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Operation optimization for passanger boarding in regional aviation

Alexssander Jean Santos Bezerra

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Operation Optimization for Passanger Boarding in Regional Aviation

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ABSTRACT

People with special needs represent a considerable portion of the population and are entitled, like any citizen, to access services with dignity, including air transport.

In the field of commercial aviation, in Brazil, the Passenger with the Need for Special Assistance (PNAE), is defined as: the person with a disability, a person aged 60 or over, a pregnant woman, a lactating woman, a person accompanied by a child lap, person with reduced mobility or anyone who, due to a specific condition, has limited autonomy as a passenger.

The objective of this work is to identify the flow of passengers with special needs at the main regional airports, taking into account the data collection with the airlines and clarifying the points of greatest difficulty for these people, in view of the classification of the passenger according to with rules defined by the National Civil Aviation Agency - ANAC in its Resolution No. 280 of July 11, 2013.

The planned work plan was composed of the tasks necessary to approach the subject, being divided into three stages: data collection from the airlines, filtering of the data obtained and identification of the need for regional airports in the scope of accessibility.

After completing the data filter and identifying the real need for support in the assumptions regarding accessibility at the regional airports studied, it is proposed to purchase a ramp equipment, in order to assist / optimize the embarkation and disembarkation of passengers.

This proposed equipment consists of a mobile ramp that serves both ordinary passengers and PNAE.

In view of the different types of aircraft present in the data survey (Embraer / Boeing / Airbus), the proposal is a solution for the acquisition of equipment that meets both types of aircraft.

Keywords: Accessibility; Passenger in Need of Special Assistance (PNAE); Regional Aviation.

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CHAPTER 1

INTRODUCTION

1.1 FUNDAMENTATION

People with special needs represent a considerable portion of the population and are entitled, like any citizen, to access services with dignity, including air transport.

The increase in the number of people using air transport in Brazil tends to increase more and more. In this perspective, the number of people with disabilities and reduced mobility is expected to increase due to the phenomenon of an aging world population and acquired disabilities. In addition, there is growth in the economic potential of this group, which tends to travel more and more, thereby generating an increase in the flow of passengers who need special assistance.

In the field of commercial aviation, in Brazil, the Passenger with the Need for Special Assistance (PNAE), is defined as: the person with a disability, a person aged 60 or over, a pregnant woman, a lactating woman, a person accompanied by a child lap, person with reduced mobility or anyone who, due to a specific condition, has limited autonomy as a passenger.

The air transport sector has grown a lot in recent years and the perspective is for an even greater increase, mainly within the scope of Brazilian Regional Aviation. Brazil is the third largest domestic civil aviation market in the world, behind only the United States and China. Three of the large companies operating in the country represent a considerable percentage of the market on the international stage, namely TAM, Gol, Azul.

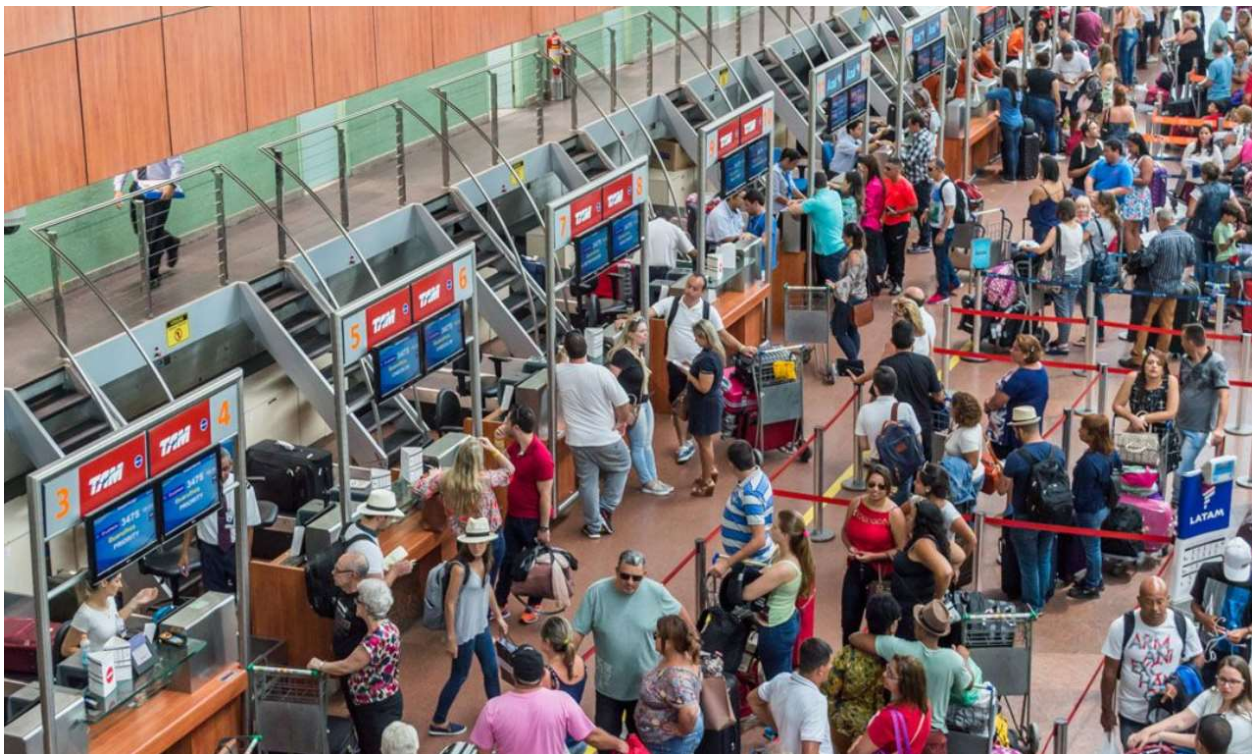


FIGURE 1 – INCREASE IN THE PASSANGERS FLOW IN BRAZIL

The choice of Brazilian travel is influenced by three factors: cost, time and comfort. In a country with a large extension, as is the case of Brazil, the option for air transport is becoming more and more frequent.

The Brazilian is traveling more and the trend is that this scenario will be further expanded. An increase in the number of passengers presupposes an increase also in the number of PNAEs that seek air transport as an alternative. Which leads to the question: Is this sector prepared to offer an adequate service to these passengers?

It is important to clarify that this group of people is heterogeneous and that for each disability there are different needs.



FIGURE 2 – INCREASE IN THE NUMBER OF PNAES

1.2 INTRODUCTION TO THE THEME

The changes in relation to the understanding of special needs in the world seek the realization of social inclusion and the greater participation of people with special needs in all contexts and activities.

However, in air transport there are numerous barriers that can hinder the travel of these people. Many passengers find it difficult to access, despite recent investments in the airport sector.

Therefore, the need to develop projects involving users is visible, so that it is possible to understand the real needs of these passengers and develop solutions that ensure their independence and security in the use of transport.



FIGURE 3 – ACTUAL PNAE BOARDING IN BRAZIL

1.3 SCOPE

Based on the arguments cited above, it is understood that accessibility is an act of social inclusion for people who need special care. Thus, in order to be able to use the resources available in society, several adaptations are necessary according to the difficulties of each one.

Considering the increase in the number of PNAEs, which is envisioned in the scope of regional aviation and in view of the reduced number of daily flights in regional aviation, we note the almost maximum capacity, or even maximum, of the capacity of the aircraft. Taking this into account, there is a considerable flow of passengers per flight, in a small structure, which is the size of regional airports.

On flights with passengers with special needs, the obstacles encountered when boarding and disembarking these people are clear, which often cause delays in flight schedules and also generate the need for special service by airlines for this group of people.

In view of the arguments presented, a relevant aspect for improving the scenario would be the optimization of the boarding and disembarkation of passengers with special needs, envisioning punctuality in flight schedules, as well as operational improvement in the flow of passengers. This fact would provide improvements not only to passengers, but also for the operation of the airport and airlines, considering that ANAC Resolution No. 280 of 11 July 2013 stipulates that the companies responsible for the service must offer the necessary conditions to serve carriers mobility difficulties.

1.4 OBJECTIVE

The objective of this work is to identify the flow of passengers with special needs at the main regional airports, taking into account the data collection with the airlines and clarifying the points of greatest difficulty for these people, in view of the classification of the passenger according to with rules defined by the National Civil Aviation Agency - ANAC in its Resolution No. 280 of July 11, 2013.

1.5 INTERNSHIP COMPANY

The internship took place at the Investment Department - DINV of the National Secretariat for Civil Aviation - SAC, which is part of the organizational structure of the Ministry of Infrastructure - MINFRA, Brazil, from March 1, 2020 to August 31, 2020.

