM ALLOYS

Description	Material	Material Specification	Heat Treat as Purchased	Final Heat Treat	Comments
Extrusion		CVXXX			Add: "CV #___" Note 16**
Bar-Rolled	6061	QQ-A-225/8	-T4 -T6	-T4, -T6 -T6	If welded - Note 44
Bar-Rolled	7075	QQ-A-225/9	-T73 -T7351	-T73 -T7351	Note 16
CS Section		CSXXX			Add: "CS # ___"
Hand Forging	7050	AMS 4108	-T7452	-T7452	Add machining allowance
Die Forging	7075	QQ-A-367	-T73	-T73	Notes 19, 71, 72 (***) State all required tolerances as per EM 3-8.

* See ESP 68 to determine whent to specify.
** This note not applicable to trim or non-structural CVs.
*** Supplier ultrasonic inspection to MIL-STD-2154.

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TABLE 1. STANDARD DRAWING CALL-OUT FOR METALLIC MATERIALS ALLUMINUM ALLOYS

Description	Material	Material Specification	Heat Treat as Purchased	Final Heat Treat	Comments
Die Forging	7175	AMS 4149	-T74	-T74	Notes 19, 71, 72 (***) State all required tolerances as per EM 3-8.
Casting	356.0	AMS 4260	-T6	-T6	Notes 70 State all required tolerances as per EM 3-7.
Casting	A356.0	MIL-I-21180 CLASS 1 or 11	-T6	-T6	Notes 70 State all required tolerances as per EM 3-7.
Casting	A357.0	MIL-I-21180 CLASS 1 or 11	-T6	-T6	Notes 70 State all required tolerances as per EM 3-7.
Tube	5052	WW-T-700/4	- O	- O	Specify: OD, wall thickness Notes: 29, 34A, 34B
Tube	6061	WW-T-700/6*	-T4	-T4, -T6	*For Non-Flared Tube Ends Specify: OD, wall thickness ** Note 44(welded assy.),29, 34A, 34B ***For magneform applications ****For systems single and double flared tube ends. **After Forming, Flaring aged to -T6.
			-T6	-T6	
		DHMS 2.21***	-T6	-T6	
		MIL-T-7081****	-T4	-T6**	

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TABLE 2. STANDARD DRAWING CALL-OUT FOR METALLIC MATERIALS FERROUS ALLOYS

Description	Material	Material Specification	Heat Treat as Purchased	Final Heat Treat	Comments
Sheet/ Strip	1095 STEEL	MIL-S-7947	Annealed	Rc 40-43 (180-200 ksi)	Note: If plated = Note 8.
Sheet/ Strip	1095 STEEL	MIL-S-7947	Annealed	Rc 43-46 (200-220 ksi)	Note: If plated - Note 8
Sheet/Strip	4130	MIL-S-18729	Condition N	90 - 120 ksi	For fusion welding.
				125 - 145 ksi	
				150 - 170 ksi	Note: If plated - Note 8.
				Cond. N	
Sheet/Plate/ Strip	301 CRES	AMS 5517	1/4 Hard	1/4 Hard	125 ksi tensile strength min.
Sheet/Plate/ Strip	301 CRES	AMS 5518	1/2 Hard	1/2 Hard	150 ksi tensile strength min.
Sheet/Plate/ Strip	301 CRES	AMS 5519	Full Hard	Full Hard	185 ksi tensile strength min.
Sheet/Plate/ Strip	321 CRES	AMS 5510	Annealed	Annealed	- Suitable for fusion welding - For inter stage annealing state Note 11.
Sheet/Plate/ Strip	15-5 PH CRES	AMS 5862	Solution Heat Treat	H1025 (155-175 ksi)	Note 10, 14A, 15 If plated: Note 8.
Sheet/Plate/ Strip	17-7PH CRES	MIL-S-25043,	Condition A	TH1050 (180-200 ksi)	Note 10, 14, 14A If plated: Note 8.
				RH 950 (200-240 ksi)	

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TABLE 2. STANDARD DRAWING CALL-OUT FOR METALLIC MATERIALS FERROUS ALLOYS

Description	Material	Material Specification	Heat Treat as Purchased	Final Heat Treat	Comments
Bar	4130 STEEL	MIL-S-6758	Condition N	90 - 120 ksi	For fusion welding
				125-145 ksi	Note 14.
				150-170 ksi	If plated, Note 8 Note 15
Bar	Nitralloy 135M (7140)	AMS 6470		Core 130-150 ksi	Note 14.
				Core 170-190 ksi	
Bar/Forging	4330V STEEL	AMS 6411	Normalized	220-240 ksi	Notes 7, 15, 17 If plated: Note 8.
Bar/Forging	4340 (Air) STEEL	AMS 6409	Normalized and Tempered	125-145 ksi 150-170 ksi	Note 14. Note 14, 15 If plated: Note 8.
Bar/Forgings	4340 (Vac) STEEL	AMS 6414	Annealed	180-200 ksi	Note 6, 15. If plated: Note 8.
Bar/Forging	300M STEEL	AMS 6419	Normalized	280-305 ksi	Notes 7, 15, 17.. If plated: Note 8.
Bar/Forging	9310 STEEL	AMS 6260	Annealed	Note 9	Note 9, 15.
Bar	303 CRES	DHMS M2.23	Annealed	Annealed	
Bar	321 CRES	QQ-A-763	Annealed	Annealed	

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TABLE 2. STANDARD DRAWING CALL-OUT FOR METALLIC MATERIALS FERROUS ALLOYS

