

NITROGEN CYLINDERS & COMPONENTS INDEX

PAGE	DATE	SERIES	DESCRIPTION
C-1	02/13/24	-	Cam Index
C-1.1	04/08/18	-	General Cam Specifications
C-2	06/27/07	-	Aerial Cam Specifications
C-3	03/23/04	-	Aerial Cam Specifications
C-4	06/09/04	-	Standard Aerial Cam Envelope
C-5	08/24/07	-	Performance Calculations - Die Mount and Aerial Cams
C-6	03/23/04	C11, C12, C13	Aerial Cam 50mm Mounting Face
C-7	03/23/04	C11, C12, C13	Aerial Cam 75mm Mounting Face
C-8	04/29/04	C11, C12, C13	Aerial Cam 100mm Mounting Face
C-9	04/29/04	C11, C12, C13	Aerial Cam 150mm Mounting Face
C-10	03/23/04	C11, C12, C13	Aerial Cam 175mm Mounting Face
C-11	04/29/04	C11, C12, C13	Aerial Cam 200mm Mounting Face
C-12	04/29/04	C11, C12, C13	Aerial Cam 250mm Mounting Face
C-13	04/29/04	C11, C12, C13	Aerial Cam 300mm Mounting Face
C-14	06/26/00	-	Die Mounted Cam Specifications
C-15	06/26/00	-	Die Mounted Cam Specifications
C-16	06/26/00	-	Standard Die Mounted Cam Envelope
C-17	09/22/00	C21, C22, C23	Die Mounted Cam 75mm Mounting Face
C-18	09/22/00	C21, C22, C23	Die Mounted Cam 100mm Mounting Face
C-19	09/22/00	C21, C22, C23	Die Mounted Cam 150mm Mounting Face
C-20	09/22/00	C21, C22, C23	Die Mounted Cam 200mm Mounting Face
C-21	09/22/00	C21, C22, C23	Die Mounted Cam 250mm Mounting Face
C-22	09/22/00	C21, C22, C23	Die Mounted Cam 300mm Mounting Face
C-23	02/13/24	C34	Cam Accelerator Roller
C-24	06/03/10	C33	Discontinued
C-25	04/24/06	C34	Aerial Cam Accelerator Plate - Set-up Drawing
C-26	04/24/06	C34	Aerial Cam Accelerator Plate - Set-up Chart
C-27	06/03/10	C34	Aerial Cam Accelerator Plate
C-28	02/13/24	C35	Aerial Cam - Long Reach
C-29	02/13/24	C35	Aerial Cam - Long Reach

AERIAL CAM SPECIFICATIONS

1. Cam angles will be in 5° increments from 0° to 60°.
2. Standard nominal mounting face widths are to be 50, 75, 125, 150, 175, 200, 250, and 300 mm.
3. The aerial cams will be categorized by mounting face width, which determines the shut height and overall width.

Mounting Surface width (mm)	Slide Stroke (mm)	Shut Height (mm)
50	30 (min)	225
75	50 (min)	275
125	50 (min)	300
150	50 (min)	300
175	50 (min)	300
200	50 (min)	300
250	60 - 0° to 20° 50 - 25° to 60°	375
300	60 - 0° to 20° 50 - 25° to 60°	375

Series C11 = Light Duty

Series C12 = Heavy Duty

Series C13 = Heavy Duty / High Volume

Mandatory - All Cams

1. Unit shall be completely HARD METRIC.
2. All wear units shall be self-lubed.
3. Positive Returns.
4. Accelerators (0° through 25°), required on 125 mm widths and larger.
5. Mechanical springs shall be NAAMS / ISO standard.
6. Accessibility to all mounting screws and dowels.
7. Rear accessibility for spring maintenance on 125 mm widths and larger.
8. Cross and centerline keyed slide adapter on 75 mm widths and wider.
9. Performance rating target, 0.04 mm wear after 1.6 million cycles, calculated by:
Overall cam width (W) x 1.5 mm material thickness x 310 MPa (44,000 psi.)
which equals the required Newton's of work force.
10. All dowel holes shall be unfinished to nominal minus 0.2/0.3 mm.

Mandatory - Series C11

1. Minimum capability to comply with the light duty cam performance curves.

(CONTINUED ON FOLLOWING PAGE)

A

B

AERIAL CAM SPECIFICATIONS

CONTINUED FROM PREVIOUS PAGE

Mandatory - Series C12

1. Minimum capability to comply with the heavy duty cam performance curves.

Mandatory - Series C13

1. Minimum capability to comply with the heavy duty cam performance curves.
2. Double wearstrips (10 mm or 12 mm NAAMS or DIN preferred),
on backup surfaces, keeper surfaces and driver surfaces.

Optional - All Cams

1. Additional keyways
2. Slide lock-up capability
3. Cross and centerline keyed slide adapter on 50 mm width
4. Replaceable V-drivers (whole unit or wearplates)
5. Gas springs NAAMS / ISO

B

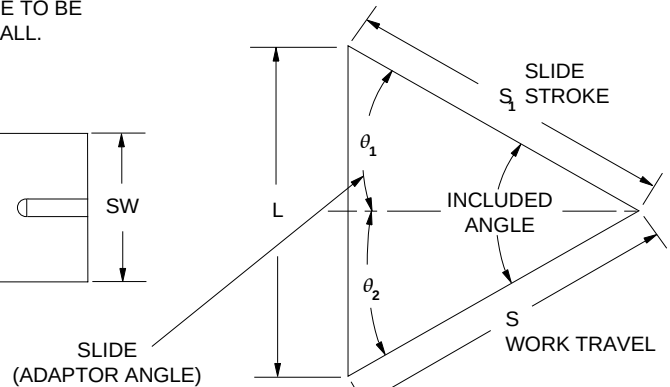
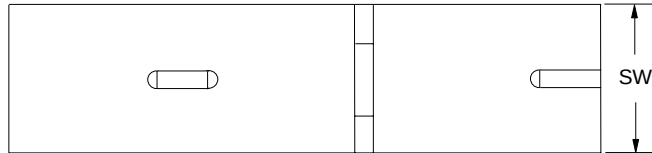
A

C

STANDARD AERIAL CAM ENVELOPE

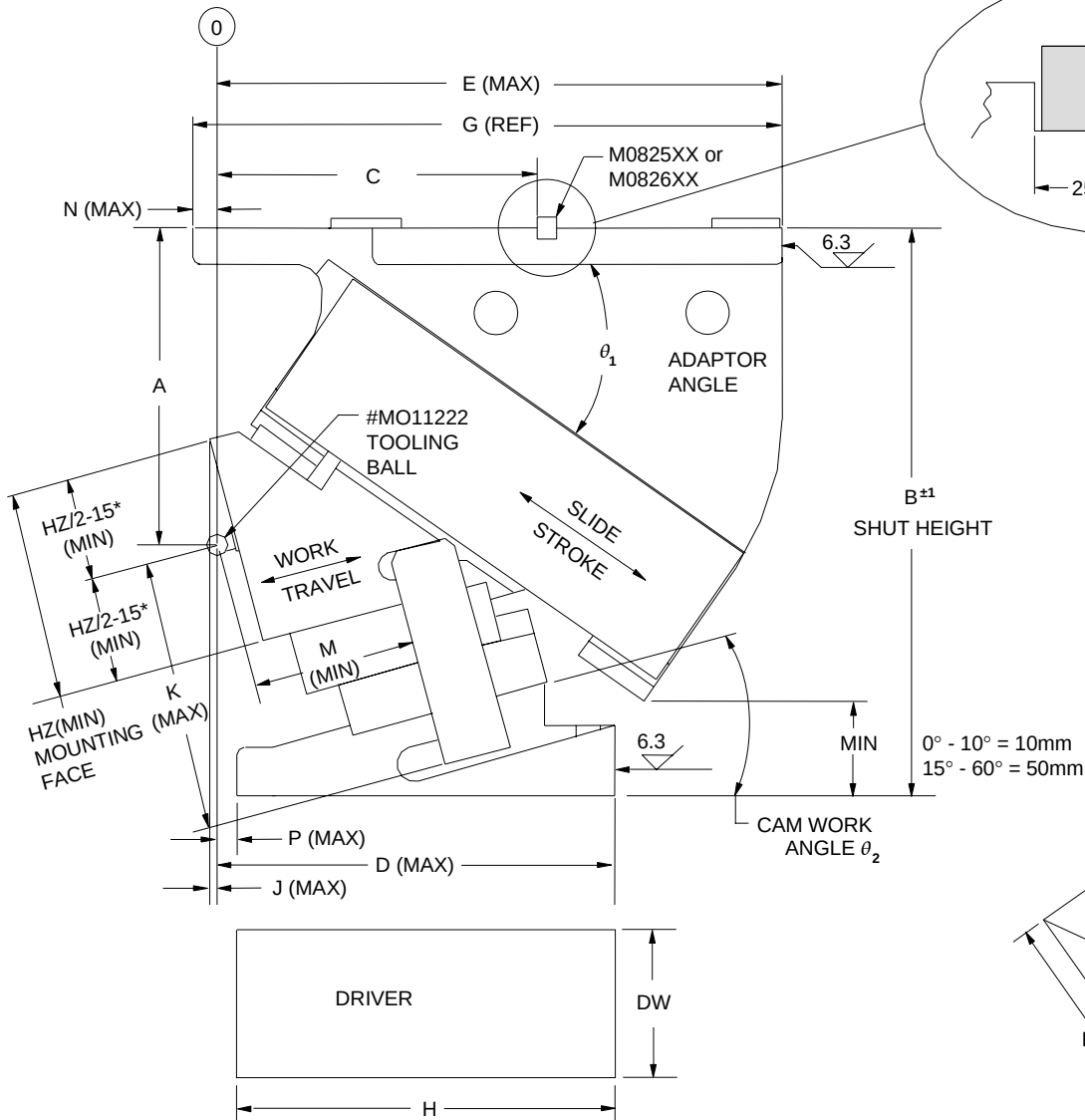
* LOCATION OF THE WORK MOUNTING FACE: TOP OR BOTTOM EDGE TO BE LOCATED A DISTANCE OF HZ/2-15 MINIMUM FROM THE TOOLING BALL.

ALL DIMENSIONS ARE AT CAM CLOSED POSITION.