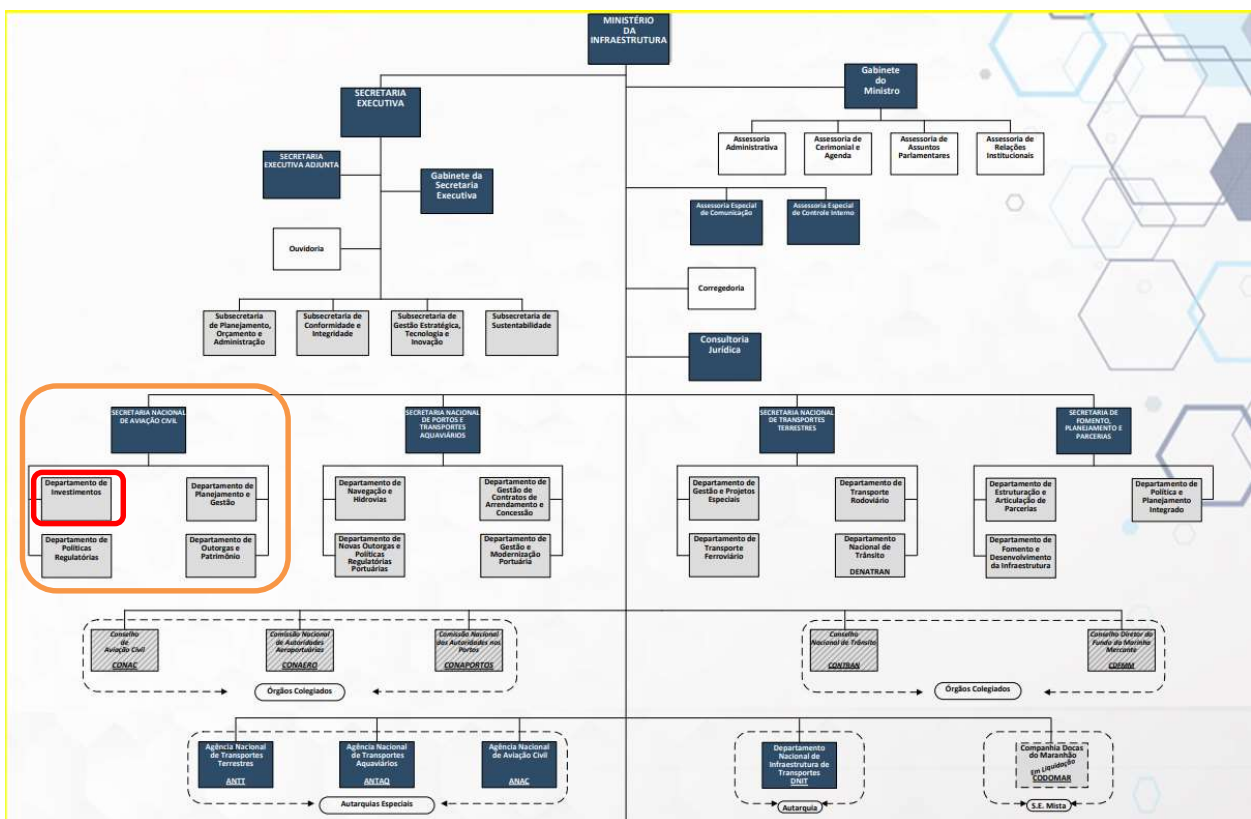


FIGURE 4 – MINFRA ORGANIZATION CHART

1.6 INTERNSHIP TASKS

The Internship Tutor was the Investment Coordinator - CGINV Guilherme Afonso, public servant of the National Civil Aviation Agency - ANAC and currently assigned to MINFRA.

The tasks of the internship were directed to the elaboration of the data survey with the airlines to verify the flow of passengers by category of special needs in the main regional airports of Brazil.

The CGINV coordinator advised that for the necessary data collection, consultation with the airlines would be necessary, with ANAC as the contact facilitator.

This done, a filter was performed on the acquired data, where the numbers were separated by PNAE category and by regional airport, in order to verify the demand for airport.

Finally, after performing this task, considering the flow of PNAE by regional airport, a list of the main airports that most need support in terms of accessibility was generated.

CHAPTER 2

STUDENT INTRODUCTION

I, Alexssander Jean Santos Bezerra, graduated in civil engineering from Universidade Paulista - UNIP in late 2009 and in March 2010 I was admitted as a public employee at the Brazilian Airport Infrastructure Company - INFRAERO.

In the first 3 years of work as a civil engineer at INFRAERO I worked with analysis of projects for foundations, structures and hydrosanitary systems, in public works bidding processes and also in the management and supervision of construction works for passenger terminal buildings.

I became the Project Planning Coordinator of the Superintendence of Enterprises Midwest, North and Northeast - DENN, where I participated in commissions for receiving works at airports located in the host cities of the 2014 World Cup.

As a calculator of reinforced concrete structures and foundations, I provided technical support in the renovation and modernization works of the passenger terminal at the International Airport of Salvador / BA.

Currently based in the Department of Investment in Regional Airports of the National Secretariat of Civil Aviation - SAC, he is responsible for monitoring the works of the investment program in Regional Airports.

During the period of the internship that makes up the ENAC Air Navigation Management Advanced Master course, data collection and filtering activities were carried out to check the situation and need of Regional Airports with regard to accessibility.

The purpose of the tasks performed during the internship period was to identify obstacles during the embarkation and disembarkation of people with special needs.

Flight delays were noted due to the special attention that is given to this category of passengers in regional aviation and, with that, a list of regional airports that most need support in terms of accessibility was generated.

CHAPTER 3

THE WORK PLAN

The planned work plan containing the tasks necessary to approach the subject was divided into three stages: survey of data with the airlines, filtering of the data obtained, identification of the need for regional airports in the scope of accessibility.

3.1 DATA COLLECTION WITH AIRLINES

The start of the process takes into account the obtaining of data from the airlines with the support of ANAC. In this task, the objective will be to hold meetings with the airline companies so that they provide data related to the flow of PNAE at the main regional airports in Brazil.

Considering that airlines can also be favored with this study, it is understood that the necessary data will be obtained easily.

3.2 FILTERING OF DATA OBTAINED

With the data in hand, a filter will be carried out on the flow of passengers by PNAE category, by airline and by regional airport.

The purpose of this filtering will be to identify the categories of PNAE that require more attention with regard to the flow during the process of boarding and disembarking passengers. This fact is directly linked to punctuality on flights.

3.3 IDENTIFICATION OF THE NEED FOR REGIONAL AIRPORTS WITH REGARD TO ACCESSIBILITY

After filtering the data obtained, finally a list of the main regional airports with the highest flow of PNAE will be generated, in order of the highest flow for the lowest flow.

Therefore, airports that need more attention with regard to accessibility will be identified, and with that, one can have a better idea of the direction of investments in regional aviation.

CHAPTER 4
IN-DEPTH ANALYSIS OF THE SUBJECT

For the analysis of the movement of PNAE in regional airports, the data collected between January and June 2019 were forwarded by ANAC, as a sample universe.

The formatting of the data sent by ANAC was carried out considering the embarkation / disembarkation filter by regional airport and PNAE category, as well as the type of aircraft used (ATR or EMBRAER / BOEING / AIRBUS).



FIGURE 5 – ATR AIRCRAFT



FIGURE 6 – BOEING AIRCRAFT

Only aircraft that regularly operate at Brazilian Regional Airports were considered: ATR72, E190, E195, A319, A320, B737, B738.

The following are the data by airlines and aircraft type:

4.1 PASSAREDO ATR AIRCRAFT

Fluxo Total	BLND	DEAF	INF	MEDA	MAAS	WCBW	WCBD	WCHC	WCHR	WCHS	Total
Araguaína (AUX)	1	1	121	0	57	0	0	37	42	0	259
Barreiras (BRA)	0	0	88	0	25	0	0	15	26	2	156
Ribeirão Preto (RAO)	20	10	595	0	253	0	0	100	233	3	1214
Rondonópolis (ROO)	1	4	177	0	78	0	0	42	55	5	362
São José do Rio Preto (SJP)	4	0	35	0	28	0	0	9	28	0	104
Três Lagoas (TJL)	3	0	28	0	26	0	0	2	11	0	70
Vitória da Conquista (VDC)	20	9	636	0	461	0	1	142	196	1	1466
Total	49	24	1680	0	928	0	1	347	591	11	3631

TABLE 2 - PNAE FLOW PASSAREDO ATR AIRCRAFT

4.2 MAP ATR AIRCRAFT

Fluxo Total	BLND	DEAF	INF	MEDA	MAAS	WCBW	WCBD	WCHC	WCHR	WCHS	Total
Barcelos (SWBC)	0	0	24	0	0	0	0	0	0	0	24
Carauari (SWCA)	0	0	71	1	49	0	0	5	3	0	129
Coari (SWKO)	0	0	43	0	3	0	0	1	0	0	47
Eirunepé (SWEI)	0	1	70	0	20	0	0	4	4	1	100
Itaituba (SBIH)	3	2	182	14	128	0	1	9	40	3	382
Lábrea (SWLB)	0	0	73	0	21	0	0	7	6	2	109
Parintins (SWPI)	1	0	154	1	124	0	0	9	26	3	318
Porto Trombetas (SBTB)	0	0	79	0	37	0	0	1	3	1	121
Uaupés (SBUA)	0	0	109	1	10	0	0	1	1	0	122
Total	4	3	805	17	392	0	1	37	83	10	1352