Description	Material	Material Specification	Heat Treat as Purchased	Final Heat Treat	Comments
Bar	17-4 PH CRES	AMS 5643	Solution Heat Treat	H1150 (135-155 ksi)	Notes 10, 14
				H1025 (155-175 ksi)	Notes 10, 15 If plated: embrittlement relieve to PPS 30.06.
Bar	Custom 455 CRES	AMS 5617	Solution Heat Treat	H1000 (200 - 220 ksi)	Notes 10, 15
				H950≤4.00" (225-245 ksi) 4.01-6.00" (220-240 ksi)	If plated: embrittlement relieve to PPS 30.06.
Bar	303F CRES	AMS 5738	Cold Worked	Cold Worked	
Bar	15-5 PH CRES	AMS 5659	Solution Heat Treat	H1025 (155-175 ksi)	If plated: Embrittlement relief to PPS 30.06. Notes 10, 15 If fusion welded: Note 45. If brazed: Note 49
Bar/Forging	PH13-8 Mo CRES	AMS 5629	Solution Heat Treat	H1050 (175-195 ksi)	Notes 10, 14, 15 If fusion welded: Note 45. If brazed: Note 49 If plated: Note 8
				H1000 (205-225)ksi	
Investment Casting	347 CRES	AMS 5362	Annealed	Annealed	Note 71 State all required tolerances per EM 3-7

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TABLE 2. STANDARD DRAWING CALL-OUT FOR METALLIC MATERIALS FERROUS ALLOYS

Description	Material	Material Specification	Heat Treat as Purchased	Final Heat Treat	Comments
Investment Casting	17-4PH CRES	AMS 5342	Solution Heat Treat	H 1100 (130-160 ksi)	Notes 14, 71 State all required tolerances per EM 3-7
Structural Tubing	4130 STEEL	MIL-T_6736	Cond. N	Cond. N	General note for all tubes Specify: OD, wall thickness
				90-120 ksi	For Fusion Welding
				125-145 ksi	Note 14
				150-170 ksi	If plated Note 8.
Tubing	304 CRES	MIL-T-8504	Annealed	Annealed	Specify: OD, wall thickness Notes: 28, 34B
Tubing	304 CRES	MIL-T-6845	1/8 Hard	1/8 Hard	
Tubing	321 CRES	MIL-T-8606	Annealed	Annealed	If Brazed: Note 49 Specify: OD, wall thickness If Fusion welded: Note 45.
Tubing	21-6-9 CRES	BMS 7-185	Cold Worked	Cold Worked	Specify: OD, wall thickness Notes: 29, 34B
Wire	302 CRES	AMS 5688	Spring Temper	Spring Temper	
Wire	17-7PH	AMS 5678	Condition C	CH 900	Note 10

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TABLE 3. STANDARD DRAWING CALL-OUT FOR METALLIC MATERIALS NON-FERROUS ALLOYS

Description	Material	Material Specification	Heat Treat as Purchased	Final Heat Treat	Comments
Sheet Strip Plate & Bar	Copper Pure	DHMS M2.22	(060) Soft Annealed or (061) Annealed	060 or 061	
Strip	Beryllium Copper C17200	ASTM B194	TB00	TF00	
			TD01	TH01	
			TD02	TH02	
			TD04	TH04	
Rod & Bar	Beryllium Copper C17200	ASTM B196	TB00	TF00	
			TD04	TH04	
Rod & Bar	Aluminum Bronze	ASTM B150 ALLOY 630 or AMS 4640	Annealed	Annealed	

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TABLE 4. STANDARD DRAWING CALL-OUT FOR METALLIC MATERIALS TITANIUM ALLOYS

Description	Material	Material Specification	Heat Treat as Purchased	Final Heat Treat	Comments
Sheet	Ti-CP-40	MIL-T-9046, Class CP-3	Annealed (Cond. A)	Annealed	After cold forming (< 500°F) All shrink and strech flange parts and contour formed skins with radius less than 40" - state: - stress relieve after forming to PPS 30.14.
Sheet	Ti-CP-70	MIL-T-9046, Class CP-1 AMS 4901*	Annealed (Cond. A)	Annealed	
Sheet	Ti-5Al-2.5Sn	MIL-T-9046 Class A-1	Annealed (Cond. A)	Annealed	
Sheet/Plate	Ti-6Al-4V	MIL-T-9046 Class AB-1	Annealed (Cond. A) Cond. ST	Annealed Cond. STA	
Bar	Ti-CP-70	MIL-T-9047	Annealed (Cond. A)	Annealed	
Bar	Ti-6Al-4V	MIL-T-9047	Annealed (Cond. A)	Annealed	
Die Forgings	Ti-6Al-4V	AMS 4928	Annealed 135-155 ksi for t≤ 2.00 inch 130-150 ksi for t=2.001-6.000 inch	Annealed	- State all required tolerances per EM3-8.
Tube	Ti-3Al-2.5V	AMS 4945	Cold Worked	Cold worked	Specify: OD, wall thickness

* Short Bros.

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TABLE 5. STANDARD DRAWING CALL-OUT FOR METALLIC MATERIALS MISCELLANEOUS

Description	Material	Material Specification	Heat Treat as Purchased	Final Heat Treat	Comments
Shim Stock	Aluminum	MIL-S-22499 Comp. 1, Type I or II, Class 2	-	-	Type I= Shim is all laminations Type II- Shim is 1/2 solid stock
Shim Stock	Brass	MIL-S-22499 Comp. 2, Type I or II, Class 2	-	-	Type I= Shim is all laminations Type II- Shim is 1/2 solid stock
Shim Stock	Stainless Steel	MIL-S-22499 Comp. 3, Type I or II, Class 2	-	-	Type I= Shim is all laminations Type II- Shim is 1/2 solid stock
Wire Rope (Cable)	Carbon Steel	MIL-W-83420 Type I, Comp.A Tin over zinc coating	-	-	Specify construction
Wire Rope (Cable)	Stainless Steel	MIL-W-83420 Type I, Comp.B (Non-coated)	-	-	Specify construction

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TABLE 6. STANDARD DRAWING CALL-OUT FOR METALLIC MATERIALS HEAT RESISTANT ALLOYS

Description	Material	Material Specification	Heat Treat as Purchased	Final Heat Treat	Comments
Sheet/Plate/ Strip	Inconel 625	AMS 5599	Annealed	Annealed	
Bar/Forging	Inconel 625	AMS 5666	Annealed	Annealed	
Sheet/Plate/ Strip	Inconel 718	AMS 5596	Solution HT	Aged: 180-200 ksi	Note 12
		AMS 5662	Aged 180 - 200 ks	Aged 180 - 200 ksi	

TABLE 7. STANDARD NOTES - SHOT PEENING

Reference #	SHOT PEENING
1	SATURATION SHOT PEEN ALL SURFACES TO PPS 17.03 USING STEEL SHOT CS___* MAX., INTENSITY ___* ± ___* OR USING GLASS BEADS GP__*, INTENSITY ___* ± __*.
2	SHOT PEEN FORM TO PPS 17.04 (Specify contour tolerance required)
3	IF REQUIRED, SHOT PEEN STRAIGHTEN TO PPS 17.04; SATURATION SHOT PEEN ALL SURFACES TO PPS 17.03 USING STEEL SHOT CS ___* MAX., INTENSITY ___* ± ___* OR USING GLASS BEADS GP ___* , INTENSITY ___* ± ___*.