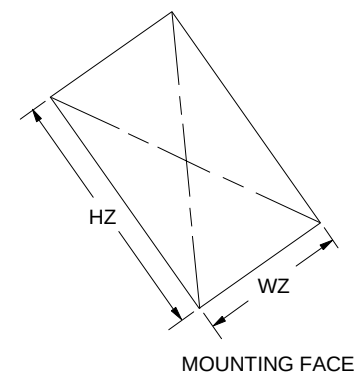


INCLUDED ANGLE 50° TO 60° ALLOWABLE

MINUS (-) ← → PLUS (+)



SEE CAM PERFORMANCE CALCULATION PAGE C-5



PERFORMANCE CALCULATION DIE MOUNT & AERIAL CAMS

A

The performance curves on the following pages were derived from the equation:

$$W = K * P * L * N$$

Where,

$$W = 0.04\text{mm} = 40\mu\text{m}$$

P = Load Applied / Surface Area (N/mm²)

Load Applied (N) = overall width (mm) * metal thickness (mm) * σ_{tensile} (MPa) * function of angle
 $\sigma_{\text{tensile}} = 310 \text{ MPa}$

L = work stroke (mm) = the average work travel for each width (20mm for 50mm, 39mm for 75mm, 56mm for 125-300mm)

K = coefficient of wear ($\mu\text{m} / (\text{km} * \text{N}/\text{mm}^2)$), dependent on material running at 23 sliding meters/minute.

$$\text{Cycles} = W (\mu\text{m}) \times 1e^6 (\text{mm}/\text{km}) / (P (\text{N}/\text{mm}^2) * K (\mu\text{m} / (\text{km} * \text{N}/\text{mm}^2)) * \text{work stroke (mm)})$$

Light Duty Performance Curves:

Based on the minimum capabilities of aluminum bronze C95900 against cast iron.

Heavy Duty Performance Curves:

Based on the minimum capabilities of aluminum bronze C95900 against steel.

C

B

AERIAL CAM 50 mm MOUNTING FACE

Mounting Face Width (WZ) 50 (Minimum)
Mounting Face Height (HZ) 75 (Minimum)
Upper Adapter Width (SW) 90 (Maximum)
Shut Height (B) 225

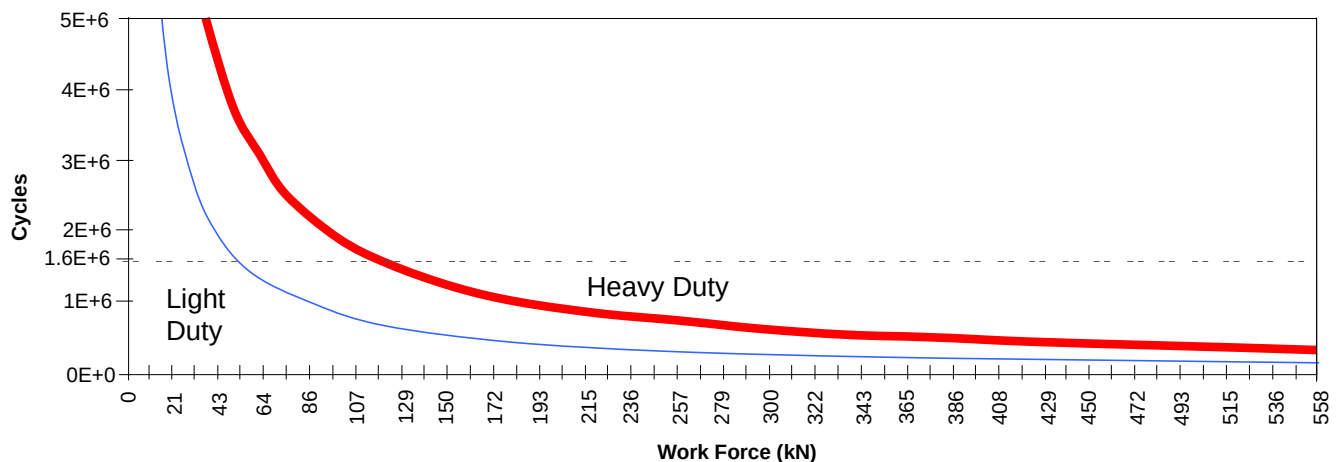
Slide Stroke (S₁) 30 (Minimum)
K 96 (Maximum)
M 50 (Minimum)
DW 90 (Maximum)

Fastener Schedule Dowels Screws
Preferred 2-Ø12 2-M12 (Min)
Optional 2-Ø10 4-M10

CXX:
C11 = Light Duty
C12 = Heavy Duty
C13 = Heavy Duty / High Volume

NAAMS CODE	Angle	A	C	D (max)	E (max)	G (max) (ref)	H (ref)	J (max)	N (max)	P (max)	Work Travel (min)
CXX0500	0	120	155.5	173	285	280	190	12	-2	-18	15
CXX0505	5	125	149.5	184	280	280	190	6	-11	-7	15
CXX0510	10	130	145	187	285	295	190	3	-16	-4	15
CXX0515	15	135	140.5	193	286	310	200	-2	-25	-8	17
CXX0520	20	140	134.5	205	277	305	200	-7	-32	4	18
CXX0525	25	145	130	205	268	310	200	-13	-43	4	16
CXX0530	30	150	125.5	208	276	315	170	-16	-48	23	17
CXX0535	35	155	119.5	209	264	320	165	-23	-57	23	19
CXX0540	40	160	115	210	258	315	155	-27	-63	27	20
CXX0545	45	165	110.5	200	243	315	165	-33	-72	23	23
CXX0550	50	170	106	205	246	315	160	-32	-77	31	23
CXX0555	55	175	101.5	205	229	315	160	-42	-86	29	26
CXX0560	60	180	98.5	205	229	320	150	-45	-93	34	31

Cam Performance



Calculations assume an include angle of 50° and a surface area of 3,600 mm² using a safety factor of 2.
A safety factor of 2 is the minimum requirement.

SEE CAM PERFORMANCE CALCULATION PAGE C-5

AERIAL CAM 75 mm MOUNTING FACE

Mounting Face Width (WZ) 75 (Minimum)
Mounting Face Height (HZ) 75 (Minimum)
Upper Adapter Width (SW) 115 (Maximum)
Shut Height (B) 275

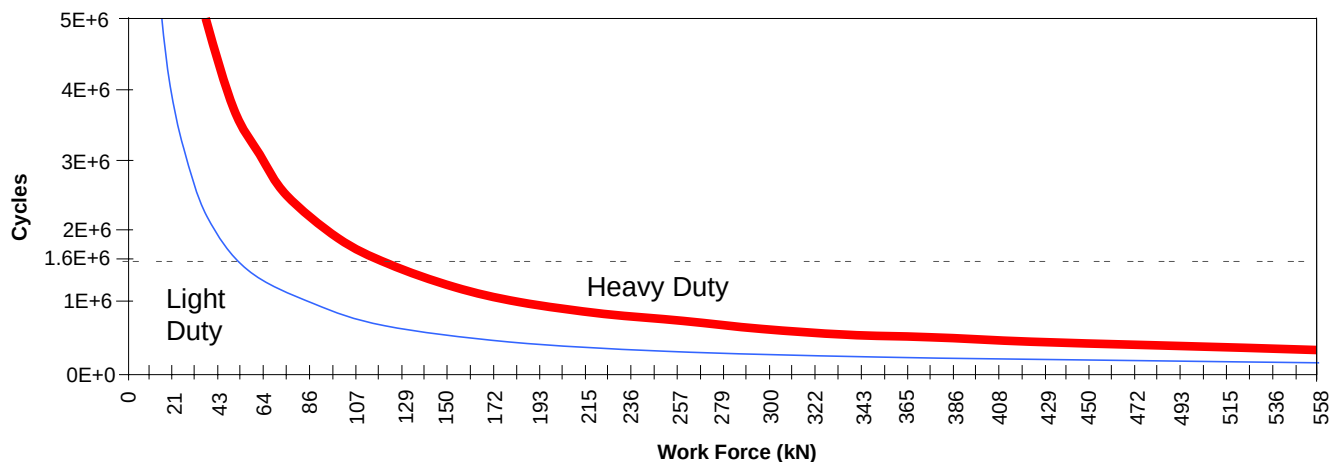
Slide Stroke (S₁) 50 (Minimum)
K 155 (Maximum)
M 68 (Minimum)
DW 115 (Maximum)

Fastener Schedule Dowels Screws
2-Ø12 4-M12

CXX:
C11 = Light Duty
C12 = Heavy Duty
C13 = Heavy Duty / High Volume

NAAMS CODE	Angle	A	C	D (max)	E (max)	G (max) (ref)	H (ref)	J (max)	N (max)	P (max)	Work Travel (min)
CXX0700	0	155	180	210	333	332	225	12	0	-17	30
CXX0705	5	160	160.5	218	338	346	235	9	-8	-18	30
CXX0710	10	165	153	227	336	335	235	-3	-4	-9	31
CXX0715	15	170	144	237	331	356	235	-7	-25	40	33
CXX0720	20	175	136.5	239	334	347	245	-18	-19	45	32
CXX0725	25	180	127.5	247	326	346	210	-19	-20	58	35
CXX0730	30	185	120	254	328	360	205	-31	-35	65	34
CXX0735	35	190	112.5	262	314	350	200	-31	-48	69	37
CXX0740	40	195	105	271	305	358	195	-45	-55	76	39
CXX0745	45	200	99	275	286	365	195	-41	-80	80	43
CXX0750	50	205	93	279	278	365	195	-61	-93	84	46
CXX0755	55	210	72	270	278	355	195	- 51	-77	95	53
CXX0760	60	215	79	282	269	350	195	- 57	-83	101	61

Cam Performance



Calculations assume an include angle of 50° and a surface area of 3,600 mm² using a safety factor of 2.
A safety factor of 2 is the minimum requirement.

SEE CAM PERFORMANCE CALCULATION PAGE C-5

AERIAL CAM 125 mm MOUNTING FACE

Mounting Face Width (WZ) 125 (Minimum)
Mounting Face Height (HZ) 120 (Minimum)
Upper Adapter Width (SW) 165 (Maximum)
Shut Height (B) 300

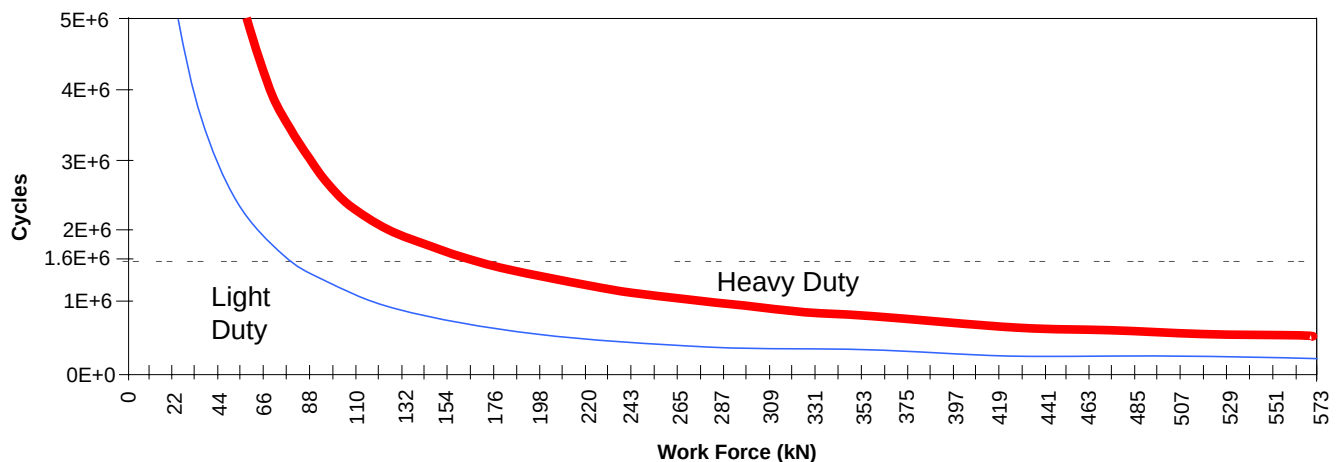
Slide Stroke (S₁) 50 (Minimum)
K 151 (Maximum)
M 63 (Minimum)
DW 165 (Maximum)