TABLE 2 - PNAE FLOW MAP ATR AIRCRAFT

4.3 AZUL ATR AIRCRAFT

Fluxo Total	BLND	DEAF	INF	MEDA	MAAS	WCBW	WCBD	WCHC	WCHR	WCHS	Total
Araçatuba (ARU)	9	8	239	0	301	0	0	15	70	8	650
Araxá (AAX)	0	0	22	0	21	0	0	0	5	0	48
Barra do Garças (BPG)	4	2	94	0	73	0	0	4	28	4	209
Bauru (JTC)	6	12	207	0	194	0	0	18	56	8	501
Campos dos Goytacazes (CAW)	51	0	0	0	19	0	0	3	6	0	79
Cascavel (CAC)	8	3	523	3	390	0	0	38	83	22	1070
Caxias do Sul (CXJ)	0	0	9	0	7	0	0	0	0	0	16
Divinópolis (DIQ)	1	0	15	0	22	0	0	3	4	1	46
Dourados (DOU)	8	5	179	0	184	0	0	14	64	5	459
Fernando de Noronha (FEN)	0	3	149	0	38	0	0	7	14	5	216
Governador Valadares (GVR)	4	5	244	2	243	0	0	25	85	7	615
Ipatinga (IPN)	8	3	560	1	368	0	0	27	87	9	1063
Lages (LAJ)	1	0	80	0	46	0	0	2	13	1	143
Lençóis (LEC)	2	1	59	0	34	0	0	2	5	1	104
Marlília (MIL)	3	3	155	0	229	0	0	11	65	10	476
Maringá (MGF)	14	13	572	2	743	0	0	60	137	20	1561
Passo Fundo (PFB)	0	0	33	0	11	0	0	0	3	0	47
Ponta Grossa (PGZ)	1	1	72	0	59	0	0	3	28	1	165
Presidente Prudente (PPB)	5	3	386	1	856	0	0	31	103	14	1399
Ribeirão Preto (RAO)	16	14	735	1	671	0	2	74	178	57	1748
Rio Verde (RVD)	8	1	124	1	131	0	0	10	42	1	318
Rondonópolis (ROO)	3	3	99	0	75	0	0	14	26	3	223
Santa Maria (RIA)	2	0	171	0	104	0	0	14	29	2	322
Santo Ângelo (GEL)	1	2	184	0	102	0	0	4	9	1	303
São José do Rio Preto (SJP)	25	14	798	2	602	0	0	54	176	55	1726
Sinop (OPS)	1	4	158	0	207	0	0	5	26	6	407
Teixeira de Freitas (TXF)	7	1	192	1	169	0	0	9	44	8	431
Três Lagoas (TJL)	3	1	103	1	94	0	0	4	34	5	245
Ubá (UBA)	6	7	156	0	220	0	0	18	38	8	453
Varginha (VAG)	0	1	40	0	33	0	0	2	9	0	85
Vilhena (BVH)	3	3	174	3	257	0	0	36	48	8	532
Vitória da Conquista (VDC)	12	5	445	1	554	0	0	53	75	10	1155
Zona da Mata (IZA)	4	6	212	1	172	0	0	15	46	7	463
Total	216	124	7189	20	7229	0	2	575	1636	287	17278

TABLE 3 - PNAE FLOW AZUL ATR AIRCRAFT

4.4 AZUL EMBRAER AIRCRAFT

Fluxo Total	BLND	DEAF	INF	MEDA	MAAS	WCBW	WCBD	WCHC	WCHR	WCHS	Total
Alta Floresta (AFL)	2	7	266	1	235	0	0	46	58	1	616
Bonito (BYO)	2	0	68	0	69	0	0	3	19	0	161
Cabo Frio (CFB)	1	3	336	2	130	0	0	10	47	14	543
Cacoal (OAL)	11	16	264	2	711	0	1	62	68	22	1157
Caldas Novas (CLV)	3	3	324	0	58	0	0	5	27	2	422
Carajás (CKS)	15	3	312	1	371	0	1	37	36	4	780
Caxias do Sul (CXJ)	2	3	137	1	88	0	0	8	25	3	267
Chapecó (XAP)	11	10	743	5	674	0	0	48	74	23	1588
Feira de Santana (FEC)	1	0	12	0	24	0	0	0	2	0	39
Fernando de Noronha (FEN)	2	1	211	0	43	0	0	7	10	10	284
Ilhéus (IOS)	18	11	1044	1	704	0	1	71	128	26	2004
Jaguaruna (JJG)	2	0	147	1	120	0	0	10	35	4	319
Jijoca de Jericoacoara (JJD)	0	0	107	0	59	0	0	1	9	4	180
Ji-Paraná (JPR)	4	9	281	1	450	0	0	71	86	16	918
Maringá (MGF)	8	7	199	1	156	0	0	24	54	5	454
Passo Fundo (PFB)	7	5	417	0	351	0	0	18	109	9	916
Ribeirão Preto (RAO)	4	1	186	0	154	0	0	9	16	6	376
Sinop (OPS)	9	7	412	0	560	0	0	23	76	13	1100
Sorriso (SMT)	5	3	162	0	193	0	0	11	31	6	411
Total	107	89	5628	16	5150	0	3	464	910	168	12535

TABLE 4 - PNAE FLOW AZUL EMBRAER AIRCRAFT

4.5 LATAM AIRBUS AIRCRAFT

Fluxo Total	BLND	DEAF	INF	MEDA	MAAS	WCBW	WCBD	WCHC	WCHR	WCHS	Total
Caldas Novas (CLV)	0	70	0	0	7	0	0	4	9	11	101
Porto Seguro (BPS)	8	10	434	8	258	0	1	25	147	48	931
Ribeirão Preto (RAO)	0	1	6	0	9	0	0	0	3	3	22
São José do Rio Preto (SJP)	2	1	71	1	37	0	0	6	18	4	139
Total	10	82	511	9	311	0	1	35	177	66	1193

TABLE 5 - PNAE FLOW LATAM AIRBUS AIRCRAFT

4.6 GOL BOEING AIRCRAFT

Fluxo Total	BLND	DEAF	INF	MEDA	MAAS	WCBW	WCBD	WCHC	WCHR	WCHS	Total
Araguaína (AUX)	1	8	0	0	114	0	1	43	44	7	218
Barreiras (BRA)	0	2	0	0	20	0	0	1	7	1	31
Caldas Novas (CLV)	2	5	0	0	155	0	0	23	108	29	322
Caxias do Sul (CXJ)	9	6	0	0	457	0	5	30	103	40	650
Chapecó (XAP)	6	9	0	0	494	0	3	59	146	54	771
Dourados (DOU)	0	0	0	0	0	0	0	0	1	0	1
Fernando de Noronha (FEN)	2	0	0	0	48	0	0	23	39	7	119
Ilhéus (IOS)	16	17	0	0	937	0	4	77	260	115	1426
Ipatinga (IPN)	0	0	0	0	2	0	0	3	0	3	8
Jijoca de Jericoacoara (JJD)	1	2	0	0	52	0	0	2	11	2	70
Maringá (MGF)	64	51	0	0	2594	2	13	286	793	317	4120
Porto Seguro (BPS)	81	55	0	0	1536	0	13	223	832	298	3038
Presidente Prudente (PPB)	62	17	0	0	1009	0	5	141	468	250	1952
Ribeirão Preto (RAO)	2	2	0	0	51	0	0	8	18	9	90
Rondonópolis (ROO)	0	0	0	0	25	0	0	3	2	3	33
São José do Rio Preto (SJP)	2	0	0	0	10	0	0	0	1	1	14
Vitória da Conquista (VDC)	4	5	0	0	104	0	0	8	19	6	146
Total	252	179	0	0	7608	2	44	930	2852	1142	13009

TABLE 6 - PNAE FLOW GOL BOEING AIRCRAFT

4.7 AVIANCA AIRBUS AIRCRAFT

Fluxo Total	BLND	DEAF	INF	MEDA	MAAS	WCBW	WCBD	WCHC	WCHR	WCHS	Total
Chapecó (XAP)	18	11	5	20	1628	0	2	138	198	59	2079
Ilhéus (IOS)	29	22	7	38	2594	0	3	192	359	94	3338
Total	47	33	12	58	4222	0	5	330	557	153	5417

TABLE 7 - PNAE FLOW AVIANCA AIRBUS AIRCRAFT

NOTE: Below follows the meanings of the acronyms of each Pnae category:

- **BLND** – PASSENGERS WITH REDUCED OR NULL VISUAL CAPACITY;
- **DEAF** – PHYSICALLY DISABLED PASSENGERS;
- **INF** – PASSENGERS WITH CHILDREN;
- **MEDA** – PASSENGERS TRANSPORTED IN MACA;
- **MAAS** – PREGNANT PASSENGERS;
- **WCBW** – PASSENGERS WITH LEFT LEGS FIXED;
- **WCBD** - PASSENGERS WITH REDUCED MOBILITY;
- **WCHC** – PEOPLE WITH A WHEELCHAIR FOR A CABIN SEAT (Passenger unable to move. Needs a wheelchair to move to the aircraft and to and from his seat and adequate equipment to embark and disembark when the aircraft is in motion. parked on the ramp);
- **WCHR** – PASSENGERS WITH THE RIGHT LEG IMMOBILIZED;
- **WCHS** - PEOPLE WITH A WHEELCHAIR AND NEED ASSISTANCE TO CLIMB UP OR DOWN STAIRS (Passenger cannot go up or down stairs, but can walk to and from their seat, but needs a wheelchair to move over distances. Needs adequate equipment to embark or disembark when the aircraft is parked on the ramp.