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TABLE 8. STANDARD NOTES - HEAT TREATMENT

Reference #	HEAT TREATING
4	
5	
6	STRESS RELIEVE TO PPS 30.04 All parts having a specific tensile strength range of 180 - 200 ksi or greater which will be machined or ground and are to undergo pickling or plating, shall be stress relieved prior to pickling or plating.
7	STRESS RELIEVE TO PPS 30.04 All parts having a specified tensile strength range of 200 - 220 ksi or greater which will be machined or ground in the finish condition shall be stress relieved.
8	EMBRITTLEMENT RELIEVE TO PPS 30.04 All parts having a tensile strength range of 150 - 170 ksi or greater that have been chemically (acid or alkaline) cleaned, electroplated or burn detection tested per PPS 20.05.
9	CARBURIZE AND HEAT TREAT TO PPS 30.11.
10	HEAT TREAT TO PPS 30.06 (Note for PH Steels)
11	ANNEAL TO PPS 30.10
12	HEAT TREATMENT OF NICKEL AND NICKEL ALLOYS TO PPS 30.13
13	HEAT TREATMENT OF TITANIUM AND TITANIUM ALLOYS TO PPS 30.14
14	STEEL CASE HARDENING - LIQUID NITRIDING TO PPS 30.16
14A	STEEL CASE HARDENING - ION NITRIDING TO PPS 30.17.

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TABLE 9. STANDARD NOTES - NON-DESTRUCTIVE TESTING

Reference #	NON-DESTRUCTIVE TESTING
15	MAGNETIC PARTICLE INSPECT TO PPS 20.01 (See ESP 68)
16	FLUORESCENT PENETRANT INSPECT TO PPS 20.03 (See ESP 68)
17	MACRO-ETCH BURN DETECTION TO PPS 20.05 Prerequisite - Highly stressed critical structural parts which are to be machined or ground after heat treatment to strength range 200 - 220 ksi and greater.
18	VENDOR ULTRASONIC INSPECT RAW MATERIAL TO QAP 4.11/15. (See ESP 68)
19	VENDOR FLUORESCENT PENETRANT INSPECT TO MIL-STD-6866
20	VENDOR MAGNETIC PARTICLE INSPECT TO MIL-STD-1949
21	SHEET TO BE MINIMUM RESIDUAL STRESS (MRS) QUALITY. Prerequisite - Slender aluminum sheet metal parts which will be machined or chem. milled on one side.

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TABLE 10. STANDARD NOTES - FASTENING, JOINING

Reference #	FASTENING, JOINING
22	MAGNEFORM FITTING TO PPS 1.08
23	MAGNEFORM METAL SLEEVES ON ELASTIC CORD ASSEMBLIES TO PPS 3.11
24	WET INSTALL BUSHINGS WITH F16 COMPOUND
25	TORQUE TO PPS 14.01, ___*inch-lb * Specify Torque Value.
26	INSTALL WITH ANAEROBIC SEALANT TO PPS 19.02 USE ___* * Specify Material & Grade
27	WIRE LOCK TO PPS 19.01
28	INSTALL RYNGLOCK FITTING TO PPS 6.20
29	SWAGE WIGGINS FITTING TO PPS 6.14 (Series 900 fittings)
30	INSTALL PERMASWAGE FITTINGS TO PPS 6.13
31	INSTALL BUSHING TO PPS 12.04
32	INSTALL SHIM TO PPS 13.21
33	COLD EXPANSION OF HOLES TO PPS 2.36
34	INSTALL BLIND BOLTS TO PPS 2.40
34A	BEAD TUBE ENDS TO MS33660-XX PER PPS 6.01.

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TABLE 10. STANDARD NOTES - FASTENING, JOINING

Reference #	FASTENING, JOINING
34B	SWAGE SIERRACIN/HARRISON FITTINGS TO PPS 6.19.
35	INSTALL HI-LITES TO PPS 2.68
36	STAKE BEARINGS TO PPS 12.03
37	
38	INSTALL GAMAH SWAGED CONNECTORS TO PPS 6.15
39	
40	INSTALL SIERRACIN/HARRISON QUICKFIT FITTINGS TO PPS 6.21
41	INSTALL SELF-ALIGN BEARING BY SWAGING TO PPS 12.06

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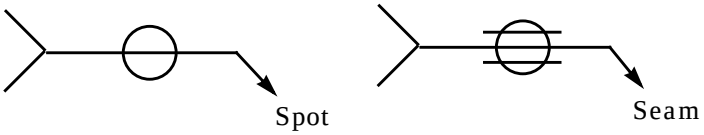
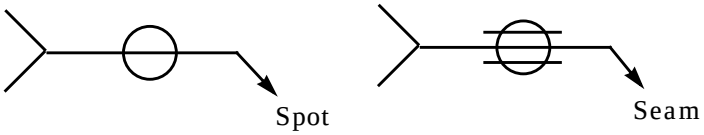
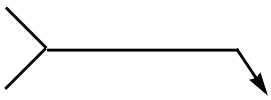
TABLE 11. STANDARD NOTES - WELDING

