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AEROSPACE INFORMATION REPORT

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AIRCRAFT ENGINE AND ACCESSORY DRIVES AND FLANGE STANDARDS

PURPOSE OF STANDARD

1. To provide the means by which both engine manufacturers and accessory manufacturers may save appreciable design and development time by utilizing the collective and coordinated efforts and the past experience of the Industry in solving the problems of tolerances and performance capability.

2. To assure, by simple identification designation, design compatibility between engine pads and drives and accessory flanges and drive shafts.

The following is a brief description of all pertinent parts of a "Standard". It may be used as a check list to determine that a given design conforms in all respects to a given "Standard".

1. ENGINE OR GEARBOX DRIVE PAD - NON-QAD TYPE

   1.1 Minimum diameter or perimeter of machined surface.
   1.2 Minimum clearance requirements surrounding pad.
   1.3 Basic bolt circle diameter.
   1.4 Number of studs.
   1.5 Basic angular location of studs, spacing and tolerance thereof.
   1.6 Stud height and minimum full thread.
   1.7 Pilot diameter, chamfer of pilot entrance, pilot cavity depth and width.
   1.8 Minimum distance between pad face and drive shaft boss.
   1.9 Distance from pad face to end of drive shaft.
   1.10 Direction of rotation of drive shaft.
   1.11 Surface finish requirements as well as minimum radii at intersecting surfaces.
   1.12 Squareness and concentricity requirements of drive shaft to pad and pilot diameter.
   1.13 Spline lubrication is specified.
   1.14 Limit of oil leakage out of drive is specified.
   1.15 Drive cavity drain.

2. ENGINE OR GEARBOX DRIVE PAD - QAD TYPE

   Same as (1) above, except:

   2.1 Clearance requirement surrounding pad is increased to accommodate "Vee" band.
   2.2 Details of "Vee" band shoulder at O.D. of pad.
   2.3 Use of dowel pin may be specified in lieu of studs to accept torque reaction from accessory.
   2.4 Basic angular location of pins and stud(s).
   2.5 Detail dimensions of pins and stud(s).

3. ACCESSORY FLANGE

   3.1 Maximum flange diameter or perimeter.
   3.2 Basic Location and dimension of stud holes.
   3.3 Use of dowel pin may be specified in lieu of studs to accept torque reaction from accessory.
   3.4 Basic dimensions for keyhole slots including dimensions of recess on back side of flange, where applicable.
   3.5 For starter applications direction of slots to oppose torque developed by accessory.
   3.6 Distance from flange to end of drive shaft.
   3.7 Wrench clearance requirements.

3. ACCESSORY FLANGE (Continued)

3.8 Minimum stud and nut clearance requirements.
3.9 Pilot dimension and concentricity requirements.
3.10 Pilot inner and outer depth dimensions.
3.11 Pilot "O" ring groove dimensions, where applicable.
3.12 "Vee" clamp shoulder at O.D. of flange, complete dimensions.
3.13 Surface finish requirements as well as minimum radii at all intersection surfaces.
3.14 Misalignment requirement for drive shaft.
3.15 Retention requirements for drive shaft.
3.16 Requirement for operation when exposed to oil leakage into pilot compartment.

4. ENGINE OR GEARBOX DRIVE

4.1 Shaft and Sealing Design Details

4.1.1 Complete dimensions of "O" ring cavity.
4.1.2 Surface finish requirements.
4.1.3 Depth of shaft cavity.
4.1.4 Radii at intersecting surfaces.
4.1.5 Concentricity limits of "O" ring cavity entrance chamfer.
4.1.6 Concentricity limits of "O" ring cavity bore and spline P.D.

4.2 Spline Design Details

4.2.1 Complete dimensions of spline.
4.2.2 Minimum length of spline.
4.2.3 Minimum surface hardness.

5. ACCESSORY DRIVE SHAFT

5.1 Shaft and Sealing Design Details

5.1.1 Shaft outside diameter.
5.1.2 "O" ring groove dimensions and location.
5.1.3 Concentricity limits of shaft O.D. and spline P.D.
5.1.4 Concentricity limit of "O" ring bottom and shaft O.D.
5.1.5 Radii at intersecting surfaces.
5.1.6 Surface finish requirements.
5.1.7 Limitation to location of shear section is specified.
5.1.8 In designing the drive and the accessory, consideration should be given to the possibility of full lubricating system oil pressure occurring within the gearbox spline inner cavity.