4.8 DATA CONSOLIDATED

After this filter was made, the total flow data was consolidated by aircraft type (Embraer / Boeing / Airbus) and airport:

	AEROPORTO	ATR	EMBRAER/BOEING/AIRBUS	TOTAL
1	Ilhéus (IOS)	0	6768	6768
2	Maringá (MGF)	1561	4574	6135
3	Chapecó (XAP)	0	4438	4438
4	Porto Seguro (BPS)	0	3969	3969
5	Ribeirão Preto (RAO)	2962	488	3450
6	Presidente Prudente (PPB)	1399	1952	3351
7	Vitória da Conquista (VDC)	2621	146	2767
8	São José do Rio Preto (SJP)	1830	153	1983
9	Sinop (OPS)	407	1100	1507
10	Cacoal (OAL)	0	1157	1157
11	Ipatinga (IPN)	1063	8	1071
12	Cascavel (CAC)	1070	0	1070
13	Passo Fundo (PFB)	47	916	963
14	Caxias do Sul (CXJ)	16	917	933
15	Ji-Paraná (JPR)	0	918	918
16	Caldas Novas (CLV)	0	845	845
17	Carajás (CKS)	0	780	780
18	Araçatuba (ARU)	650	0	650
19	Fernando de Noronha (FEN)	216	403	619
20	Rondonópolis (ROO)	585	33	618
21	Alta Floresta (AFL)	0	616	616
22	Governador Valadares (GVR)	615	0	615
23	Cabo Frio (CFB)	0	543	543
24	Vilhena (BVH)	532	0	532
25	Bauru (JTC)	501	0	501
26	Araguaína (AUX)	259	218	477
27	Marília (MII)	476	0	476
28	Zona da Mata (IZA)	463	0	463
29	Dourados (DOU)	459	1	460
30	Ubá (UBA)	453	0	453
31	Teixeira de Freitas (TXF)	431	0	431
32	Sorriso (SMT)	0	411	411
33	Itaituba (SBH)	382	0	382
34	Santa Maria (RIA)	322	0	322
35	Jaguaruna (JJG)	0	319	319
36	Parintins (SWPI)	318	0	318
37	Rio Verde (RVD)	318	0	318
38	Três Lagoas (TJL)	315	0	315
39	Santo Ângelo (GEL)	303	0	303
40	Jijoca de Jericoacoara (JJD)	0	250	250
41	Barra do Garças (BPG)	209	0	209
42	Barreiras (BRA)	156	31	187
43	Ponta Grossa (PGZ)	165	0	165
44	Bonito (BYO)	0	161	161
45	Lages (LAJ)	143	0	143
46	Caruaru (SWCA)	129	0	129
47	Uaupés (SBUA)	122	0	122
48	Porto Trombetas (SBTB)	121	0	121
49	Lábrea (SWLB)	109	0	109
50	Lençóis (LEC)	104	0	104
51	Eirunepé (SWEI)	100	0	100
52	Varginha (VAG)	85	0	85
53	Campos dos Goytacazes (CAW)	79	0	79
54	Araxá (AAX)	48	0	48
55	Coari (SWKO)	47	0	47
56	Divinópolis (DIQ)	46	0	46
57	Feira de Santana (FEC)	0	39	39
58	Barcelos (SWBC)	24	0	24

TABLE 8 – DATA CONSOLIDATED BY AIRCRAFT TYPE NA AIRPORT

Therefore, after completing the data filter and identifying the real need for support in the assumptions regarding accessibility at the regional airports studied, it is proposed to purchase a ramp equipment, in order to assist / optimize the embarkation and disembarkation of passengers.

This proposed equipment consists of a mobile ramp that serves both ordinary passengers and PNAE.

In view of the different types of aircraft present in the data survey (Embraer / Boeing / Airbus), the proposal is a solution for the acquisition of equipment that meets both types of aircraft.

Therefore, it is proposed a type of equipment to meet the ATR type aircraft (RAMPA TYPE 01) and another type of equipment to meet EMBRAER / BOEING / AIRBUS (RAMPA TYPE 02).

As a result, the 30 regional airports with the highest flow for the acquisition of equipment were prioritized, generating the following list - Ramp Type 01 (ATR) and Ramp Type 02 (EMBRAER / BOEING / AIRBUS):

UF	ICAO	AEROPORTO	ENDEREÇO	QUANTIDADE RAMPA TIPO 01	QUANTIDADE RAMPA TIPO 02
BA	SBIL	Aeroporto de Ilhéus	R. Brg. Eduardo Gomes, S/N - Pontal, Ilhéus - BA, 45654-070	-	1
BA	SBPS	Aeroporto de Porto Seguro	Estrada do Aeroporto s/nº - Cidade Alta - Porto Seguro/BA - CEP: 45810-000	-	1
BA	SBQV	Aeroporto de Vitória da Conquista	Av. Paraná, s/n - Bairro Brasil, Vitória da Conquista - BA. CEP: 45065-010	1	1
GO	SBCN	Aeroporto de Caldas Novas	R. 2 nº 3320 - Jardim e Paraíso - Caldas Novas/GO - CEP: 75690-000	-	1
MG	SBIP	Aeroporto de Ipatinga	Rodovia BR-458, Km 43, s/n - Distrito Industrial, Santana do Paraíso - MG. CEP: 35167-000	1	-
MG	SBGV	Aeroporto de Governador Valadares	Av. Industrial S/N Distrito Industrial - Governador Valadares/MG - CEP: 35040-610	1	-
MG	SNUB	Aeroporto de Ubá	R. Ângelo Sperândio, 1723, Ubá - MG, CEP: 36500-000	1	-
MG	SBZM	Aeroporto de Zona da Mata	Rodovia MG 353, Klm 38, S/N - Centro, Goianá - MG. CEP: 36150-000	1	-
MS	SBDO	Aeroporto de Dourados	Rodovia Dourados-Itaum, km.12 - Dourados/MS - CEP: 79804-970	1	-
MT	SWSI	Aeroporto de Sinop	Rod MT 222 (Rodovia dos Pioneiros), s/n - Zona Rural - Sinop/MT - CEP: 78550-001	1	1
MT	SWRD	Aeroporto de Rondonópolis	Av. Aeroporto, s/n - Vila São José, Rondonópolis - MT, CEP: 78720-070	1	-
MT	SBAT	Aeroporto de Alta Floresta	Av Aeroporto, - Setor C - Alta Floresta, MT - CEP: 78580-000	-	1
PA	SBCJ	Aeroporto de Carajás	Rodovia Estadual PA-275 Parauapebas - PA - CEP: 68515-000	-	1
PE	SBFN	Aeroporto de Fernando de Noronha	Vila do Dpv, S/N, Aeroporto - Fernando de Noronha/PE - CEP: 53990-000	1	1
PR	SBMG	Aeroporto de Maringá	Av. Vladimir Babkov, 900 - Pq. Industrial Mario Bulhoes - Maringá/PR - CEP: 87065-665	1	1
PR	SBCA	Aeroporto de Cascavel	Av. Itelo Webber, s/nº - Bairro Santos Dumont - Cascavel/PR - CEP: 85804-810	1	-
RJ	SBCB	Aeroporto de Cabo Frio	Estrada Velha do Arraial do Cabo, s/n - Praia Sudoeste, Cabo Frio - RJ, CEP: 28900-000	-	1
RO	SSKW	Aeroporto de Cacoal	Rua 7 de Setembro, 2.674 - Centro - CEP: 78975-000	-	1
RO	SBJI	Aeroporto de Ji-Paraná	Estrada do Aeroporto, 8930 - Ji - Parana - Rondonia RO, CEP: 78961-655	-	1
RO	SBVH	Aeroporto de Vilhena	Aeroporto Brigadeiro Camarão, 6650, Vilhena - RO, CEP: 78995-000	1	-
RS	SBPF	Aeroporto de Passo Fundo	Rodovia BR 285 - Zona Rural, Passo Fundo - RS - CEP: 99042-800	1	1
RS	SBCX	Aeroporto de Caxias do Sul	Av. Salgado Filho, 3451 - Caxias do Sul/RS - CEP: 95098-420	1	1
SC	SBCH	Aeroporto de Chapecó	Ac. Florenal Ribeiro, 4535D - Quedas do Palmital - Chapecó/SC - CEP: 89812-900	-	1
SP	SBRP	Aeroporto de Ribeirão Preto	Av. Thomaz Alberto Whately - Parque Industrial Cel. Quito Junqueira, Ribeirão Preto - SP. CEP: 14075-390	1	1
SP	SBDN	Aeroporto de Presidente Prudente	Rodovia Assis Chateaubriand, KM 459, S/N Presidente Prudente-SP.CEP: 19053680	1	1
SP	SBSR	Aeroporto de São José do Rio Preto	Av. dos Estudantes, 3505 - Jd. Herculano - São José do Rio Preto/SP - CEP: 15035-010	1	1
SP	SBAU	Aeroporto de Araçatuba	Via Olegario Ferraz S/Nº - Araçatuba/SP - CEP: 16052-800	1	-
SP	SBAE	Aeroporto de Bauru-Arealva	Estr. Mun. Murilo Vilaça Maringoni, km 5,5, Bauru - SP. CEP: 17022-895	1	-
SP	SBML	Aeroporto de Marília	Av. Brigadeiro Eduardo Gomes, 2.100 - Marília/SP - CEP: 17514-000	1	-
TO	SWG N	Aeroporto de Araguaína	Av Dionísio Farias, It-945 - Loteamento de Fátima - Araguaína, TO - CEP: 77814-350	1	1
QUANTIDADE TOTAL POR TIPO DE RAMPA				21	19

TABLE 9 – REGIONAL AIRPORTS WITH HIGHEST FLOW WERE PRIORIZED

CHAPTER 5

SOLUTION PRESENTATION

The proposal considers two types of ramp due to the possibility of serving the different types most common in Brazilian regional aviation.

Therefore, each equipment has common characteristics, but there are specific points for each type, considering the different sizes of the aircraft.

The following are the general and specific characteristics for each type of ramp.

5.1 GENERAL TECHNICAL SPECIFICATIONS

5.1.1 Structural

5.1.1.1 The equipment structure must be built in weather and oxidation resistant material, designed to withstand a minimum load of 320 kg/m², with a rated towing speed of up to 15 km/h.

5.1.1.2 All parts and panels used, when the unit is operated with the aircraft, must be dimensioned and built to withstand gusts of up to 34 m/s, whether in the closed or open position.