Reference #	WELDING (Address welding questions to DHI's Welding Specialist) (Refer to Appendix A for standard welding symbols)
	RESISTANCE SPOT AND SEAM WELDING OF ALUMINUM ALLOYS
42	CLASS (A, B, OR C) PPS 37.01 
	RESISTANCE SPOT & SEAM WELDING OF NON-HARDENING STEELS, NICKEL ALLOYS AND TITANIUM ALLOYS
43	CLASS (A, B, OR C) PPS 37.02 
	FUSION WELDING OF ALUMINUM ALLOYS
44	CLASS (A, B, OR C) PPS 37.03  (6061 may be welded in the -T4 or -T6 tempers for notes A, B, or C). (5052 shall be welded in the 'O' condition only). 5052 is not heat treatable to improve mechanical properties therefore notes A, B or C are not applicable. Note A. HEAT TREAT AFTER WELDING IS NOT REQUIRED - Show appropriate welding symbol (refer to appendix "A") Note B. AFTER WELDING AGE ONLY TO -T6 (For 6061 only. Provides weld strength similar to -T4 temper) Note C. AFTER WELDING, SOLUTION HEAT TREAT AND AGE TO -T62

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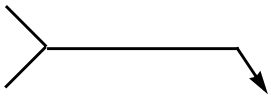
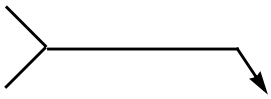
Reference #	WELDING (Address welding questions to DHI's Welding Specialist) (Refer to Appendix A for standard welding symbols)
FUSION WELDING OF FERROUS AND NICKEL ALLOYS	
45	CLASS (A, B, OR C) PPS 37.04  - Show appropriate welding symbol (refer to appendix "A")
FUSION WELDING OF TITANIUM ALLOYS	
46	CLASS (A, B, OR C) PPS 37.05  - Show appropriate welding symbol (refer to appendix "A")

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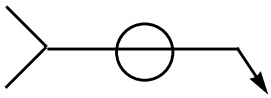
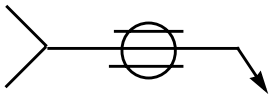
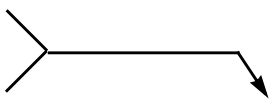
Reference #	WELDING (Address welding questions to DHI's Welding Specialist) (Refer to Appendix A for standard welding symbols)
ORBITAL WELDING OF TITANIUM ALLOYS	
47	CLASS C PPS 37.16 
APPLICATION OF RESISTANCE WELDING PRIMER	
48	RESISTANCE SPOT: CLASS (“B” or “C”) TO PPS 37.14  RESISTANCE SEAM: CLASS (“B” or “C”) TO PPS 37.14 
BRAZEING	
49	① + ② PPS 37.07  ① AB- Aliminum Braze CB - Copper Braze SB - Silver Braze NB - Nickel Braze ② D - Dip; F- Furnace; T - Torch

STANDARD NOTES AND DRAWINGS CALL-OUT OF PRODUCTION PROCESS STANDARDS - DHC-8 SERIES 400 PROGRAM

TABLE 12. STANDARD NOTES - COMPOSITES

Reference #	COMPOSITES
50	MANUFACTURE PART TO PPS ___*, CURE AT ___ PSI * 10.35 * 10.43 * 10.48
51	MATERIAL SYSTEM*, SPECIFICATION, TYPE, GRADE, CLASS ie 1)Aramid Fabric, Epoxy Preimpregnated DHMS P1.24 Type 2 Style 281 2)Core Honeycomb (State Regular, Overexpanded or Flex) DHMS P1.26, Thickness, Cell Size, Density. * Refer to DTRD-8-010 for selection of Material Systems
52	MACHINE TO PPS 10.39
53	EDGE FILL CORE WITH DHMS P1.30, GRADE 1, TO PPS 10.35
54	INSTALL INSERTS WITH DHMS P1.30, GRADE 3, TO PPS 2.64
55	POT CORE WITH DHMS P1.30, GRADE 2 TO PPS 10.35 (Can also be potted on a cured part)
56	CHAMFER CORE AT ___^{o} BEVEL
57	THIS IS CLASS (##) COMPONENT

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Reference #	COMPOSITES
58	TEST TO QAMTR 029
59	PREFORM NON DESTRUCTIVE INSPECTION TO QAMTR 034
60	MAXIMUM (#) OF BUTT JOINTS ALLOWED PER PLY, STAGGER SUBSEQUENT SPLICES MINIMUM ___*. * ie2
61	FOAM - RIGID, DHMS P1.29, GRADE __, FORM A2
62	SURFACE FINISH PER PPS 34.34
63	MAXIMUM (#) OF SPLICES ALLOWED PER PLY, MINIMUM (#) INCH OVERLAP

TABLE 13. STANDARD NOTES - MISCELLANEOUS

Reference #	MISCELLANEOUS
64	ATTACHING SURFACE*, MAXIMUM MACHINING MISMATCHES OF .002 ARE ALLOWED, ALL OTHER SURFACES TO BE FINISHED TO PPS 27.03 AS NON-ATTACHING (* Affected area can be cross hatched)
65	SWAGE STRAIGHT SHANK TERMINAL TO PPS 3.02
66	SWAGE BALL TERMINALS TO PPS 3.04
67	PROOF LOAD TO PPS 3.05
68	FOR 7000 SERIES ALUMINUM ALLOYS ONLY: Show on part: <---- GRAIN DIRECTION ----> or state " GRAIN DIRECTION OPTIONAL "
69	APPLY SHIMS TO PPS 13.21

STANDARD NOTES AND DRAWINGS CALL-OUT OF PRODUCTION PROCESS STANDARDS - DHC-8 SERIES 400 PROGRAM

Reference #	MISCELLANEOUS
70	INSPECT STEEL FORGINGS AT DHI TO PPS 35.04
71	INSPECT TO PPS 35.07, CLASS ___ CASTING
72	INSPECT ALUMINUM FORGINGS AT DHI TO PPS 35.08
73	Show principal grain direction on forging: <---- GRAIN DIRECTION ---->
74	CHEMICAL MILL TO PPS 42.01 TYPE (I, II OR III)
75	ADHESIVE COLD BOND WITH _____' TO PPS 25.30. *Refer to PPS 25.30 for compound selection