Fastener Schedule Dowels Screws
2-Ø16 4-M16

CXX:
C11 = Light Duty
C12 = Heavy Duty
C13 = Heavy Duty / High Volume

NAAMS CODE	Angle	A	C	D (max)	E (max)	G (max) (ref)	H (ref)	J (max)	N (max)	P (max)	Work Travel (min)
CXX1200	0	170	180.5	250	369	355	262	12	7	13	28
CXX1205	5	175	173	260	370	355	265	5	0	20	32
CXX1210	10	180	165.5	269	370	355	266	-3	-3	28	35
CXX1215	15	185	156.5	278	376	360	268	-10	-15	38	39
CXX1220	20	190	149	283	372	360	222	-17	-17	46	43
CXX1225	25	195	140	296	364	365	273	-23	-26	53	47
CXX1230	30	205	132.5	325	360	393	295	-30	-34	59	52
CXX1235	35	215	125	308	343	390	271	-37	-50	63	57
CXX1240	40	225	117.5	311	331	400	266	-45	-68	67	63
CXX1245	45	235	111.5	323	319	405	272	-51	-90	69	69
CXX1250	50	245	105.5	319	299	398	258	-61	-100	72	77
CXX1255	55	255	120	315	285	398	250	-65	-117	84	85
CXX1260	60	265	113	318	266	398	247	-71	-133	91	96

Cam Performance



Calculations assume an include angle of 50° and a surface area of 7,400 mm² using a safety factor of 2.
A safety factor of 2 is the minimum requirement.

SEE CAM PERFORMANCE CALCULATION PAGE C-5

AERIAL CAM 150 mm MOUNTING FACE

Mounting Face Width (WZ) 150 (Minimum)
Mounting Face Height (HZ) 120 (Minimum)
Upper Adapter Width (SW) 190 (Maximum)
Shut Height (B) 300

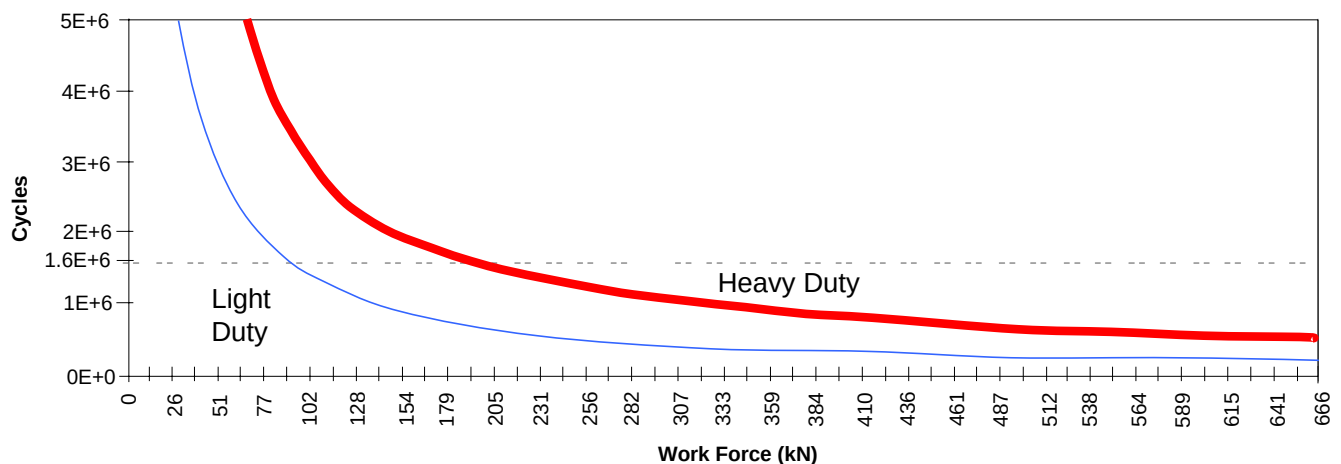
Slide Stroke (S₁) 50 (Minimum)
K 151 (Maximum)
M 63 (Minimum)
DW 190 (Maximum)

Fastener Schedule Dowels Screws
2-Ø16 4-M16

CXX:
C11 = Light Duty
C12 = Heavy Duty
C13 = Heavy Duty / High Volume

NAAMS CODE	Angle	A	C	D (max)	E (max)	G (max) (ref)	H (ref)	J (max)	N (max)	P (max)	Work Travel (min)
CXX1500	0	170	180.5	275	369	362	287	12	7	15	28
CXX1505	5	175	173	283	370	370	288	5	0	20	32
CXX1510	10	180	165.5	287	370	373	285	-2	-3	28	35
CXX1515	15	185	156.5	291	376	391	283	-8	-15	38	39
CXX1520	20	190	149	296	372	389	281	-15	-17	46	40
CXX1525	25	195	140	299	364	390	278	-21	-26	53	47
CXX1530	30	205	132.5	328	360	394	299	-29	-34	59	52
CXX1535	35	215	125	307	343	393	270	-37	-50	63	57
CXX1540	40	225	117.5	313	330	396	268	-45	-66	67	63
CXX1545	45	235	111.5	325	318	401	274	-51	-83	69	69
CXX1550	50	245	105.5	321	299	399	260	-61	-100	72	77
CXX1555	55	255	120	317	285	402	252	-65	-117	84	85
CXX1560	60	265	113	320	266	399	249	-71	-133	91	96

Cam Performance



Calculations assume an include angle of 50° and a surface area of 8,600 mm² using a safety factor of 2.
A safety factor of 2 is the minimum requirement.

SEE CAM PERFORMANCE CALCULATION PAGE C-5

AERIAL CAM 175 mm MOUNTING FACE

Mounting Face Width (WZ) 175 (Minimum)
Mounting Face Height (HZ) 115 (Minimum)
Upper Adapter Width (SW) 230 (Maximum)
Shut Height (B) 300

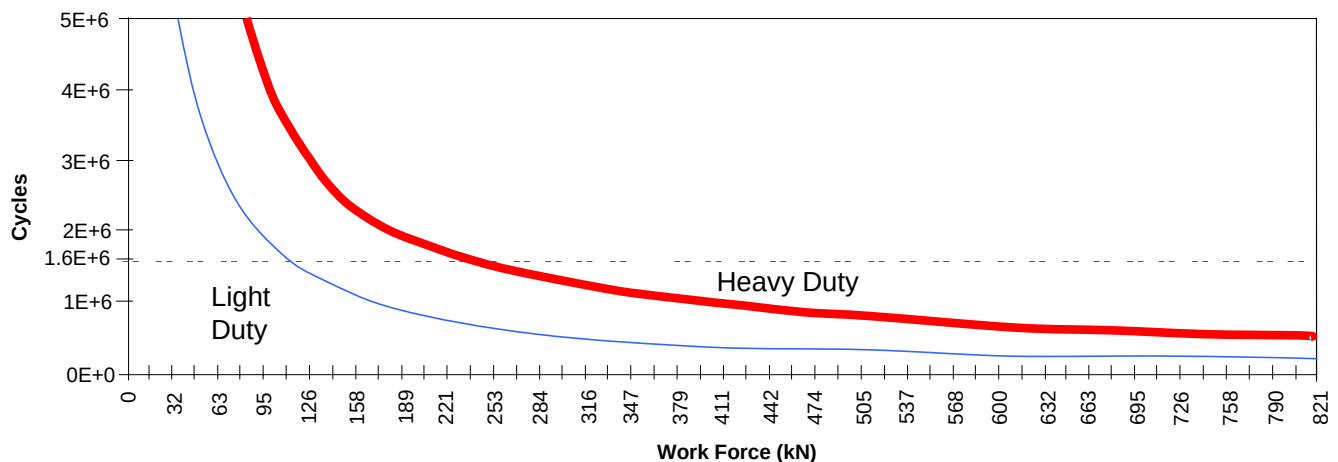
Slide Stroke (S₁) 50 (Minimum)
K 151 (Maximum)
M 63 (Minimum)
DW 230 (Maximum)

Fastener Schedule Dowels Screws
2-Ø16 4-M16

CXX:
C11 = Light Duty
C12 = Heavy Duty
C13 = Heavy Duty / High Volume

NAAMS CODE	Angle	A	C	D (max)	E (max)	G (max) (ref)	H (ref)	J (max)	N (max)	P (max)	Work Travel (min)
CXX1700	0	170	180.5	275	369	355	245	12	7	7	28
CXX1705	5	175	173	283	370	355	245	5	0	11	32
CXX1710	10	180	165.5	287	373	355	240	-2	-3	19	35
CXX1715	15	185	156.5	291	374	360	235	-8	-15	27	39
CXX1720	20	190	149	296	372	360	232	-15	-17	34	43
CXX1725	25	195	140	299	366	365	227	-21	-26	39	47
CXX1730	30	205	132.5	325	360	393	254	-29	-59	41	52
CXX1735	35	215	125	308	344	390	229	-37	-69	46	57
CXX1740	40	225	117.5	311	333	400	223	-45	-77	45	63
CXX1745	45	235	111.5	323	316	405	228	-51	-90	47	69
CXX1750	50	245	105.5	319	299	398	223	-61	-100	56	77
CXX1755	55	255	120	315	282	405	213	- 65	-124	55	85
CXX1760	60	265	113	318	266	398	213	- 71	-133	62	96

Cam Performance



Calculations assume an include angle of 50° and a surface area of 10,600 mm² using a safety factor of 2.
A safety factor of 2 is the minimum requirement.