5.1.1.3 The circulation floor must be composed of non-slip material, even in rain, and resistant to a minimum load of 320 kg/m².

5.1.1.4 The Rolling System must be suitable for the maximum ramp weight and load. The equipment must allow the entire operation to be done by only two people, one to push and the other to maneuver the equipment. (ITEM CITED AS REFERENCE AHEAD)

5.1.1.5 To guarantee stability, the weight difference allowed between two wheels (or a set of two wheels on the same side) of an axle must not exceed 5% of the average weight on the tires of this axle.

5.1.1.6 The ramp must have a cover composed of light, resistant and translucent material, fixed to the structure itself and that meets the criteria of resistance to gusts of wind placed above.

5.1.2 Dimensions

5.1.2.1 The maximum slope must meet the following limits: 12.5% or 7.13 ° in the fixed ramp segments; 14% or 8 ° in the mobile ramp segment; and 16.66% or 9.46 ° on the tilting ramp and on the coupling accessory.

5.1.2.2 The minimum free width of the ramp segment must be a minimum of 0.95 m and a maximum of 1.05 m.

5.1.2.3 The width of the upper landing must allow a 360 ° wheelchair rotation, that is, allow the registration of a circle with a diameter of 1.50 m.

5.1.2.4 The width of the intermediate levels must be at least 1.20 m.

5.1.2.5 The Beacon Guide should have a minimum height of 5 cm, executed in the projection of the guardrails, without interfering in the minimum width of the ramp (According to Figure 01).

5.1.2.6 The guardrail must have a height of 1.05 m, with rigid lateral closure that allows use for advertising (As shown in Figure 7).

5.1.2.7 The handrail must be double, made of resistant material, with a diameter between 3.0 cm and 4.5 cm, on both sides, with a minimum free space of 4.0 cm (between the inside of the tube and the wall of the guardrail), with its bars installed at 0.92 m and 0.70 m from the floor, measured from the upper face to the landing (As shown in Figure 7).

5.1.2.8 The handrails must be attached to the guard rails and be firmly fixed to the support bars, without obstructing the grip, ensuring safe conditions of use throughout the ramp and landings (As shown in Figure 7).

5.1.2.9 The visual signage on the floor must be in contrasting color, at least 60 cm long, occupying the entire width of the ramp, at the beginning and end of the ramp.

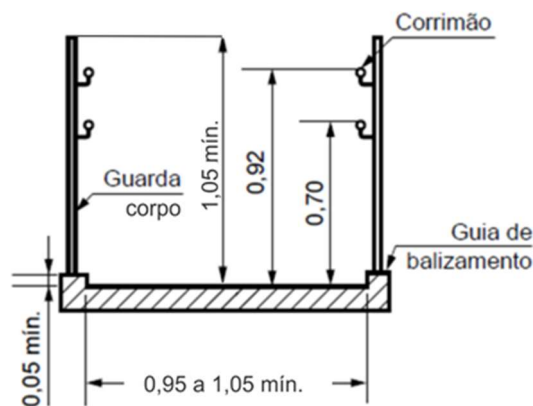


FIGURE 7 – GUARDRAIL (GUARDA-CORPO), HANDRAIL (CORRIMÃO) AND BEACON GUIDE (GUIA DE BALIZAMENTO).

5.1.3 Operational

5.1.3.1 The weight of the equipment must not compromise safety and allow manual movement, as already specified in item 5.1.1.4.

5.1.3.2 The maximum force undertaken by an operator to start moving the equipment is 38.00 kgf (kilogram force).

5.1.3.3 The maximum force used by an operator to keep the equipment in motion is 23.00 kgf (kilogram force).

5.1.3.4 The equipment must be equipped with a lifting system to move the ramp segments and activate the safety shoes.

5.1.3.5 The unit must be provided with a safety system that prevents its operation if the stabilizer shoes are not lowered.

5.1.3.6 The lifting and stabilizing cylinders must allow the ramp to be adjusted and adjusted to the specific height of the aircraft.

5.1.3.7 Protection should be provided for the upper level of the ramp to avoid contact of the rigid surface of the ramp with the aircraft.

5.1.3.8 The floor beacon system must be in LED lights, being waterproof and guaranteeing uniform lighting along the ramp path, with at least 54 LUX measured at the floor height.

5.1.3.9 The lighting and positioning of the instruments must not impair visibility during day or night operations.

5.1.3.10 The equipment must have an adapter for universal coupling.

5.1.3.11 Normal and continuous production tires, available on the national market for prompt delivery, should be used in the equipment, without changing the characteristics of the equipment in terms of performance and safety;

5.1.3.12 The equipment must have reflective safety signs;

5.1.3.13 The Instrument Panel must be located in the operator's visual field, providing immediate reading and interpretation, with the necessary information for the operation and monitoring of the equipment.

5.1.3.14 The Instrument Panel must be protected from the weather.

5.1.3.15 The equipment must have a power source with sufficient power for perfect operation and with a minimum autonomy of 4 hours.

5.1.3.16 All system components and controls must be identified in Portuguese (Brazil).

5.2 SPECIFIC TECHNICAL SPECIFICATIONS

5.2.1 Ramp type 01:

5.2.1.1 The ATR 72 aircraft and other aircraft that have similar heights must be considered, considering as reference the maximum height of the lower part of the doorway in relation to the ground of 1.60m.

5.2.1.2 Maximum equipment length should not exceed 7.00 m, when not in use.

5.2.1.3 Maximum width of the equipment: it should not exceed the width of 2.50 m, when not in use.

5.2.2 Ramp type 02:

5.2.2.1 You must guarantee access to the front door of the following commercial passenger aircraft models: Boeing 737, Boeing 738, Airbus A318, Airbus A319, Airbus A320, Airbus A321, Embraer 190 and Embraer 195.

5.2.2.2 Maximum length: it should not exceed the length of 12.00 m, when not in use.

5.2.2.3 Maximum width of the equipment: it should not exceed the width of 3.20 m, when not in use.

CHAPTER 6

SOLUTION OF THE PROBLEM

The acquisition of Mobile Ramp equipment for access to Aircraft is intended to allow passengers with special assistance needs - PNAE, access to aircraft for boarding and disembarking on an equal basis with other passengers, regardless of their physical characteristics, skills and age group.

The advantage of the suggested proposal to serve Brazilian regional airports is the fact that the equipment serves not only people with special needs, but also the airport operator and the airlines responsible for boarding and disembarking this category of passengers.

The equipment is viable in terms of handling. For RAMP TYPE 01, 1 person can move it and attach it to the aircraft. And RAMP TYPE 02 does not require two people, which is also not a problem.

Equipment costs are also accessible: RAMPA TYPE 01 - R\$ 200,000.00 (two hundred thousand reais) and RAMPA TYPE 02 - R\$ 300,000.00 (three hundred thousand reais).

With regard to sustainability, the equipment also meets this requirement as it does not use fuel (manual handling as already shown) and the lighting system is composed of LED.

With the growth of regional aviation, the feasibility of relocating ramps to other airports should be taken into account, which may in the future show a growth in the flow of PNAE and which is not currently present in the list generated in the study of the data collected. The equipment is not “stuck” to the airport you are going to serve.

CHAPTER 7

CONCLUSION

For this study, the database of the first semester of 2019 was used in view of the occurrence of the pandemic arising from the COVID-19 virus (Corona virus). With that, it was possible to make the study with data from a typical year and that can be taken into account for future projections, after the end of the pandemic.

Even after the airline Avianca declared bankruptcy, the data related to its PNAE flows were also considered, considering that for the analyzed period, Avianca had a significant weight in Brazilian regional aviation.

The data survey carried out can be used as a source of primary information on the movement of PNAE in regional airports, since the data analysis followed a standardization and validated the major movements in regional aviation.

In view of what was set out in § 4º art. 20 of Anac Resolution No. 280 and the analysis of the results obtained in the surveyed database, the need to acquire the proposed equipment is visible, considering the breadth of the PNAE flow within the scope of Brazilian regional aviation.

BIBLIOGRAFY + WEB REFERENCES

ABNT NBR 5410 – Instalações Elétricas de Baixa Tensão – Procedimento

ABNT NBR 7028 – Equipamento de apoio no solo – Preparação para aplicação de pintura;

ABNT NBR 7736 – Aeronave – Equipamento de apoio no solo;

ABNT NBR 7392 – Equipamento de apoio no solo – Símbolos pictográficos para identificação dos controles do equipamento;

ABNT NBR 8004 – Equipamento de apoio no solo – Engates para veículos e equipamentos de apoio no solo (GSE) em aeroportos;

ABNT NBR 8006 – Aeronaves – Escada de manutenção;

ABNT NBR 8919 – Aeronaves – Equipamento de apoio no solo - Sinalização;

ABNT NBR 9050 – Acessibilidade a edificações, espaço, mobiliário e equipamentos urbanos;

ABNT NBR 14273 – Acessibilidade da pessoa portadora de deficiência no transporte aéreo comercial;

ABNT NBR 15369 – Equipamentos de apoio no solo – requisitos de estabilidade para equipamento de carga e serviço;

NBR 15646 – Acessibilidade - Plataforma elevatória veicular e rampa de acesso veicular para acessibilidade de pessoas com deficiência ou mobilidade reduzida, em veículo de transporte de passageiros de categorias M1, M2 e M3 – Requisitos;

ABNT NBR 16520 – Equipamento de apoio em solo para aeronaves - Barra de reboque;

Resolução ANAC nº 280, de 11 de julho de 2013;

AC 150/5220-21C – Aircraft Boarding Equipment;

NR 12 – Máquinas e Equipamentos;

NR 17 – Portaria nº 3214 de 08 de junho de 1978 – Ministério do Trabalho (Ergonomia);

NR 26 – Sinalização de segurança.