TABLE 14. STANDARD NOTES - SEALING

Reference #	SEALING
76	FILLET SEAL WITH DHMS S3.01, TYPE II, CLASS B-1/2 OR B-2 SEALANT TO *PPS 21.03 *PPS 21.16 for areas not part of the integral fuel tank.
77	DOME SEAL WITH DHMS S3.01, TYPE II, CLASS B-1/2 OR B-2 SEALANT TO *PPS 21.03 *PPS 21.16 for areas not part of the integral fuel tank.
78	VOID SEAL WITH DHMS S3.01, TYPE II, CLASS B-1/2 OR B-2 SEALANT TO *PPS 21.03 *PPS 21.16 for areas not part of the integral fuel tank.
79	PRESSURE/ENVIRONMENTAL SEAL WITH DHMS S3.01, TYPE II, CLASS B 1/2 OR B2 SEALANT TO PPS 21.16
80	HIGH TEMPERATURE SEAL WITH DHMS S3.04 SEALANT TO PPS 21.18
81	BRUSH APPLY DHMS S3.01, TYPE I, CLASS A-1/2 OR A-2 SEALANT TO PPS 21.21
82	FAYING SURFACE SEAL WITH DHMS S3.06, TYPE I, CLASS C SEALANT TO *PPS 21.03 *PPS 21.21 for areas not part of the integral fuel tank.
83	SEAL WITH DHMS S3.02 SEALANT TO PPS 21.19 For sealing removable parts or temporary seals

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TABLE 15. STANDARD NOTES - ADHESIVE BONDING

Reference #	METAL TO METAL ADHESIVE BONDING (HOT)
84	For High Strength Adhesive Bonding state notes a), b), c) & d).
a)	PREPARE AND PHOSPHORIC ACID ANODIZE ALL PARTS EXCEPT HONEYCOMB CORE TO BAC 5555. PREPARE HONEYCOMB CORE IN ACCORDANCE WITH BAC 5514
b)	PRIME SURFACES OF PARTS ALL OVER WITH BMS 5-89, TYPE I, GRADE A, BONDING PRIMER TO BAC 5514-589
c)	BOND PARTS TOGETHER IN FLAT FORM/CURVED SHAPE WITH BMS 5-101, TYPE II ADHESIVE TO BAC 5514-5101, SPLICE HONEYCOMB USING BMS 5-90, TYPE II
d)	COMPLIANCE WITH PPS 36.10 FOR THE APPLICABLE ISSUES OF BAC 5555, BAC 5514 AND ANY DEVIATIONS TO SAID BAC SPECIFICATIONS IS A REQUIREMENT

TABLE 16. STANDARD NOTES - COLD BONDING

Reference #	ADHESIVE BONDING (COLD)
89	ADHESIVE COLD BOND WITH ******' TO PPS ____*, * Refer to Appendix B for appropriate specification. ****** Appropriate DHMS or Adhesive.

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TABLE 17. STANDARD NOTES -ELECTRICAL BONDING AND GROUNDING

Reference #	ELECTRICAL BONDING
90	ELECTRICAL BONDING THROUGH BONDING JUMPER TO PPS 9.06, TYPE 1, 2, 3, 4, OR 5. - See DS 127 for appropriate assy. type number and hardware.
91	ELECTRICAL BONDING AND POTTING WITH DHMS S3.01 CLASS B, TYPE I TO PPS 9.06 TYPE III. -See DS 127 for appropriate assy. type number and hardware.
92	AFTER BONDING POT ENTIRE ASSY WITH DHMS S3.01, CLASS B, TYPE I, TO PPS 9.06
93	ELECTRICAL BONDING THROUGH ATTACHMENT HARDWARE PER PPS 9.06.
94	ELECTRICAL BONDING THROUGH DIRECT CONTACT PER PPS 9.06.
95	FASTENER COUNTERSINKS TO BE FREE OF ALL PROTECTIVE FINISHES PER PPS9.06.

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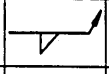
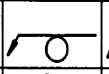
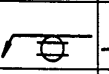
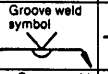
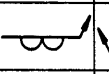
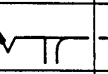
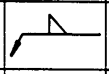
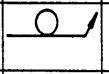
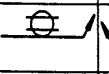
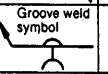
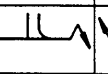
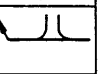
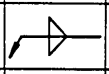
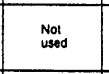
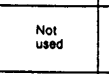
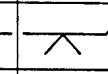
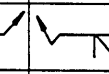
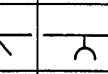
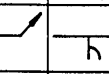
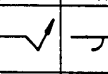
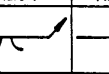
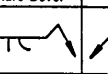
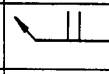
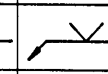
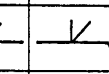
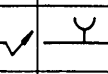
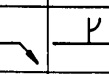
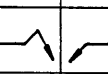
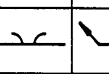
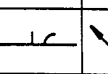
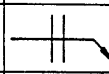
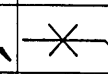
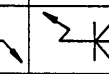
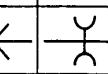
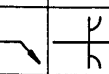
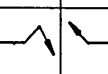
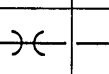
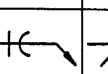
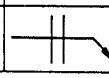
APPENDIX A AMERICAN WELDING SOCIETY SYMBOLOGY