SEE CAM PERFORMANCE CALCULATION PAGE C-5

AERIAL CAM 200 mm MOUNTING FACE

Mounting Face Width (WZ) 200 (Minimum)
Mounting Face Height (HZ) 115 (Minimum)
Upper Adapter Width (SW) 260 (Maximum)
Shut Height (B) 300

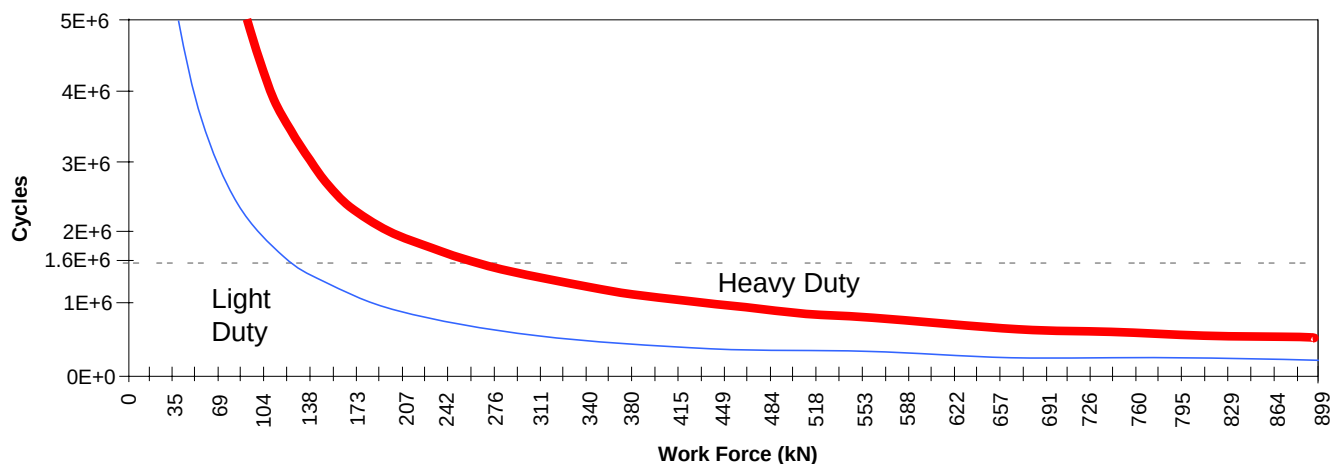
Slide Stroke (S₁) 50 (Minimum)
K 151 (Maximum)
M 63 (Minimum)
DW 230 (Maximum)

Fastener Schedule Dowels Screws
2-Ø16 4-M16

CXX:
C11 = Light Duty
C12 = Heavy Duty
C13 = Heavy Duty / High Volume

NAAMS CODE	Angle	A	C	D (max)	E (max)	G (max) (ref)	H (ref)	J (max)	N (max)	P (max)	Work Travel (min)
CXX2000	0	170	180.5	275	369	362	287	12	7	7	28
CXX2005	5	175	173	283	370	370	289	6	0	11	32
CXX2010	10	180	165.5	287	373	376	289	-2	-3	19	35
CXX2015	15	185	156.5	291	374	389	299	-8	-15	27	39
CXX2020	20	190	149	296	372	389	311	-15	-17	34	43
CXX2025	25	195	140	299	366	392	320	-21	-26	39	47
CXX2030	30	205	132.5	325	360	419	354	-29	-59	41	52
CXX2035	35	215	125	308	344	413	345	-37	-69	46	57
CXX2040	40	225	117.5	311	333	410	356	-45	-77	45	63
CXX2045	45	235	111.5	323	316	406	374	-51	-90	47	69
CXX2050	50	245	105.5	319	299	399	380	-61	-100	56	77
CXX2055	55	255	120	315	282	406	380	- 65	-124	55	85
CXX2060	60	265	113	318	266	399	389	- 71	-133	62	96

Cam Performance



Calculations assume an include angle of 50° and a surface area of 11,600 mm² using a safety factor of 2.
A safety factor of 2 is the minimum requirement.

SEE CAM PERFORMANCE CALCULATION PAGE C-5

AERIAL CAM 250 mm MOUNTING FACE

Mounting Face Width (WZ) 250 (Minimum)
Mounting Face Height (HZ) 150 (Minimum)
Upper Adapter Width (SW) 330 (Maximum)
Shut Height (B) 375

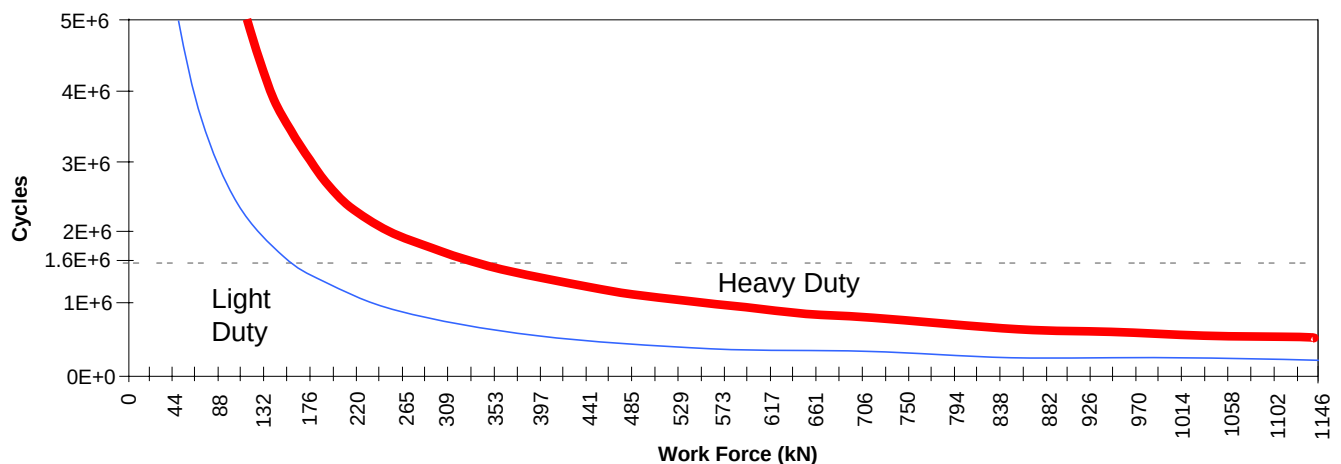
Slide Stroke (S₁) 60 - 0° to 20°
50 - 25° to 60°
K 166 (Maximum)
M 36 (Minimum)
DW 320 (Maximum)

Fastener Schedule Dowels Screws
2-Ø20 4-M20

CXX:
C11 = Light Duty
C12 = Heavy Duty
C13 = Heavy Duty / High Volume

NAAMS CODE	Angle	A	C	D (max)	E (max)	G (max) (ref)	H (ref)	J (max)	N (max)	P (max)	Work Travel (min)
CXX2500	0	180	193	242	420	435	410	12	-16	-25	28
CXX2505	5	185	182.5	256	419	435	415	4	-26	-10	32
CXX2510	10	190	172	270	421	433	420	-4	-41	12	35
CXX2515	15	195	161.5	284	420	434	425	-11	-40	27	39
CXX2520	20	200	151	297	418	439	430	-18	-53	39	43
CXX2525	25	205	140.5	307	413	474	435	-23	-70	52	47
CXX2530	30	215	130	312	407	474	435	-32	-90	57	52
CXX2535	35	225	121	309	403	479	440	-45	-115	68	57
CXX2540	40	235	112	318	379	455	425	-45	-100	69	63
CXX2545	45	245	103	323	378	460	425	-67	-134	79	69
CXX2550	50	265	94	323	356	455	430	-68	-136	88	77
CXX2555	55	285	86.5	380	364	461	425	-69	-103	85	87
CXX2560	60	300	79	377	341	452	425	-77	-115	83	99

Cam Performance



Calculations assume an include angle of 50° and a surface area of 14,800 mm² using a safety factor of 2.
A safety factor of 2 is the minimum requirement.

SEE CAM PERFORMANCE CALCULATION PAGE C-5

AERIAL CAM 300 mm MOUNTING FACE

Mounting Face Width (WZ) 300 (Minimum)
Mounting Face Height (HZ) 150 (Minimum)
Upper Adapter Width (SW) 400 (Maximum)
Shut Height (B) 375

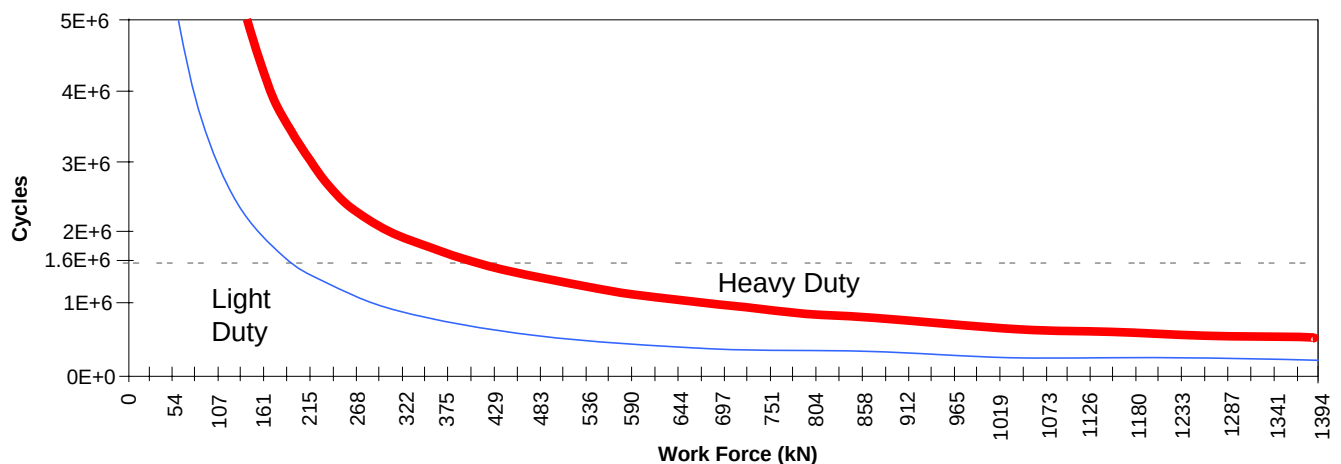
Slide Stroke (S₁) 60 - 0° to 20°
50 - 25° to 60°
K 166 (Maximum)
M 36 (Minimum)
DW 320 (Maximum)

Fastener Schedule Dowels Screws
2-Ø20 4-M20

CXX:
C11 = Light Duty
C12 = Heavy Duty
C13 = Heavy Duty / High Volume

NAAMS CODE	Angle	A	C	D (max)	E (max)	G (max) (ref)	H (ref)	J (max)	N (max)	P (max)	Work Travel (min)
CXX3000	0	180	193	242	420	435	250	12	-16	-25	28
CXX3005	5	185	182.5	258	419	435	248	4	-26	-10	32
CXX3010	10	190	172	270	421	433	245	-4	-41	12	35
CXX3015	15	195	161.5	284	420	414	245	-11	-40	27	39
CXX3020	20	200	151	297	418	414	248	-18	-53	39	43
CXX3025	25	205	140.5	307	413	474	250	-23	-70	52	47
CXX3030	30	215	130	312	407	474	243	-32	-90	57	52
CXX3035	35	225	121	309	403	479	225	-45	-115	68	57
CXX3040	40	235	112	318	379	455	225	-45	-100	69	63
CXX3045	45	245	103	323	378	460	225	-67	-134	79	69
CXX3050	50	265	94	323	356	455	220	-68	-136	88	77
CXX3055	55	285	86.5	380	364	460	220	-69	-103	85	87
CXX3060	60	300	79	377	341	452	220	-77	-115	83	99

Cam Performance



Calculations assume an include angle of 50° and a surface area of 18,000 mm² using a safety factor of 2.
A safety factor of 2 is the minimum requirement.