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ANNEX 1

TECHNICAL NOTEBOOK FOR COMPANY HIRING TO SUPPLY RAMP EQUIPMENT

1. OBJECT

- 1.1. The scope of supply includes the “CONTRACTING COMPANY FOR THE ACQUISITION OF MOBILE RAMP ACCESSING AIRCRAFT FOR EMBARKING AND DISEMBARKING OF PASSENGERS”.

2. OBJECTIVE / PURPOSE

- 2.1. This document aims to establish the basic assumptions and the minimum technical and procedural requirements necessary for “CONTRACTING A COMPANY FOR THE ACQUISITION OF MOBILE RAMPS FOR ACCESSING AIRCRAFT TO EMBARK AND DISEMBARK PASSENGERS”.
- 2.2. The tenderer must consider all the components and services mentioned or indicated in the execution of the works, so that the product is delivered with a quality finish and in conditions to operate in a fully satisfactory manner.
- 2.3. This document shall guide and discipline the technical relationship between the CONTRACTOR and the CONTRACTING PARTY'S SUPERVISORY COMMITTEE.

3. BACKGROUND

- 3.1. The acquisition of Mobile Ramp equipment for access to Aircraft is intended to allow passengers with special assistance needs - PNAE, access to aircraft for boarding and disembarking on an equal basis with other passengers, regardless of their physical characteristics, skills and age group.

4. STANDARD REFERENCES

- 4.1. For the provision of the Contracted Services in this scope, the CONTRACTOR must comply with the ABNT Norms - Brazilian Association of Technical Norms and / or relevant foreign norms.
- 4.2. In the absence of corresponding national standards, always with the approval of the CONTRACTING PARTY, other Standards of recognized authority may be accepted, which can guarantee the desired level of quality.
- 4.3. The specific standards listed below, or others that may replace them, apply to the object of this Technical Booklet:
 - 4.3.1. ABNT NBR 5410 – Instalações Elétricas de Baixa Tensão – Procedimento;
 - 4.3.2. ABNT NBR 7028 – Equipamento de apoio no solo – Preparação para aplicação de pintura;
 - 4.3.3. ABNT NBR 7736 – Aeronave – Equipamento de apoio no solo;
 - 4.3.4. ABNT NBR 7392 – Equipamento de apoio no solo – Símbolos pictográficos para identificação dos controles do equipamento;
 - 4.3.5. ABNT NBR 8004 – Equipamento de apoio no solo – Engates para veículos e equipamentos de apoio no solo (GSE) em aeroportos;
 - 4.3.6. ABNT NBR 8006 – Aeronaves – Escada de manutenção;
 - 4.3.7. ABNT NBR 8919 – Aeronaves – Equipamento de apoio no solo - Sinalização;

- 4.3.8. ABNT NBR 9050 – Acessibilidade a edificações, espaço, mobiliário e equipamentos urbanos;
 - 4.3.9. ABNT NBR 14273 – Acessibilidade da pessoa portadora de deficiência no transporte aéreo comercial;
 - 4.3.10. ABNT NBR 15369 – Equipamentos de apoio no solo – requisitos de estabilidade para equipamento de carga e serviço;
 - 4.3.11. NBR 15646 – Acessibilidade - Plataforma elevatória veicular e rampa de acesso veicular para acessibilidade de pessoas com deficiência ou mobilidade reduzida, em veículo de transporte de passageiros de categorias M1, M2 e M3 – Requisitos;
 - 4.3.12. ABNT NBR 16520 – Equipamento de apoio em solo para aeronaves - Barra de reboque;
 - 4.3.13. Resolução ANAC nº 280, de 11 de julho de 2013;
 - 4.3.14. AC 150/5220-21C – Aircraft Boarding Equipment;
 - 4.3.15. NR 12 – Máquinas e Equipamentos;
 - 4.3.16. NR 17 – Portaria nº 3214 de 08 de junho de 1978 – Ministério do Trabalho (Ergonomia);
 - 4.3.17. NR 26 – Sinalização de segurança.
- 4.4.** The standards mentioned must always be complied with, always considering the latest version, or respective substitute, in addition to the complementary ones.
- 4.5.** In addition to the requirements of ABNT, ANAC and common practices related to each activity, the services must comply with this Technical Booklet, with the Contractor having the ultimate responsibility for the perfect execution of the works.
- 4.6.** If, during the contracting period, any new standard enters into force, incorporating applicable technological advances, the required requirements must be considered in the manufacture and / or assembly of the equipment.

5. GLOSSARY

- 5.1.** CONTRACTING PARTY - Legal entity that will contract the execution of the Scope.
- 5.2.** CONTRACTED PARTY - Legal entity contracted for the execution of the Scope.
- 5.3.** SUPERVISION AND RECEIPT COMMITTEE - Activity carried out in a systematic manner by the CONTRACTING PARTY through a person or group of people specially designated in order to verify the CONTRACTOR's compliance with the contractual provisions in all its aspects.
- 5.4.** BIDDER - Legal entity interested in participating in the bidding process for the delivery of equipment and provision of technical services.
- 5.5.** CHASSI - Ramp support structure characterized by the part of the device that provides stability and comprises the ramp surface and the landings.
- 5.6.** RAMP SURFACE - Inclined path on which passengers travel to embark or disembark from the aircraft.
- 5.7.** MAXIMUM LOAD - Own weight of the ramp plus the maximum weight supported when in use.
- 5.8.** COUPLING ACCESSORY - Accessory for secure connection and leveling between the ramp and the aircraft door.
- 5.9.** TILTING RAMP - Part of the ramp that allows the connection between the ramp and the ground with a maximum difference of 05 mm (five millimeters).

6. GENERAL CONSIDERATIONS

- 6.1. All supply documents such as drawings, technical descriptions, specifications, calculations, etc., will be written in Portuguese.
- 6.2. In the assembly and / or commissioning supervision services, the CONTRACTOR's employees must understand and make themselves understood in the Portuguese language. The CONTRACTED PARTY may make use of interpreters, at its expense, after prior written consent from the CONTRACTING PARTY.
- 6.3. Any linguistic error committed by the CONTRACTED PARTY and which may affect the interpretation of any document, will be the entire responsibility of the CONTRACTED PARTY, which will be subject to the consequences resulting from such errors.
- 6.4. All units must be indicated in the Decimal Metric System. Exceptions may be accepted in specific cases, for example, details of screws, nuts, washers, connections, etc. In the event of a conflict between the values expressed in the Decimal Metric System and other systems, the Decimal Metric System will prevail.
- 6.5. The manufacture of the equipment must be strictly within the design standards, in accordance with this specification. The manufacturing techniques and labor to be employed must be compatible with the mentioned standards.

7. TECHNICAL SPECIFICATIONS

7.1. General requirements:

7.1.1. Structural:

- 7.1.1.1. The equipment structure must be built in weather and oxidation resistant material, dimensioned to support the minimum load of 320 kg / m², with a nominal towing speed of up to 15 km / h.
- 7.1.1.2. All parts and panels used, when the unit is operated close to the aircraft, must be dimensioned and built to withstand gusts of up to 34 m / s, whether in the closed or open position.
- 7.1.1.3. The circulation floor must be composed of non-slip material, even in the rain, and resistant to a minimum load of 320 kg / m².
- 7.1.1.4. The Rolling System must be adapted to the maximum ramp weight and load. The equipment must allow the entire operation to be done by only two people, one to push and the other to maneuver the equipment.
- 7.1.1.5. To guarantee stability, the weight difference allowed between two wheels (or a set of two wheels on the same side) of an axle must not exceed 5% of the average weight on the tires of this axle.
- 7.1.1.6. The ramp must have a cover composed of light, resistant and translucent material, fixed to the structure itself and that meets the criteria of resistance to gusts above.

7.1.2. Dimensions:

- 7.1.2.1. The maximum slope must meet the following limits:
 - 7.1.2.1.1. 12.5% or 7.13 ° in the fixed ramp segments;
 - 7.1.2.1.2. 14% or 8 ° in the mobile ramp segment; and
 - 7.1.2.1.3. 16.66% or 9.46 ° on the tilting ramp and on the coupling accessory.

- 7.1.2.2. The minimum free width of the ramp segment must be a minimum of 0.95 m and a maximum of 1.05 m.
- 7.1.2.3. The width of the upper landing should allow for a 360 ° wheelchair rotation, that is, allow the registration of a circle with a diameter of 1.50 m.
- 7.1.2.4. The width of the intermediate levels must be at least 1.20 m.
- 7.1.2.5. The Beacon Guide should have a minimum height of 5 cm, executed in the projection of the guardrails, without interfering in the minimum width of the ramp (see figure 1).
- 7.1.2.6. The guardrail must have a height of 1.05 m, with rigid lateral closure that allows use for advertising (see figure 1).
- 7.1.2.7. The handrail must be double, composed of resistant material, with a diameter between 3.0 cm and 4.5 cm, on both sides, with a minimum free space of 4.0 cm (between the inside of the tube and the guard wall -body), with its bars installed at 0.92 m and 0.70 m from the floor, measured from the upper face to the landing (see figure 1).
- 7.1.2.8. The handrails must be attached to the guardrails and be firmly fixed to the support bars, without obstructing the grip, ensuring safe conditions of use throughout the ramp and landings (see figure 1).
- 7.1.2.9. The visual signage on the floor must be in contrasting color, at least 60 cm long, occupying the entire width of the ramp, at the beginning and end of the ramp.