HOW TO USE THIS DOCUMENT

STANDARD NOTES AND DRAWINGS CALL-OUT OF PRODUCTION PROCESS STANDARDS - DHC-8 SERIES 400

Basic Welding Symbols and Their Location Significance

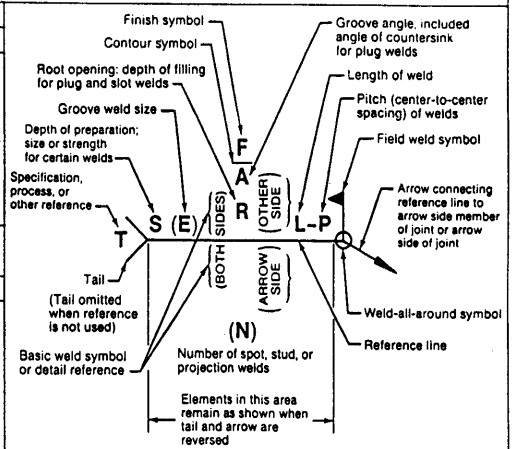
Location Significance	Fillet	Plug or Slot	Spot or Projection	Stud	Seam	Back or Backing	Surfacing	Flange Corner	Flange Edge
Arrow Side						Groove weld symbol 			
Other Side				Not used		Groove weld symbol 	Not used		
Both Sides		Not used	Not used	Not used	Not used	Not used	Not used	Not used	Not used
No Arrow Side or Other Side Significance	Not used	Not used		Not used		Not used	Not used	Not used	Not used

Location Significance	Groove							Scarf for Brazed Joint
	Square	V	Bevel	U	J	Flare-V	Flare-Bevel	
Arrow Side								
Other Side								
Both Sides								
No Arrow Side or Other Side Significance		Not used	Not used	Not used	Not used	Not used	Not used	Not used

Supplementary Symbols

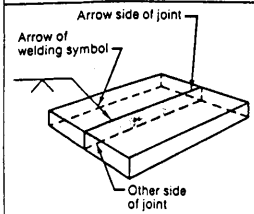
Weld-All Around	Field Weld	Melt-Thru	Consum-able Insert	Backing Spacer	Contour		
					Flush	Convex	Concave
							

Location of Elements of a Welding Symbol

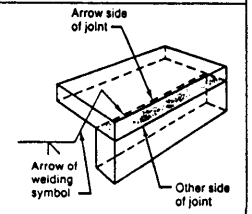


Basic Joints
Identification of Arrow Side and Other Side of Joint

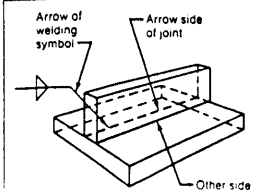
Butt Joint



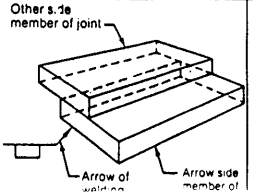
Corner Joint



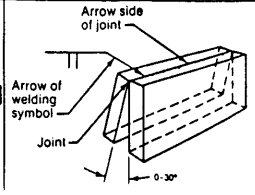
T-Joint



Lap Joint



Edge Joint



Process Abbreviations

Where process abbreviations are to be included in the tail of the welding symbol, reference is made to Table 1, Designation of Welding and Allied Processes by Letters, of AWS A2.4-86.

AMERICAN WELDING SOCIETY, INC.

Engineering Standard Practice

STANDARD NOTES AND DRAWINGS CALL-OUT OF PRODUCTION PROCESS STANDARDS - DHC-8 SERIES 400 PROGRAM

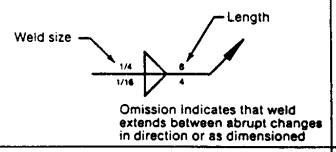
APPENDIX: A AMERICAN WELDING SOCIETY WELDING SYMBOLOGY

HOW TO USE THIS DOCUMENT

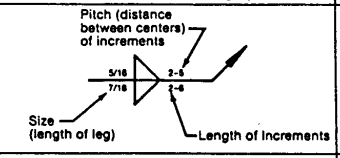
STANDARD NOTES AND DRAWINGS CALL-OUT OF PRODUCTION PROCESS STANDARDS - DHC-8 SERIES 400

Typical Welding Symbols

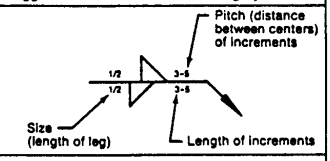
Double-Fillet Welding Symbol



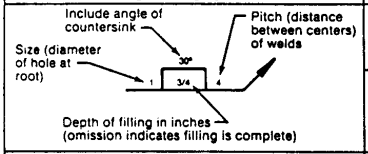
Chain Intermittant Fillet Welding Symbol



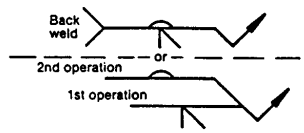
Staggered Intermittant Fillet Welding Symbol