5.2 Spline Design Details

5.2.1 Complete dimensions of splines.
5.2.2 Minimum length of spline.
5.2.3 Spline leading edge chamfer.
5.2.4 Chamfer at spline run out end.
5.2.5 Surface hardness.

6. ENGINE OR GEARBOX DRIVE PAD LOADS

Pad overhung moment limit about the centerline of the pad stud pattern should be based, as a minimum, on the accessory weight, overhung moment and vibration environment as specified in the engine model specification or by the procuring agency.

7. SPLINE TORQUE CAPACITY

The selection of the spline size should be based, as a minimum, on the accessory power and speed requirements as specified in the engine model specification or by the procuring agency. Standard stress analysis procedures should be followed to determine the allowable load carrying capacity limits. The engine shaft and spline, except when a starter is to be used, should be capable of withstanding an instantaneous torque five times the rated torque without permanent deformation or failure. When a starter is to be used the engine shaft and spline should be capable of withstanding an instantaneous torque two times the maximum starting torque without permanent deformation or failure.

The maximum torsional strength of the accessory shaft and spline shall not exceed the minimum strength requirement of the applicable mating drive.

8. TYPICAL ACCESSORY DRIVE APPLICATIONS

The following tabulation provides a listing of typical accessory drive applications and is provided only as a reference to current practice.

8.1 Bolt Circle Diameter is shown in (millimeters) inches
8.2 Spline size is shown in (millimeters) inches
8.3 Drive rating in terms of power is shown in (kilowatts) horsepower
8.4 Drive rating in terms of torque is shown in (newton-meters) pound-inches
8.5 Allowable weight is shown in (kilograms) pounds
8.6 Static overhung moment is shown in (newton-meters) pound-inches
8.7 Nominal uses are identified as:

CS	Constant Speed Generating System
FP	Fluid Power Pump
G	Narrow Speed Range Generator
S	Starter
SG	Starter-Generator
TG	Tachometer Generator

Designation Drive Accessory	Bolt Circle Dia. (mm)	Bolt Circle Dia. in.	Spline P.D. (mm)	Spline P.D. in.	Rated Speed rpm	Drive Rating Power (kW)	Drive Rating Power hp	Drive Rating Torque (N.m)	Drive Rating Torque lb-in.	Allowable Weight (kg)	Allowable Weight lbs	Static Overhung Moment (N.m)	Static Overhung Moment lb-in.	Nom. Use
AS959-1 AS960-1	(67.39)	2.653	(11.641)	0.4583	4000			(16.9)	150	(2.2)	5	(1.6)	15	FP
					8000			(16.9)	150	(2.2)	5	(1.6)	15	FP
					12000			(16.9)	150	(2.2)	5	(1.6)	15	FP
					16000			(16.9)	150	(2.2)	5	(1.6)	15	FP
					4200			(1.6)	15	(2.2)	5	(1.6)	15	TG
AS961-1 AS962-1	(127.00)	5.000	(15.24)	0.600	4000			(33.8)	300	(11.3)	25	(11.2)	100	FP
					6000			(33.8)	300	(11.3)	25	(11.2)	100	FP
					8000			(33.8)	300	(11.3)	25	(11.2)	100	FP
					12000			(33.8)	300	(11.3)	25	(11.2)	100	FP
					16000			(33.8)	300	(11.3)	25	(11.2)	100	FP
					12000	(4.4)	6	(84.7)	750	(9.0)	20	(6.7)	60	SG
					12000	(8.9)	12	(169.4)	1500	(15.8)	35	(16.9)	150	SG
					12000	(13.4)	18	(169.4)	1500	(15.8)	35	(16.9)	150	SG
					12000	(17.8)	24	(169.4)	1500	(15.8)	35	(19.2)	170	SG
AS961-2 AS962-2	(127.00)	5.000	(20.32)	0.800	4000			(67.7)	600	(11.3)	25	(11.2)	100	FP
					6000			(67.7)	600	(11.3)	25	(11.2)	100	FP
					8000			(67.7)	600	(11.3)	25	(11.2)	100	FP
AS963-1 AS964-1	(127.00)	5.000	(20.32)	0.800	3300			(203.3)	1800	(31.7)	70	(50.8)	450	S
					8000			(56.4)	500	(11.3)	25	(14.1)	125	FP
					8000	(22.3)	30			(24.9)	55	(39.5)	350	G
					12000	(22.3)	30			(22.6)	50	(28.2)	250	G
					9000	(26.0)	35			(36.2)	80	(56.4)	500	CS
					12000	(26.0)	35			(22.6)	50	(33.8)	300	CS