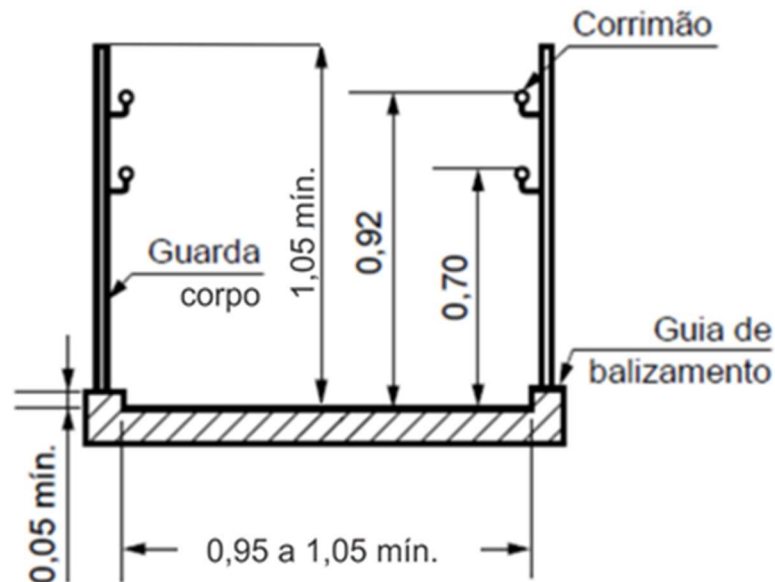


Figura 3 - Guarda-corpo, corrimão e guia de balizamento

7.1.3.Operational:

- 7.1.3.1. The weight of the equipment must not compromise safety and allow manual movement, as specified in item 7.1.1.4.
- 7.1.3.2. The maximum force undertaken by an operator to start moving the equipment is 38.00 kgf (kilogram-force).
- 7.1.3.3. The maximum force undertaken by an operator to keep the equipment in motion is 23.00 kgf (kilogram-force).
- 7.1.3.4. The equipment must be equipped with a lifting system to move the ramp segments and activate the safety shoes.
- 7.1.3.5. The unit must be provided with a safety system that prevents its operation if the stabilizer shoes are not lowered.
- 7.1.3.6. The lifting and stabilizing cylinders must allow the ramp to be adjusted and adjusted to the determined height of the aircraft.
- 7.1.3.7. Protection should be provided for the upper level of the ramp to avoid contact of the rigid surface of the ramp with the aircraft.
- 7.1.3.8. The floor beacon system should be in LED lights, being waterproof and guaranteeing uniform lighting along the ramp path, with at least 54 LUX measured at the height of the floor.
- 7.1.3.9. The lighting and positioning of the instruments must not impair visibility during day or night operations.
- 7.1.3.10. The equipment must have an adapter for universal coupling.
- 7.1.3.11. The equipment must have a sound and light device that signals the operator that the ramp is approaching the aircraft (proximity sensor).
- 7.1.3.12. Normally and continuously produced tires, available on the national market for prompt delivery, should be used in the equipment, without changing the characteristics of the equipment in terms of performance and safety.
- 7.1.3.13. The equipment must have reflective safety signs.
- 7.1.3.14. The Instrument Panel must be located in the operator's visual field, providing immediate reading and interpretation, with the necessary information for the operation and monitoring of the equipment.
- 7.1.3.15. The Instrument Panel must be protected from the weather.
- 7.1.3.16. The equipment must have a power source with sufficient power for perfect operation and with a minimum autonomy of 4 hours.
- 7.1.3.17. All system components and controls must be identified in Portuguese (Brazil).

7.2. Specific Requirements

7.2.1.Ramp type 01:

- 7.2.1.1. It must attend to ATR 72 aircraft and other aircraft that have similar heights, considering as reference the maximum height of the lower part of the doorway in relation to the ground of 1.60 m.
- 7.2.1.2. Maximum equipment length should not exceed 7.00 m, when not in use.
- 7.2.1.3. Maximum width of the equipment: it should not exceed the width of 2.50 m, when not in use.

7.2.2. Ramp type 02:

7.2.2.1. You must guarantee access to the front door of the following commercial passenger aircraft models: Boeing 737, Boeing 738, Airbus A318, Airbus A319, Airbus A320, Airbus A321, Embraer 190 and Embraer 195.

7.2.2.2. Maximum length: it should not exceed the length of 12.00 m, when not in use.

7.2.2.3. Maximum width of the equipment: it should not exceed the width of 3.20 m, when not in use.

7.3. Without prejudice to the provisions of the relevant technical standards, new equipment must have the following characteristics:

7.3.1. Quality finish;

7.3.2. Comfort and smoothness during operation;

7.3.3. Accurate leveling at all levels.

7.4. The following technical documents must be provided:

7.4.1. Provision of projects, details and graphic products for the manufacture and assembly of equipment, which must be approved by the SUPERVISION AND RECEIPT COMMITTEE;

7.4.2. The projects must be composed of all the necessary documents (calculation memories, technical specifications, spreadsheets, drawings, etc.). All cases omitted or susceptible of doubts must be submitted by the CONTRACTING PARTY to the SUPERVISION AND RECEIPT COMMISSION, for better clarifications or orientations.

7.4.3. All technical documents must be delivered with their appropriate Technical Responsibility Notes.

7.5. The CONTRACTOR shall notify the CONTRACTING PARTY of relevant errors and / or omissions in these technical specifications, requesting instructions before starting the manufacture.

7.6. All parts that are part of mechanisms, gears, etc., and all moving parts will be as interchangeable as possible and should allow easy assembly on the corresponding equipment. If modifications are made to the equipment during manufacture or assembly, such modifications must be approved by the CONTRACTING PARTY and subsequently performed on all equipment of the same type.

7.7. The equipment must fully meet the capacities specified in this document.

8. QUANTITY SHEET

8.1. The following spreadsheet lists the quantities initially identified as necessary to meet the stipulated demand, based on a preliminary study, and there may be changes at the discretion of the CONTRACTING PARTY when issuing service orders for supply:

REGIONAL AIRPORTS LIST					
UF	ICAO	AIRPOT	ADRESS	QUANTITY RAMP TYPE 01	QUANTITY RAMP TYPE 02
BA	SBPS	Aeroporto de Porto Seguro	Estrada do Aeroporto s/nº - Cidade Alta - Porto Seguro/BA - CEP: 45810-000	-	2

BA	SBQV	Aeroporto de Vitória da Conquista	Av. Paraná, s/n - Bairro Brasil, Vitória da Conquista - BA. CEP: 45065-010	1	-
BA	SNBR	Aeroporto de Barreiras	R. Anapolina, 204 - Vila Sas, Barreiras - BA. CEP: 47806-470	1	-
GO	SBCN	Aeroporto Nelson Ribeiro Guimarães - Caldas Novas	R. 2 nº 3320 - Jardim e Paraíso - Caldas Novas/GO - CEP: 75690-000	-	1
MG	SBGV	Aeroporto Coronel Altino Machado de Oliveira - Governador Valadares	Av. Industrial S/N Distrito Industrial - Governador Valadares/MG - CEP: 35040-610	1	-
MG	SBIP	Aeroporto de Ipatinga	Rodovia BR-458, Km 43, s/n - Distrito Industrial, Santana do Paraíso - MG. CEP: 35167-000	1	-
MG	SBZM	Aeroporto Regional Presidente Itamar Augusto Cautieiro Franco – Zona da Mata	Rodovia MG 353, Klm 38, S/N - Centro, Goianá - MG. CEP: 36150-000	1	-
MS	SBDO	Aeroporto de Dourados	Rodovia Dourados-Itaum, km.12 - Dourados/MS - CEP: 79804-970	1	-
MT	SWSI	Aeroporto de Sinop	Rod MT 222 (Rodovia dos Pioneiros), s/n - Zona Rural - Sinop/MT - CEP: 78550-001	-	1
PA	SBIH	Aeroporto de Itaituba	Rodovia Transamazônica, Km 05 - Itaituba/PA - CEP: 68181-000	1	-
PE	SBFN	Aeroporto de Fernando de Noronha	Vila do Dpv, S/N, Aeroporto - Fernando de Noronha/PE - CEP: 53990-000	1	1
PR	SBCA	Aeroporto Coronel Adalberto Mendes da Silva - Cascavel	Av. Itelo Webber, s/nº - Bairro Santos Dumont - Cascavel/PR - CEP: 85804-810	1	-
PR	SBMG	Aeroporto de Regional de Maringá - Sílvio Name Júnior	Av. Vladimir Babkov, 900 - Pq. Industrial Mario Bulhoes - Maringá/PR - CEP: 87065-665	1	2
RS	SBCX	Aeroporto Hugo Cantergiani - Caxias do Sul	Av. Salgado Filho, 3451 - Caxias do Sul/RS - CEP: 95098-420	-	1
SC	SBCH	Aeroporto Serafin Enoss Bertaso - Chapecó	Ac. Florenal Ribeiro, 4535D - Quedas do Palmital - Chapecó/SC - CEP: 89812-900	-	1
SC	SBJA	Aeroporto de Jaguaruna	Rodovia Lussa Librelato, s/nº, Bairro: Retiro - Jaguaruna/SC - CEP: 88715-000	-	1
SP	SBAE	Aeroporto de Bauru-Arealva	Estr. Mun. Murilo Vilaça Maringoni, km 5,5, Bauru - SP. CEP: 17022-895	1	1
SP	SBAU	Aeroporto Dario Guarita - Araçatuba	Via Olegario Ferraz S/Nº - Araçatuba/SP - CEP: 16052-800	1	-
SP	SBDN	Aeroporto de Presidente Prudente	Rodovia Assis Chateaubriand, KM 459, S/N Presidente Prudente-SP.CEP: 19053680	1	-
SP	SBML	Aeroporto de Marília	Av. Brigadeiro Eduardo Gomes, 2.100 - Marília/SP - CEP: 17514-000	1	-
SP	SBRP	Aeroporto de Ribeirão Preto	Av. Thomaz Alberto Whately - Parque Industrial Cel. Quito Junqueira, Ribeirão Preto - SP. CEP: 14075-390	2	1