SEE CAM PERFORMANCE CALCULATION PAGE C-5

DIE MOUNTED CAM SPECIFICATIONS

1. Cam angles will be in 5° increments from 0° to 20°.
2. Standard nominal mounting face widths are to be 50, 75, 150, 200, 250, and 300 mm.
3. The die mounted cams will be categorized by mounting face width, which determines the shut height and overall width.

Mounting Surface width (mm)	Work Travel (mm)	Shut Height (mm)
50	30 (min)	225
75	55 (min)	275
150	60 (min)	300
200	60 (min)	300
250	60 (min)	375
300	60 (min)	375

Series C21 = Light Duty

Series C22 = Heavy Duty

Series C23 = Heavy Duty / High Volume

Mandatory - All Cams

1. Unit shall be completely HARD METRIC.
2. All wear units shall be self-lubed.
3. Positive Returns.
4. Accelerators required on 150 mm widths and larger.
5. Mechanical springs shall be NAAMS / ISO standard.
6. Accessibility to all mounting screws and dowels.
7. Rear accessibility for spring maintenance on 150 mm widths and larger.
8. Cross and centerline keyed slide adapter on 75 mm widths and wider.
9. Performance rating target, 0.04 mm wear after 1.6 million cycles, calculated by:
Overall cam width (W) x 1.5 mm material thickness x 310 MPa (44,000 psi.)
which equals the required Newton's of work force.
10. All dowel holes shall be unfinished to nominal minus 0.2/0.3 mm.

Mandatory - Series C21

1. Minimum capability to comply with the light duty cam performance curves.

(CONTINUED ON FOLLOWING PAGE)

DIE MOUNTED CAM SPECIFICATIONS

(CONTINUED FROM PREVIOUS PAGE)

Mandatory - Series C22

1. Minimum capability to comply with the heavy duty cam performance curves.

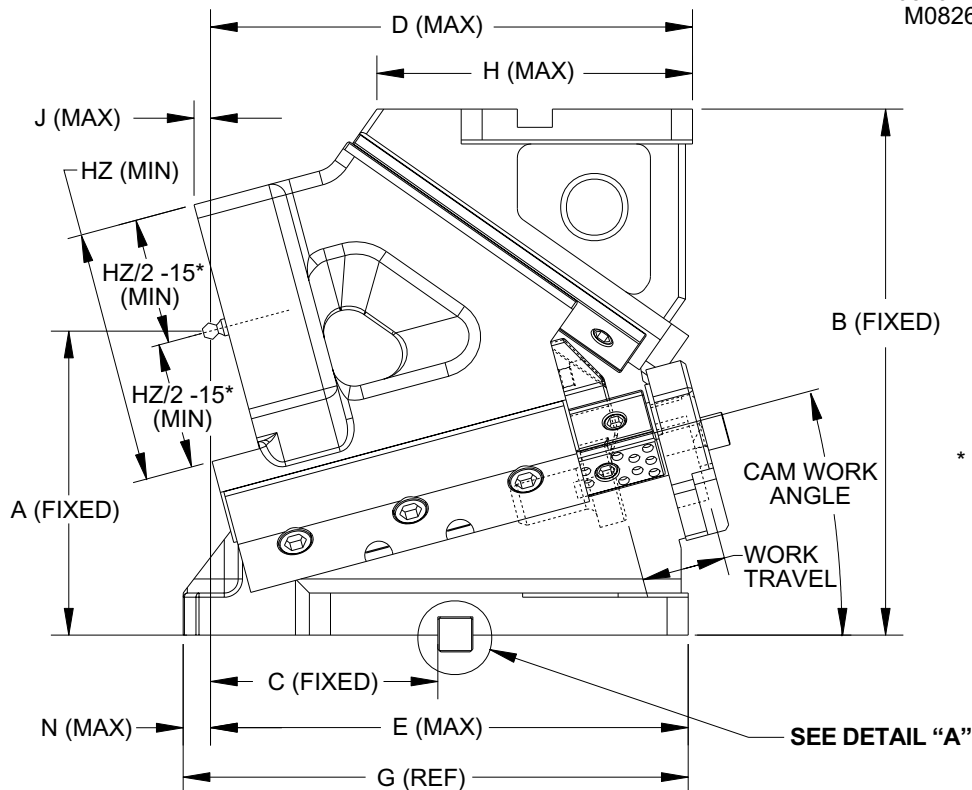
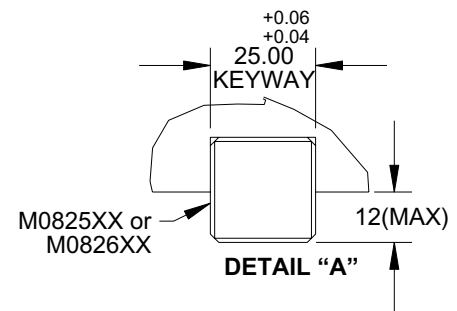
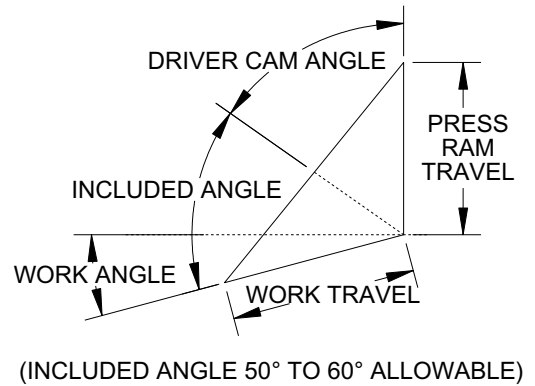
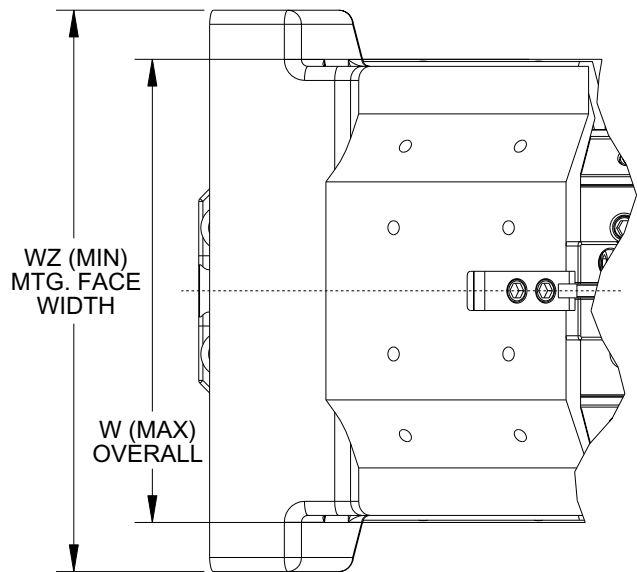
Mandatory - Series C23

1. Minimum capability to comply with the heavy duty cam performance curves.
2. Double wearplates (12 mm NAAMS wearstrips preferred), on backup surfaces, keeper surfaces and driver surfaces.

Optional - All Cams

1. Additional keyways
2. Slide lock-up capability
3. Heeled cam adaptor
4. Replaceable drivers (whole unit or wearplates)
5. Gas springs NAAMS / ISO

STANDARD DIE MOUNTED CAM ENVELOPE



* LOCATION OF THE
WORK MOUNTING FACE:
TOP OR BOTTOM EDGE TO
BE LOCATED A DISTANCE
OF HZ/2 -15 MINIMUM FROM
THE TOOLING BALL.

ALL DIMENSIONS ARE AT
CAM CLOSED POSITION.

SEE CAM PERFORMANCE CALCULATION PAGE C-5

DIE MOUNTED CAM 50 mm MOUNTING FACE

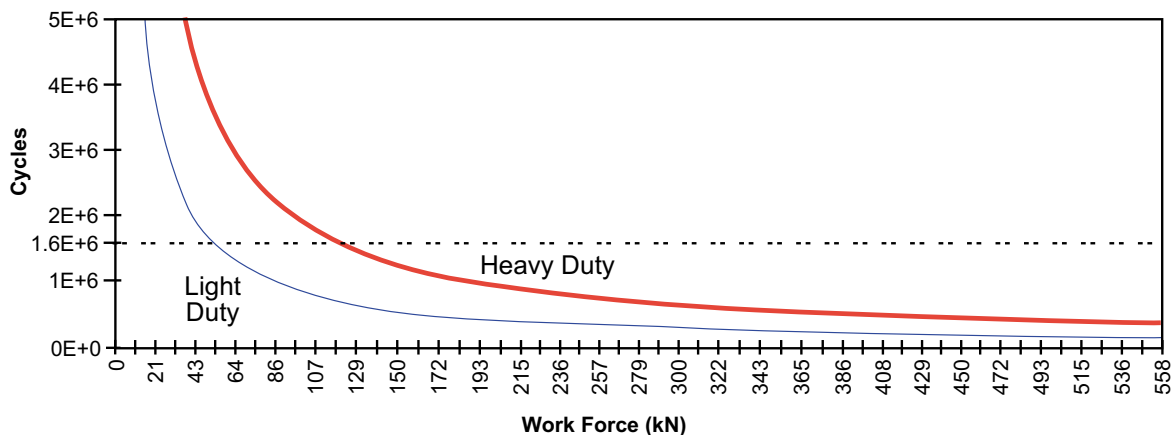
Mounting Face Width (WZ) 50 (Minimum)
Mounting Face Height (HZ) 75 (Minimum)
Overall Cam Width (W) 100 (Maximum)
Shut Height (B) 225
D 300 (Maximum)
Work Travel 45

CXX:
C21 = Light Duty
C22 = Heavy Duty
C23 = Heavy Duty / High Volume

Fastener Schedule Dowels Screws
Preferred 2-Ø12 2-M12 (Min)
Optional 2-Ø10 4-M10

NAAMS CODE	Angle	A (fixed)	C (max)	Envelope Dimensions (Based on "A" Fixed)				
				E (max)	G (ref)	H (max)	J (max)	N (max)
CXX0500	0	160	170	350	390	200	0	40
CXX0505	5	150	180	360	390	210	0	30
CXX0510	10	140	190	365	390	215	5	25
CXX0515	15	135	200	370	390	220	10	20
CXX0520	20	130	210	375	385	230	15	10

Cam Performance



Calculations assume an included angle of 50° and a surface area of 3,600 mm² using a safety factor of 2.
A safety factor of 2 is the minimum requirement.