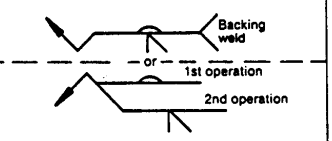
Plug Welding Symbol



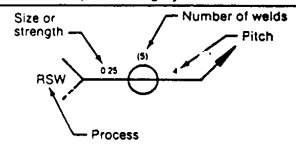
Back Welding Symbol



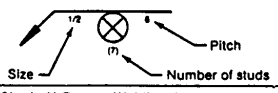
Backing Welding Symbol



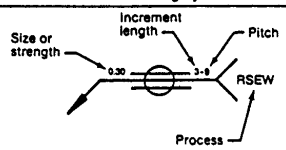
Spot Welding Symbol



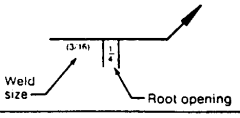
Stud Welding Symbol



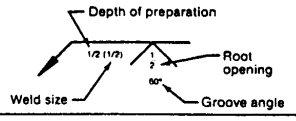
Seam Welding Symbol



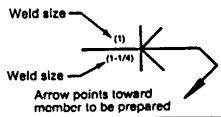
Square-Groove Welding Symbol



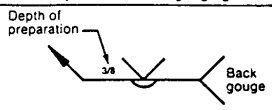
Single-V Groove Welding Symbol



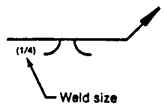
Double-Bevel-Groove Welding Symbol



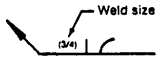
Symbol with Backgouging



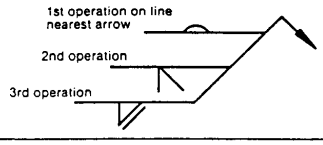
Flare-V Groove Welding Symbol



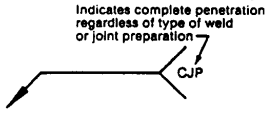
Flare-Bevel-Groove Welding Symbol



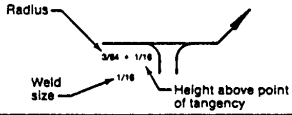
Multiple Reference Lines



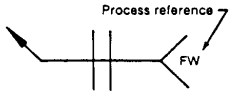
Complete Penetration



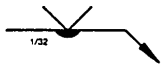
Edge Flange Welding Symbol



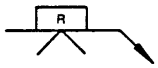
Flash or Upset Welding Symbol



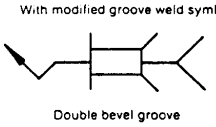
Melt-Thru Symbol



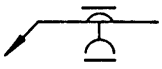
Joint with Backing



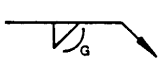
Joint with Spacer



Flush Contour Symbol



Convex Contour Symbol



*It should be understood that these charts are intended only as shop aids. The only complete and official presentation of the standard welding symbols is in A2.4

Engineering Standard Practice

STANDARD NOTES AND DRAWINGS CALL-OUT OF PRODUCTION PROCESS STANDARDS - DHC-8 SERIES 400 PROGRAM

APPENDIX B COLD BONDING

MATERIAL #1	MATERIAL #2	ADHESIVE	PPS
Acrylic Plastic - Plexiglas MIL-P-5425	Rubber - Neoprene, MIL-R-6130, Type 2, Grade A Medium or MIL-R-6855 Class 2	DHMS A6.11 Ty.I Cl.1	25.23
Acrylic Plastic - Plexiglas MIL-P-5425	Rubber - Silicone AMS 3345 or AMS 3346	DHMS A6.13	25.14
Acrylic Plastic - Plexiglas MIL-P-5425	Acrylic Plastic - Plexiglas MIL-P-5425	Acrylic Plastic Cement	25.54
Acrylic Polyvinyl Chloride (PVC) DHMS P1.09 (Kydex)	Neoprene Coated Nylon DHMS F5.07 Metal (Unstressed) Wood	DHMS A6.11 Ty.II Cl.1	25.55
Acrylic Polyvinyl Chloride (PVC) DHMS P1.09 (Kydex)	Metal (Stressed)	DSC 479-1	25.22
Acrylic Polyvinyl Chloride (PVC) DHMS P1.09 (Kydex)	Rubber - Neoprene, MIL-R-6130, Type 2, Grade A Medium or MIL-R-6855 Class 2	DHMS A6.11 Ty.I Cl.1	25.23
Acrylic Polyvinyl Chloride (PVC) DHMS P1.09 (Kydex)	Rubber - Silicone AMS 3345 or AMS 3346	DHMS A6.13	25.14
Acrylic Polyvinyl Chloride (PVC) DHMS P1.09 (Kydex)	Velcro Tape	DHMS A6.10 Ty.II	25.08

Engineering Standard Practice

STANDARD NOTES AND DRAWINGS CALL-OUT OF PRODUCTION PROCESS STANDARDS - DHC-8 SERIES 400 PROGRAM

APPENDIX B COLD BONDING

MATERIAL #1	MATERIAL #2	ADHESIVE	PPS
Acrylic Polyvinyl Chloride (PVC) DHMS P1.09 (Kydex)	Acrylic Polyvinyl Chloride DHMS P1.09 (Kydex)	EC-2262	25.53
ARBORITES - SEE PHENOLIC LAMINATES			
Asbestos	Metal	DHMS A6.11 Ty.II Cl.1	25.55
Balsa Wood (End Grain) DHMS CS 8.01	Metal Phenolic Laminates (Arborite, Formica, Durolam)	DSC 479-1	25.22
Balsa Wood (End Grain) DHMS CS 8.01	Fiberglass	Lay-up Fiberglass directly to the Balsa	
Carpet Backing	Velcro Tape	DHMS A6.10 Ty.II	25.08
Cork (Adelite, Armstrong DK153, Langite)	Metal	DHMS A6.10 Ty.II	25.08
Cork - Rubberized MIL-G-6183	Metal	DHMS A6.10 Ty.II	25.08
Decorative Film Veneers P1.28	Kevlar Fiberglass Metal Wood	EC-1022	25.57
Fabric Backing	DSC 52 Foams Metal Wood Fabric Backing	DHMS A6.11 Ty.II Cl.1	25.55
Fabric Backing	Vinyl	EC-2262	25.53

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MATERIAL #1	MATERIAL #2	ADHESIVE	PPS
Fabrilite Facing	Metal Wood Fabrilite Facing	EC-2262	25.53
Felt CF206A	Fiberglass Acrylic Polyvinyl Chloride (PVC) DHMS P1.09 Acrylic Metal Wood	DHMS A6.11 Ty.II Cl.1	25.55
Fiberglass Laminate - Unstressed	Metal Neoprene Wood Fiberglass Laminate - Unstressed	DHMS A6.11 Ty.I Cl.1	25.23
Fiberglass Laminate - Unstressed	Metal Labels	DSC 215-1	25.25
Fiberglass Laminate - Unstressed	Polycarbonate DHMS P1.01	DSC 479-1	25.22
Fiberglass Laminate - Stressed	Metal Wood Fiberglass Laminate - Stressed	EC-2216	25.52
Fiberglass Insulation	Metal	DHMS A6.10 Ty.II	25.08
Fiberthin - See Neoprene Coated Nylon DHMS F5.07			
Fluorosilicone (Foam Sheet Stock, Extrusion) MIL-R-25988	Metal	DSC 215-1	25.25