Designation		Bolt Circle Dia.		Spline P.D.		Rated Speed	Drive Rating Power		Drive Rating Torque		Allowable Weight		Static Overhung Moment		Nom. Use
Drive	Accessory	(mm)	in.	(mm)	in.	rpm	(kW)	hp	(N.m)	lb-in.	(kg)	lbs	(N.m)	lb-in.	
AS963-2	AS964-2	(127.00)	5.000	(30.48)	1.200	3300			(542.3)	4800	(36.2)	80	(70.6)	625	S
						3300			(813.4)	7200	(36.2)	80	(79.0)	700	S
						4000			(112.9)	1000	(13.6)	30	(22.5)	200	FP
						4000			(169.4)	1500	(34.0)	75	(70.6)	625	FP
						6000			(169.4)	1500	(22.6)	50	(39.5)	350	FP
AS965-1	AS966-1	(203.20)	8.000	(20.32)	0.800	6000	(33.5)	45			(34.0)	75	(56.4)	500	G
						8000	(11.1)	15			(22.6)	50	(28.2)	250	G
						8000	(22.3)	30			(29.4)	65	(39.5)	350	G
						8000	(33.5)	45			(34.0)	75	(56.4)	500	G
						12000	(22.3)	30			(22.6)	50	(28.2)	250	G
						9000	(26.0)	35			(36.2)	80	(84.7)	750	CS
						12000	(26.0)	35			(45.3)	100	(135.5)	1200	CS
AS965-2	AS966-2	(203.20)	8.000	(30.48)	1.200	3300			(813.4)	7200	(36.2)	80	(90.3)	800	S
						9000	(41.0)	55			(52.1)	115	(141.2)	1250	CS
						9000	(55.9)	75			(68.0)	150	(225.9)	2000	CS
						9000	(82.0)	110			(79.3)	175	(282.4)	2500	CS
AS965-3	AS966-3	(203.20)	8.000	(41.28)	1.625	3300			(1626.9)	14400	(54.4)	120	(146.8)	1300	S
						4000			(451.9)	4000	(56.6)	125	(67.7)	600	FP
						6000			(451.9)	4000	(56.6)	125	(67.7)	600	FP

Designation		Bolt Circle Dia.		Spline P.D.		Rated Speed	Drive Rating Power		Drive Rating Torque		Allowable Weight		Static Overhung Moment		Nom. Use
Drive	Accessory	(mm)	in.	(mm)	in.	rpm	(kW)	hp	(N.m)	lb-in.	(kg)	lbs	(N.m)	lb-in.	
AS967-1	AS968-1	(254.00)	10.000	(20.32)	0.800	6000	(33.5)	45			(40.8)	90	(62.1)	550	G
						6000	(48.4)	65			(45.3)	100	(67.7)	600	G
						8000	(33.5)	45			(34.0)	75	(45.1)	400	G
						8000	(48.4)	65			(38.5)	85	(56.4)	500	G
						20000	(55.9)	75			(40.8)	90	(101.6)	900	CS
AS967-2	AS968-2	(254.00)	10.000	(30.48)	1.200	6000	(70.8)	95			(56.6)	125	(84.7)	750	G
						6000	(104.3)	140			(68.0)	150	(124.2)	1100	G
						6000	(141.6)	190			(79.3)	175	(169.4)	1500	G
						8000	(70.8)	95			(45.3)	100	(73.4)	650	G
						8000	(104.3)	140			(56.6)	125	(84.7)	750	G
						8000	(141.6)	190			(72.5)	160	(135.5)	1200	G
						9000	(41.0)	55			(61.2)	135	(192.0)	1700	CS
						9000	(55.9)	75			(68.0)	150	(225.9)	2000	CS
						9000	(82.0)	110			(79.3)	175	(282.4)	2500	CS
						16000	(164.0)	220			(90.7)	200	(327.6)	2900	CS
						19000	(123.0)	165			(70.3)	155	(180.7)	1600	CS
						20000	(82.0)	110			(52.1)	115	(135.5)	1200	CS
AS967-3	AS968-3	(254.00)	10.000	(41.28)	1.625	4000			(451.9)	4000	(56.6)	125	(67.7)	600	FP
						9000	(123.0)	165			(102.0)	225	(338.9)	3000	CS
						9000	(164.0)	220			(124.7)	275	(406.7)	3600	CS
AS967-4	AS968-4	(254.00)	10.000	(50.80)	2.000	4000			(1016.8)	9000	(90.7)	200	(135.5)	1200	FP