SEE CAM PERFORMANCE CALCULATION PAGE C-5

DIE MOUNTED CAM 75 mm MOUNTING FACE

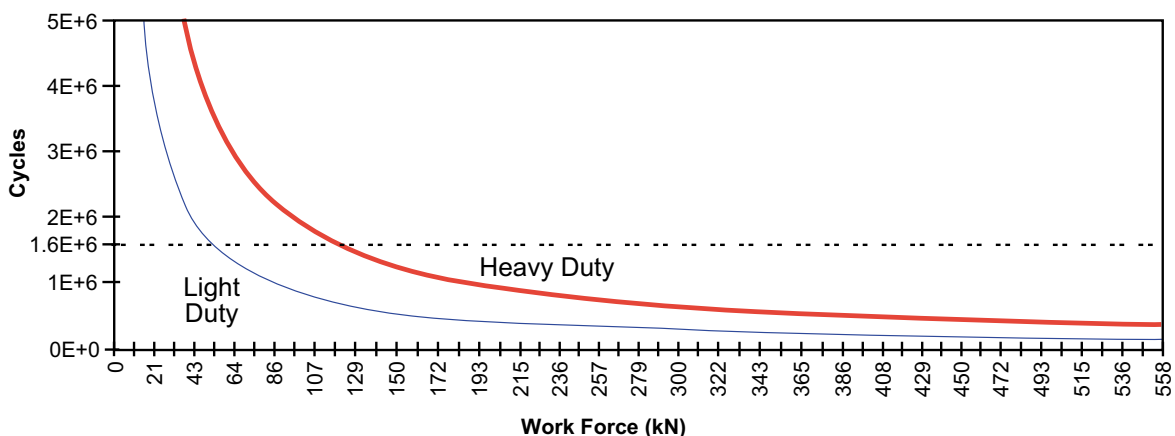
Mounting Face Width (WZ) 75 (Minimum)
Mounting Face Height (HZ) 75 (Minimum)
Overall Cam Width (W) 125 (Maximum)
Shut Height (B) 275
D 340 (Maximum)
Work Travel 60

CXX:
C21 = Light Duty
C22 = Heavy Duty
C23 = Heavy Duty / High Volume

Fastener Schedule Dowels Screws
2-Ø12 4-M12

NAAMS CODE	Angle	A (fixed)	C (max)	Envelope Dimensions (Based on "A" Fixed)				
				E (max)	G (ref)	H (max)	J (max)	N (max)
CXX0700	0	200	170	350	390	220	0	40
CXX0705	5	190	180	360	390	225	0	30
CXX0710	10	175	190	365	390	230	5	25
CXX0715	15	165	200	370	390	235	10	20
CXX0720	20	155	210	375	385	240	15	10

Cam Performance



Calculations assume an included angle of 50° and a surface area of 3,600 mm² using a safety factor of 2.
A safety factor of 2 is the minimum requirement.

SEE CAM PERFORMANCE CALCULATION PAGE C-5

DIE MOUNTED CAM 150 mm MOUNTING FACE

Mounting Face Width (WZ) 150 (Minimum)
Mounting Face Height (HZ) 120 (Minimum)
Overall Cam Width (W) 240 (Maximum)
Shut Height (B) 300
D 360 (Maximum)
Work Travel 60

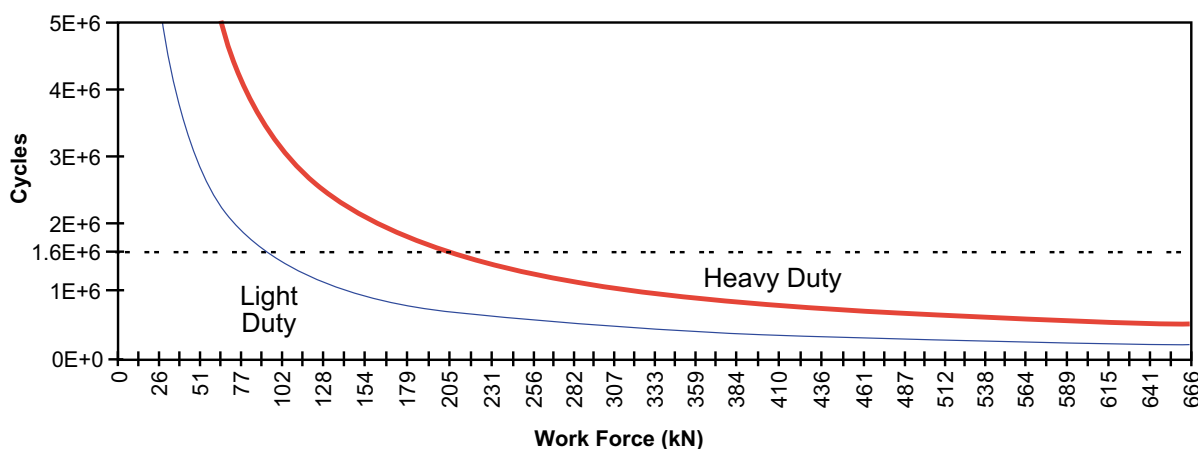
CXX:
C21 = Light Duty
C22 = Heavy Duty
C23 = Heavy Duty / High Volume

Fastener Schedule Dowels Screws
 2-Ø16 4-M16

NAAMS CODE	Angle	A (fixed)	C (max)	Envelope Dimensions (Based on "A" Fixed)				
				E (max)	G (ref)	H (max)	J (max)	N (max)
CXX1500	0	200	170	375	440	220	0	65
CXX1505	5	190	180	380	430	250	0	50
CXX1510	10	175	190	385	425	230	5	40
CXX1515	15	165	200	390	425	235	10	35
CXX1520	20	155	210	390	420	240	20	30

A

Cam Performance



Calculations assume an included angle of 50° and a surface area of 8,600 mm² using a safety factor of 2.
A safety factor of 2 is the minimum requirement.

SEE CAM PERFORMANCE CALCULATION PAGE C-5

DIE MOUNTED CAM 200 mm MOUNTING FACE

Mounting Face Width (WZ) 200 (Minimum)
Mounting Face Height (HZ) 120 (Minimum)
Overall Cam Width (W) 290 (Maximum)
Shut Height (B) 300
D 360 (Maximum)
Work Travel 60

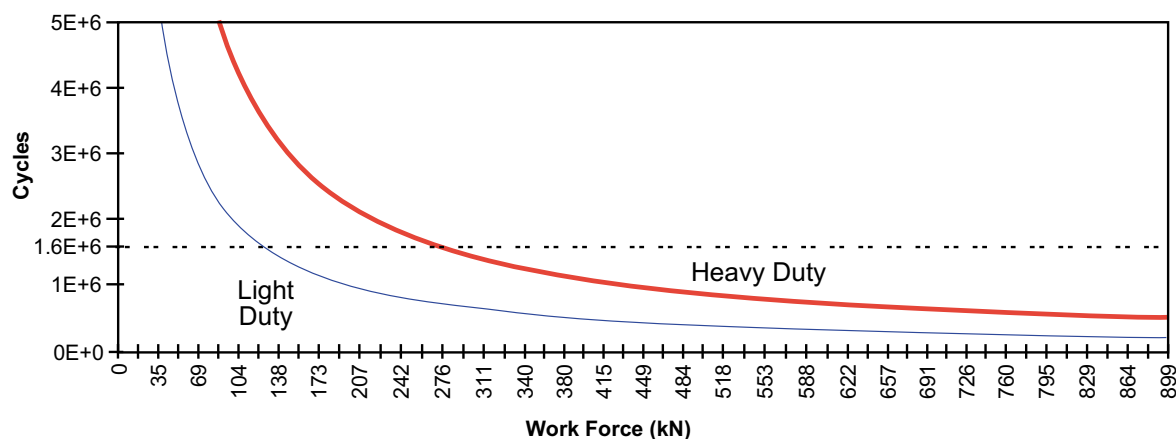
CXX:
C21 = Light Duty
C22 = Heavy Duty
C23 = Heavy Duty / High Volume

Fastener Schedule Dowels Screws
 2-Ø16 4-M16

NAAMS CODE	Angle	A (fixed)	C (max)	Envelope Dimensions (Based on "A" Fixed)				
				E (max)	G (ref)	H (max)	J (max)	N (max)
CXX2000	0	200	170	375	440	220	0	65
CXX2005	5	190	180	380	430	250	0	50
CXX2010	10	175	190	385	425	230	5	40
CXX2015	15	165	200	390	425	235	10	35
CXX2020	20	155	210	390	420	240	20	30

A

Cam Performance



Calculations assume an included angle of 50° and a surface area of 11,600 mm² using a safety factor of 2.
A safety factor of 2 is the minimum requirement.

SEE CAM PERFORMANCE CALCULATION PAGE C-5

DIE MOUNTED CAM 250 mm MOUNTING FACE

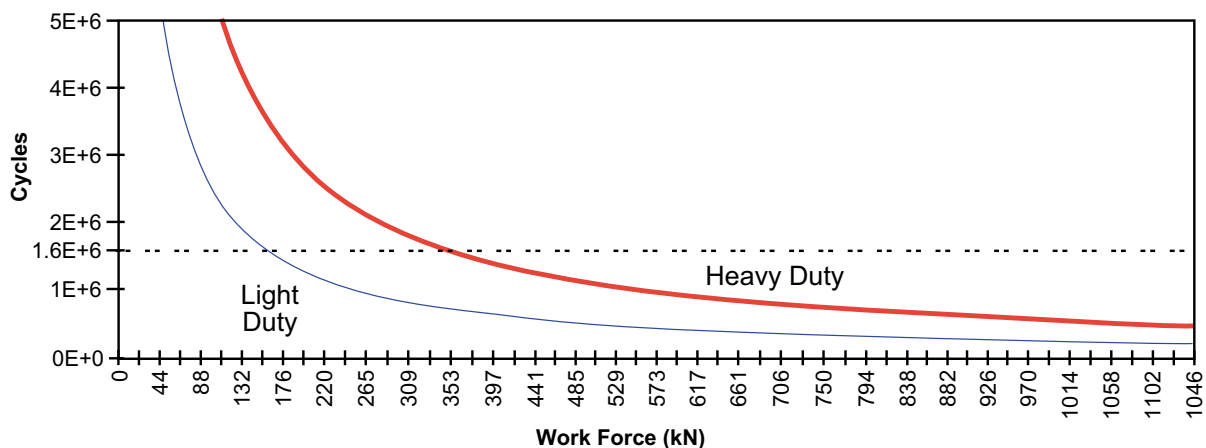
Mounting Face Width (WZ) 250 (Minimum)
Mounting Face Height (HZ) 160 (Minimum)
Overall Cam Width (W) 330 (Maximum)
Shut Height (B) 375
D 420 (Maximum)
H 240 (Maximum)
Work Travel 60

CXX:
C21 = Light Duty
C22 = Heavy Duty
C23 = Heavy Duty / High Volume

Fastener Schedule Dowels Screws
 2-Ø20 4-M20

NAAMS CODE	Angle	A (fixed)	C (max)	Envelope Dimensions (Based on "A" Fixed)			
				E (max)	G (ref)	J (max)	N (max)
CXX2500	0	260	170	450	545	0	95
CXX2505	5	235	180	465	550	5	85
CXX2510	10	225	190	480	555	10	75
CXX2515	15	210	200	495	570	15	75
CXX2520	20	195	210	510	575	25	65

Cam Performance



Calculations assume an included angle of 50° and a surface area of 14,800 mm² using a safety factor of 2.
A safety factor of 2 is the minimum requirement.