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APPENDIX B COLD BONDING

MATERIAL #1	MATERIAL #2	ADHESIVE	PPS
DSC 52 Foam	Fabric Wood DSC 52 Foam	DHMS A6.11 Ty.II Cl.1	25.55
DSC 52 Foam	DHMS P1.01 Polycarbonate Stressed	DSC 479-1	25.22
DSC 52 Foam	DHMS P1.01 Polycarbonate Unstressed	DHMS A6.11 Ty.I Cl.2	25.63
Formica - See Phenolic Laminates			
Kevlar - DHMS P1.24	Velcro Tape	DHMS A6.10 Ty.II	25.08
Kevlar - DHMS P1.24	Decorative Film	EC-1022	25.57
Kevlar - DHMS P1.24	Felt CF206A	DHMS A6.11 Ty.II Cl.1	25.55
Kevlar - DHMS P1.24	Rubber - Silicone AMS 3345 or AMS 3346	DHMS A6.13	25.14
Kydex - See Acrylic Polyvinyl Chloride DHMS P1.09			
Metal	Cork - All Types Fiberglass Insulation Velcro Tape	DHMS A6.10 Ty.II	25.08
Metal	Facings - Vinyl	EC-2262	25.53
Metal	Facings - Silicone Rubber - Silicone AMS 3345 or AMS 3346	DHMS A6.13	25.14
Metal	Fiberglass - Stressed	DHMS A6.12	25.52

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APPENDIX B COLD BONDING

MATERIAL #1	MATERIAL #2	ADHESIVE	PPS
Metal	Metal - Low Stress, high temperature and fluid resistance Metal Labels Rubber - Fluorosilicone MIL-R-25988	DSC 215-1	25.25
Metal	Acrylic Polyvinyl Chloride (PVC) DHMS P1.09 Asbestos - Plain Asbestos - Rubberized Fabric Backing Facings - Neoprene Facings - Nylon DSC 52 Foam Metal - Low Stress Phenolic Laminates Plywood Wood	DHMS A6.11 Ty.II Cl.1	25.55
Metal	Polycarbonate DHMS P1.01	DSC 479-1	25.22
Metal	Sound Proofing LD400	DHMS P1.15	25.28
Metal	Fiberglass - Unstressed Neoprene Coated Nylon DHMS F5.07 Rubber - Neoprene, MIL-R-6130, Type 2, Grade A Medium or MIL-R-6855 Class 2 Weatherbar - Polyolefin Coated Nylon Fabric	DHMS A6.11 Ty.I Cl.1	25.53

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APPENDIX B COLD BONDING

MATERIAL #1	MATERIAL #2	ADHESIVE	PPS
Metal Labels - Where resistance to Diester oil and JP fuel is required	Fiberglass Metal Polycarbonate DHMS P1.01	DSC 215-1	25.25
Metal Labels - Where resistance to phosphate ester fluid is required	Fiberglass Metal Polycarbonate DHMS P1.01	DSC 233	25.50
Neoprene, MIL-R-6130, Type 2, Grade A Medium or MIL-R-6855 Class 2	Acrylic Plastic MIL-P-5425 Fiberglass Metal Wood	DHMS A6.11 Ty.I Cl.1	25.23
Neoprene Coated Nylon DHMS F5.07	Acrylic Polyvinyl Chloride (PVC) DHMS P1.09 Metal Neoprene Coated Nylon DHMS F5.07	DHMS A6.11 Ty.II Cl.1	25.55
Nylon LP410 6/6 (Bar, Rod, Sheet) - Consult Materials Technology			
Phenolic MIL-P-79	Metal Wood Phenolic MIL-P-79	DHMS A6.11 Ty.II Cl.1	25.55
Phenolic MIL-P-79	Balsa Wood DHMS CS8.01	DSC 479-1	25.22
Plywood	Metal	DHMS A6.11 Ty.II Cl.1	25.55
Polycarbonate DHMS P1.01 - Unstressed	Velcro Tape	Adhesive Transfer Tape DSC 91-14	25.64

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APPENDIX B COLD BONDING

MATERIAL #1	MATERIAL #2	ADHESIVE	PPS
Polycarbonate DHMS P1.01 - Unstressed	Fiberglass Laminate Metal Urethane foam Polycarbonate DHMS P1.01-Unstressed	DHMS A6.11 Ty.I Cl.2	25.63
Polycarbonate DHMS P1.01 - Stressed	Fiberglass Laminate Metal Urethane foam Polycarbonate DHMS P1.01-Stressed	DSC 479-1	25.22
Polycarbonate DHMS P1.01 - Stressed	Velcro Tape	Adhesive Transfer Tape DSC 91-14	25.64
Rulon "A" - See Teflon, Ceramic Filled			
Silicone - Sheet, Foam	Acrylic Polyvinyl Chloride (PVC) DHMS P1.09 Fiberglass Metal	DHMS A6.13	25.14
Silicone - Sheet, Foam	Polycarbonate DHMS P1.01	DSC 233	25.50
Sound Proofing LD400	Metal	DHMS P1.15	25.28
Teflon - Ceramic Filled (Rulon "A")	Metal	DHMS A6.12	25.52
Teflon, Treated	Aluminum Steel Teflon - Ceramic Filled (Rulon "A")	DHMS A6.09 Epoxy	25.30
Teflon, Untreated - Refer to Materials Technology			

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MATERIAL #1	MATERIAL #2	ADHESIVE	PPS
Velcro Tape	Polycarbonate DHMS P1.01 - Stressed Polycarbonate DHMS P1.01 - Unstressed	Adhesive Transfer Tape DSC 91-14	25.64
Velcro Tape	Vinyl DSC 85 - Decorative	EC-2262	25.53
Velcro Tape	Acrylic Polyvinyl Chloride (PVC) DHMS P1.09 Carpet Backing Metal Vinyl DSC 85 - Non-decorative Wood	DHMS A6.10 Ty.II	25.08
Vinyl DSC 85 - Decorative	Acrylic Polyvinyl Chloride (PVC) DHMS P1.09 Metal Velcro Tape Vinyl DSC 85 - decorative	EC-2262	25.53
Vinyl DSC 85 - Non-decorative	Velcro Tape	DHMS A6.10 Ty.II	25.08
Weatherbar - Polyolefin Coated Nylon Fabric	Metal Weatherbar - Polyolefin Coated Nylon Fabric	DHMS A6.11 Ty.I Cl.1	25.23
Wood	Acrylic Polyvinyl Chloride (PVC) DHMS P1.09 Metal Wood - Unstressed	DHMS A6.11 Ty.II Cl.I	25.55

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