SEE CAM PERFORMANCE CALCULATION PAGE C-5

DIE MOUNTED CAM 300 mm MOUNTING FACE

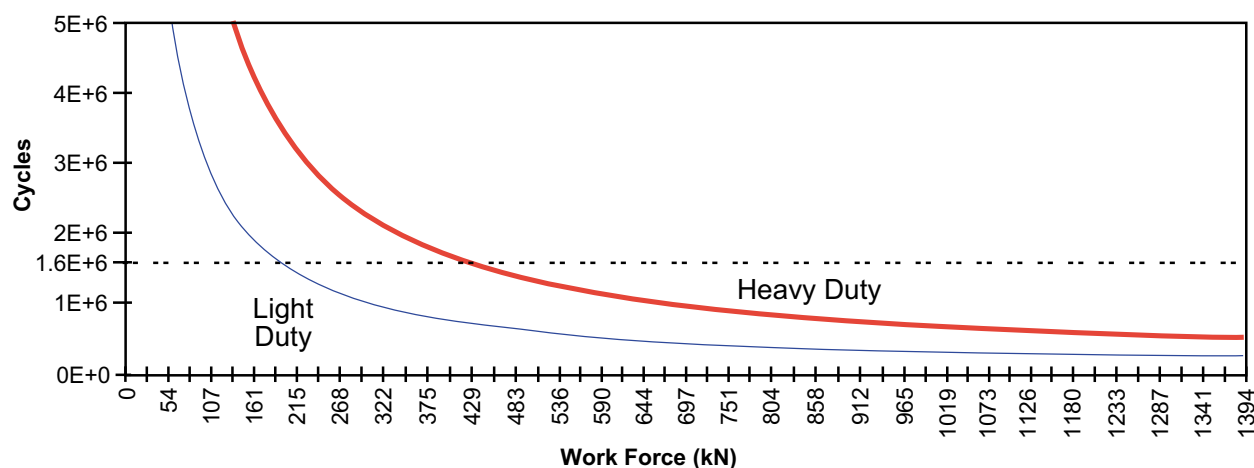
Mounting Face Width (WZ) 300 (Minimum)
Mounting Face Height (HZ) 160 (Minimum)
Overall Cam Width (W) 400 (Maximum)
Shut Height (B) 375
D 420 (Maximum)
H 240 (Maximum)
Work Travel 60

CXX:
C21 = Light Duty
C22 = Heavy Duty
C23 = Heavy Duty / High Volume

Fastener Schedule Dowels Screws
 2-Ø20 4-M20

NAAMS CODE	Angle	A (fixed)	C (max)	Envelope Dimensions (Based on "A" Fixed)			
				E (max)	G (ref)	J (max)	N (max)
CXX3000	0	260	170	450	545	0	95
CXX3005	5	235	180	465	550	5	85
CXX3010	10	225	190	480	555	10	75
CXX3015	15	210	200	495	570	15	75
CXX3020	20	195	210	510	575	25	65

Cam Performance



Calculations assume an included angle of 50° and a surface area of 18,000 mm² using a safety factor of 2.
A safety factor of 2 is the minimum requirement.

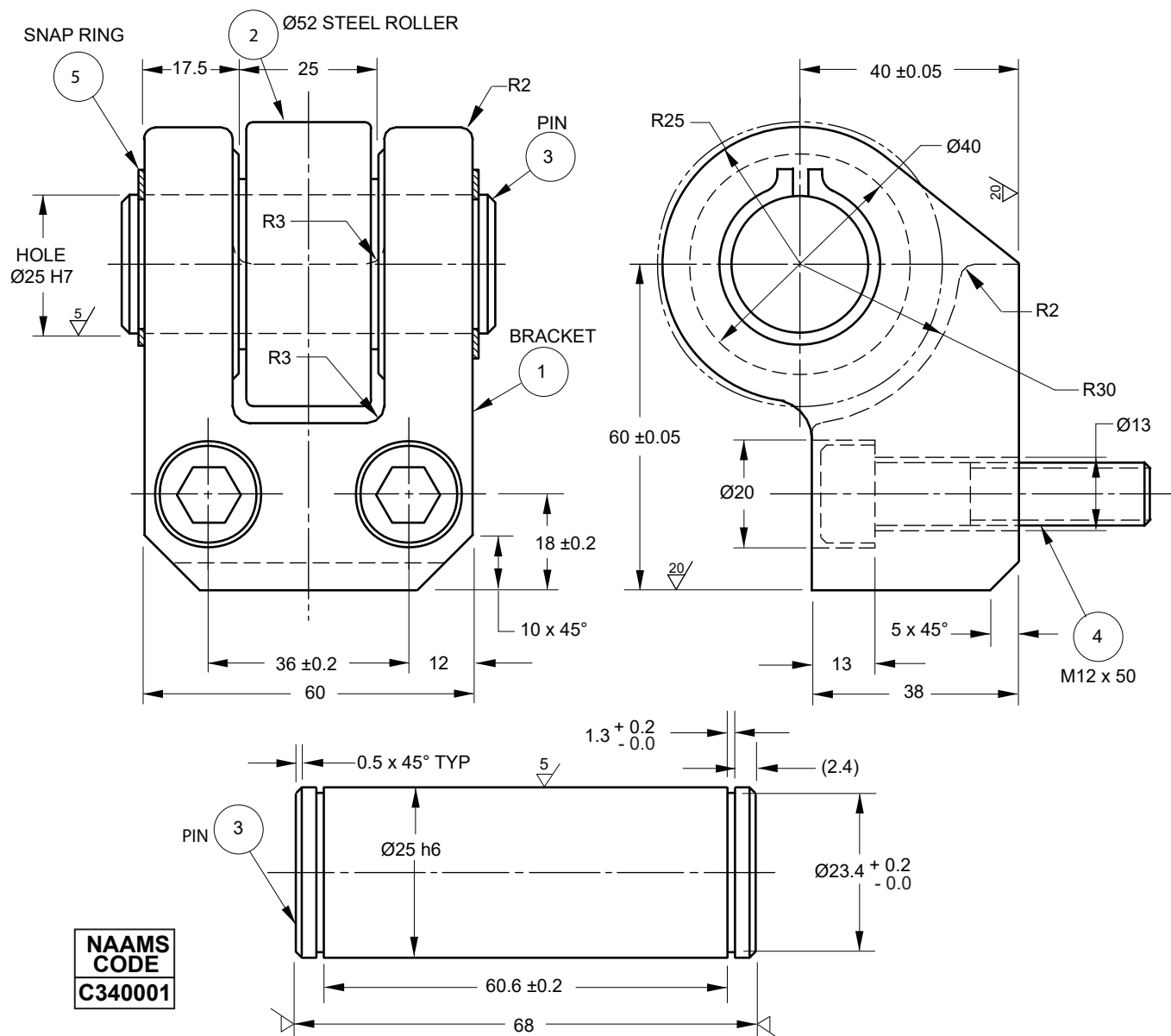
SEE CAM PERFORMANCE CALCULATION PAGE C-5

(C34 SERIES)



Stamping

02/13/24



DETAIL	DESCRIPTION	QUANTITY
1	Bracket	1
2	Roller - MCYRR 25S McGill or equivalent	1
3	Pin	1
4	Socket Head Screw M12 x 50 Length	2
5	Snap Ring (DIN 471) for 25 O.D. Shaft	2

NOTES & SPECIFICATIONS:

Material: Bracket - ISO 683/18 - C20 Harden to HRC 28-32
Pin - ISO 683/1 - 42CrMo4H Harden to HRC 60-65

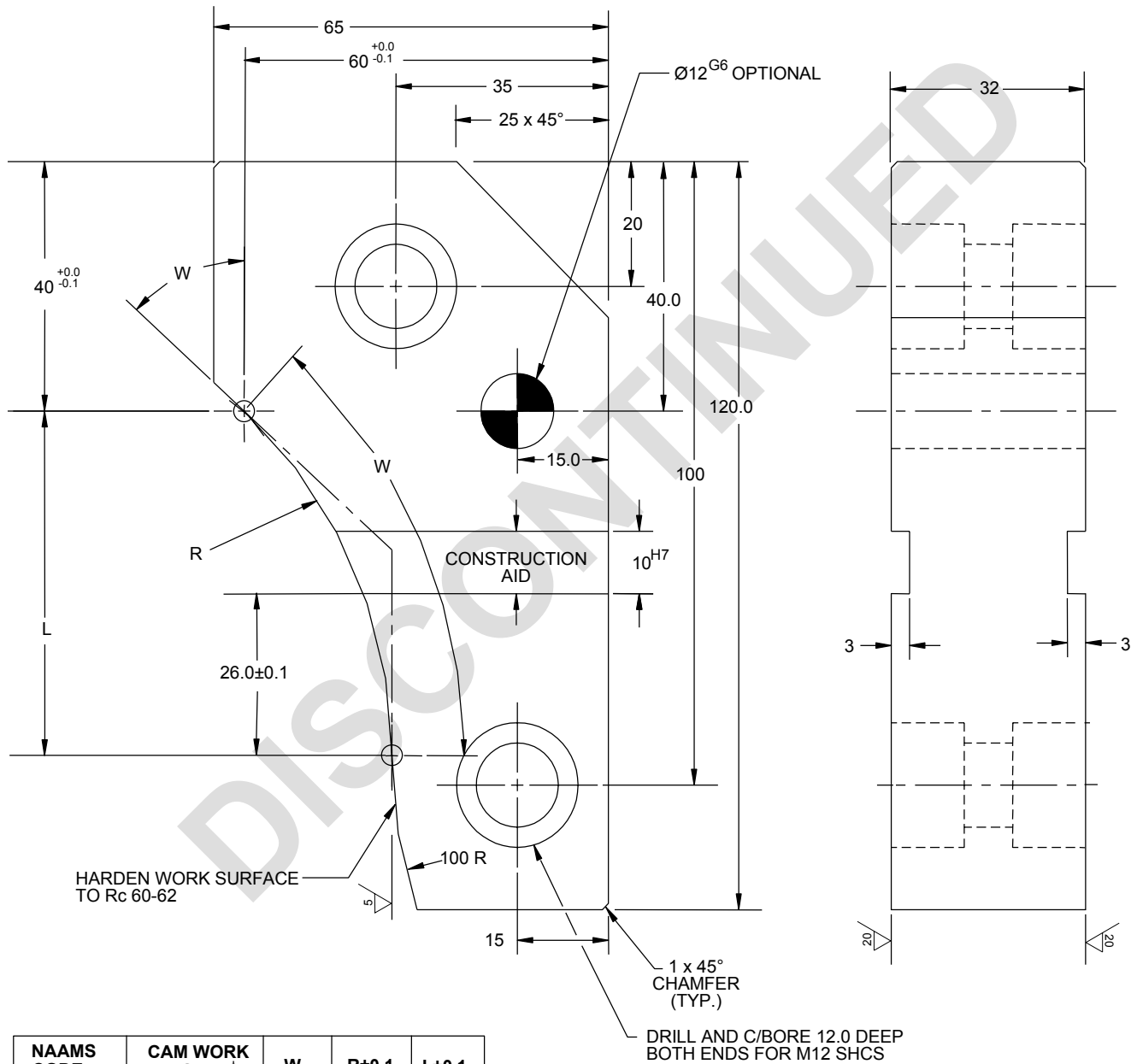
Break all edges.

For fabricated cam slides over 200 kg.

To be installed at die construction after final cam adjustment.

AERIAL CAM ACCELERATOR PLATE (C33 SERIES)

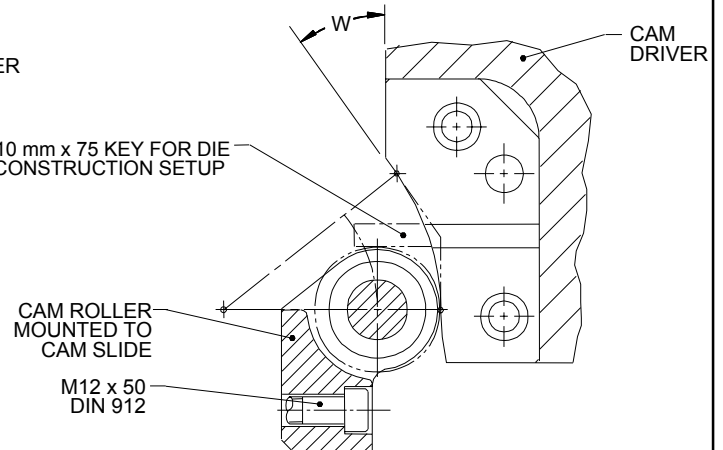
Surface Finish 20 μ Unless Otherwise Specified



NAAMS CODE	CAM WORK ANGLE Φ	W	R±0.1	L±0.1
C330005	5	42.5	100	57.36
C330010	10	45.0	100	60.87
C330015	15	47.5	90	54.79
C330020	20	50.0	90	57.85
C330025	25	52.5	75	50.67
C330030	30	55.0	75	53.03
C330035	35	57.5	75	55.29
C330040	40	60.0	65	49.79
C330045	45	62.5	65	51.57

NOTES & SPECIFICATIONS:
MATERIAL:
AISI-4150 OR AISI-6150

05/03/06



EXAMPLE WITH VERTICAL MOUNT ROLLER

AERIAL CAM ACCELERATOR SETUP TM

GLOBAL STANDARD COMPONENTS

NAAMS



Stamping

05/26/06

SEE SET-UP DRAWING
ON PRECEDING PAGE

NAAMS CODE	CAM WORK ANGLE Θ	W	X	Y	L1 ± 0.1	R1 ± 0.1
C330005	5	42.5°	12.87	33.10	50.67	75
C330010	10	45.0°	14.35	34.65	53.03	75
C330015	15	47.5°	15.89	36.13	55.29	75
C330020	20	50.0°	13.93	29.87	49.79	65
C330025	25	52.5°	15.25	30.94	51.57	65
C330030	30	55.0°	14.50	27.85	49.15	60
C330035	35	57.5°	15.73	28.68	50.60	60
C330040	40	60.0°	14.50	25.11	47.63	55
C330045	45	62.5°	15.61	25.72	48.79	55

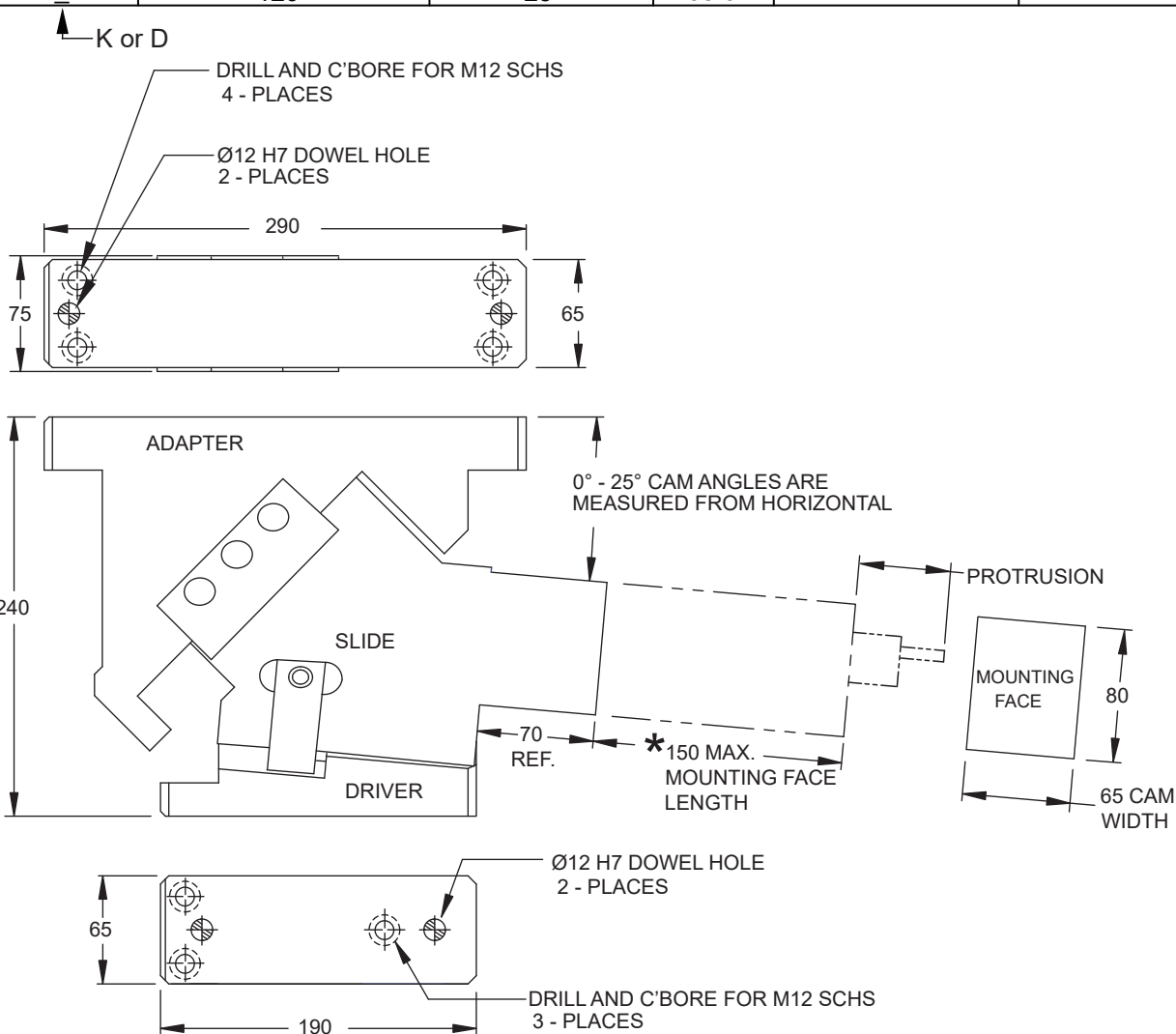
A

C-27

AERIAL CAM - LONG REACH

(C35 SERIES)

NAAMS LONG REACH CAM DESIGNATION	MAXIMUM TOOLING PROTRUSION (mm)	AVAILABLE CAM ANGLE 5 DEG INCREMENT	STROKE (mm)	MAXIMUM TOTAL TOOLING WIEGHT (kg)	MAXIMUM WORK FORCE (kN)
C356500_xxx	120	00	30.2	1	14.7
C356505_xxx	120	05	31.9	1	14.7
C356510_xxx	120	10	35.0	1	14.7
C356515_xxx	120	15	31.4	1	14.7
C356520_xxx	120	20	32.3	1	14.7
C356525_xxx	120	25	35.0	1	14.7



* LENGTH FROM 1 TO 150mm (IN INCREMENTS OF 1 mm)

NOTES & SPECIFICATIONS:

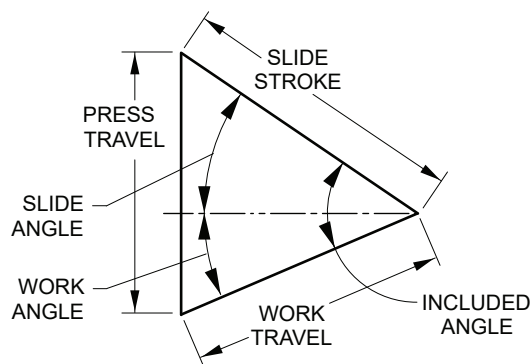
- Cam manufacturer to include set-up block with the cam for use during die construction.
- All cams have gas spring return.
- Tooling may not overhang mounting face of cam.

AERIAL CAM - LONG REACH

NAAMS CODE	SANKYO LONG NOSE CAM DESIGNATION	WORK TRAVEL (mm)	PRESS TRAVEL (mm)	SLIDE STROKE (mm)	INCLUDED ANGLE (DEGREES)	GAS SP RETURN FORCE (N)
C356500 xxx	SULNG65-00-SCxxx-GK-N12	30.2	36	47	50	3437.0
C356505 xxx	SULNG65-05-SCxxx-GK-N12	31.9	34.6	45	50	3376.2
C356510 xxx	SULNG65-10-SCxxx-GK-N12	35	35	45	50	3365.1
C356515 xxx	SULNG65-15-SCxxx-GK-N12	31.4	29.3	37	50	3153.0
C356520 xxx	SULNG65-20-SCxxx-GK-N12	32.3	28.5	35	50	3090.3
C356525 xxx	SULNG65-25-SCxxx-GK-N12	35	29.6	35	50	3077.7

↑ K or D

↑ GK = Kaller Gas Spring
 GD = Dadco Gas Spring



NAAMS DESIGNATION
 C35 65 05 xxx
 FACE WIDTH
 SCxxx (LENGTH MOUNT SURFACE EXTENDED)
 1 TO 150mm - IN INCREMENTS OF 1mm
 K = Kaller Gas Spring
 D = Dadco Gas Spring
 CAM WORK ANGLE

ORDER CODE OPTIONS