SP	SBSR	Aeroporto de São José do Rio Preto	Av. dos Estudantes, 3505 - Jd. Herculano - São José do Rio Preto/SP - CEP: 15035-010	1	1
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9. PRESENTATION OF THE PROPOSAL

- 9.1.** The BIDDER must consider in the global value of its commercial proposal all direct and indirect expenses for the execution of the services, such as: labor, tools, equipment, materials, products, transportation, training, daily rates, meals, taxes and miscellaneous fees.
- 9.2.** The BIDDER must consider in the global value of its commercial proposal all direct and indirect expenses for the execution of any services covered by the guarantee.
- 9.3.** The BIDDER must consider in the global value of its proposal the expenses resulting from the transportation of all equipment from the origin to the place of delivery, as well as the costs of training the local team, including expenses with accommodation and transportation of the training team. to the destinations of each equipment delivery location.
- 9.4.** Participation in the form of consortia of companies will be allowed to provide the scope.
- 9.5.** The BIDDER must demonstrate that the ramps and their accessories have technical assistance and parts distribution throughout the national territory.
- 9.6.** The BIDDER must provide the following documentation:
- 9.6.1. One or more certificates of technical capacity, on behalf of the BIDDER, issued by a public or private legal entity, proving that the bidding company provided ground equipment of the same nature (such as passenger boarding ramps, passenger stairs, motorized ladder, push-back and other ground equipment used in airports), as detailed below:
- 9.6.1.1. The BIDDER will be required to prove supply of a minimum quantity equal to 1 (one) unit of the equipment in this Technical Notebook of the same nature;
- 9.6.1.2. The certificates must be supplied by acquisition (purchase) by the contracting legal entity, with provision of guarantee as established in the contract;
- 9.6.1.3. The certificate (s) of technical capacity must contain at least the following information:
- 9.6.1.3.1. Identification of the legal entity and the person responsible for issuing the certificate;
- 9.6.1.3.2. BIDDER identification and
- 9.6.1.3.3. Clear description of the equipment provided and technical assistance provided.

10. 10. CONTRACTOR'S OBRIGATIONS

- 10.1.** Proceed with the delivery of each equipment, at the airport indicated by the CONTRACTING PARTY and, on this occasion, provide versions of the maintenance and operation manuals, catalog of parts suitable for the equipment, including electronically.
- 10.2.** Provide inspection teams designated by the CONTRACTING PARTY with conditions to monitor the manufacturing and / or assembly steps, testing and receiving the Equipment.
- 10.3.** Formally notify the SUPERVISORY AND RECEIPT COMMITTEE, of the completion of the manufacture / assembly of the Equipment.
- 10.4.** Training must be provided by the CONTRACTOR in order to enable the CONTRACTING PARTY's professionals to operate and maintain (preventive and corrective) equipment at each of the regional airports where the delivery takes place.

- 10.5.** The scope of the training must be previously approved by the SUPERVISION AND RECEIPT COMMITTEE, and must be sent within 15 (fifteen) days of the approval of the prototype, being a prerequisite for the issuance of any service order.
- 10.6.** The training must contemplate preventive and corrective maintenance, aiming at the qualification of the technicians to perform all the activities related to maintenance and enabling the CONTRACTING PARTY staff the ability to diagnose and solve any problem in the equipment and systems.
- 10.7.** It should cover at least the following topics:
- 10.7.1. General presentation of the equipment;
 - 10.7.2. Constructive details;
 - 10.7.3. Requirements for operation and automatic systems;
 - 10.7.4. Operational requirements for releasing equipment for maintenance;
 - 10.7.5. Protection and Safety Measures in equipment interventions;
 - 10.7.6. Test and calibration of sensors;
 - 10.7.7. List of critical alarms and necessary actions;
 - 10.7.8. Inspections and checks;
 - 10.7.9. Diagnosis and correction of defects;
 - 10.7.10. Performing maintenance.
- 10.8.** At the end of the training, the CONTRACTOR shall request the participants to complete an Evaluation Form. If the training is considered unsatisfactory by the participants, the CONTRACTOR shall review the content and schedule a new training at no additional cost to the CONTRACTING PARTY.
- 10.9.** The CONTRACTOR shall issue, for each participant, the certificates of all courses taken by him, detailing the information identifying the course, the student, the instructor (s) and program content (the latter on the back of the certificate).
- 10.10.** The minimum training load will be 4 hours for each type of ramp.
- 10.11.** The CONTRACTOR shall have and prove the company's registration and the maintenance of its headquarters and / or branches in Brazil.
- 10.12.** The CONTRACTOR must present its planning that guarantees service after activation, considering the costs and terms of the different regions where the equipment will be delivered.
- 10.13.** The CONTRACTOR shall consider the following deadlines for service: for the South and Southwest region 3 working days; for Midwest and Northeast 5 business days; North 8 business days.
- 10.14.** It is the CONTRACTOR's responsibility to protect the equipment during transport, from the factory to the destination under conditions involving shipments, landings, transport by unpaved roads and / or by air, sea or river.
- 10.15.** The CONTRACTOR will be responsible for damages of any kind during the transport of the equipment.
- 10.16.** The supplier must protect the equipment against loss, corrosion and other forms of damage before delivery.
- 10.17.** The equipment can only be shipped with written authorization from the CONTRACTING PARTY.
- 10.18.** All expenses arising from the return and replacement of equipment not in accordance with this Technical Booklet will be the responsibility of the CONTRACTOR.
- 10.19.** The CONTRACTOR must have a TECHNICAL RESPONSIBLE, duly qualified, who will issue the Technical Responsibility Notes (ART) for the services specified in this Technical Booklet with CREA or the equivalent body, without charge to the CONTRACTING PARTY.

11. CONTRACTING PARTY'S OBLIGATIONS

- 11.1.** The CONTRACTING PARTY's obligations are:
- 11.1.1. Supervise the execution of the contracted object, allowing the participation of third parties to provide assistance or information deemed pertinent.
 - 11.1.2. Demand the fulfillment of all the commitments assumed by the CONTRACTOR.
 - 11.1.3. Proceed to the payment in the form and deadlines provided for in the Contract Term.
 - 11.1.4. Communicate to the CONTRACTOR any occurrence, taking care that the irregularities or failures are fully corrected. After the delivery and completion of the local training, this communication will be made by the delegate or by the aerodrome operator.
 - 11.1.5. Provide the information and clarifications that may be requested by the CONTRACTOR, when necessary for the execution of the contracted object.

12. STEPPING AND SCHEDULE

- 12.1.** The stepping-stone to supply the equipment considers as essential premise the maintenance of the operation in full conditions of safety and reliability. Therefore, all actions related to the startup of the Ramps must be previously planned between the CONTRACTING PARTY and the CONTRACTED PARTY to guarantee this premise.
- 12.2.** The CONTRACTING PARTY will issue a Partial Service Order authorizing the manufacture of the prototype.
- 12.3.** After the acceptance of the prototype by the SUPERVISION AND RECEIPT COMMISSION, the CONTRACTING PARTY will issue a Service Order for the acquisition of the other equipment.
- 12.4.** The deadlines for delivery and receipt of equipment will be distributed as follows:
- 12.4.1. FIRST STAGE: 15 days for the presentation of the projects, counting from the Partial Service Order issued by the CONTRACTING PARTY;
 - 12.4.2. SECOND STAGE: 60 days for presentation of the ramp prototype object of the contract, counting from the Partial Service Order issued by the CONTRACTING PARTY;
 - 12.4.3. THIRD STAGE: 60 days for acceptance of the prototype of each type of ramp by the COMMITTEE FOR SUPERVISION AND RECEIPT of the contract;
 - 12.4.4. FOURTH STEP: 30 days for delivery of each unit, counting from each Service Order issued by the CONTRACTING PARTY;
 - 12.4.5. FIFTH STAGE: 30 days to receive and test each ramp as soon as the delivery and training is formally communicated in each location indicated in this Technical Booklet

13. INSPECTION AND ACCEPTANCE

- 13.1.** The CONTRACTOR shall submit to the CONTRACTING PARTY a schedule of inspection activities, which shall contain all activities related to the CONTRACTOR's quality control, tests during manufacture, routine tests and type tests (when applicable).
- 13.2.** All tests and inspection will be carried out by the CONTRACTOR with the supervision of the CONTRACTING PARTY. Therefore, the CONTRACTOR shall provide one or more supervisors with technical knowledge of the equipment to supervise all the tasks that will be performed to put the equipment into service.
- 13.3.** All equipment, once definitively assembled and delivered to the planned locations, will be subjected to functional tests.
- 13.4.** They will be checked if all components (mechanical, electrical and electronic) of the equipment work under normal operating conditions, as defined in the specifications of this

document and in applicable technical standards. The perfect functioning of all control, protection, signaling and automation devices will be verified.

- 13.5.** Technical reports should be prepared to report information collected during the factory assembly phase, tests and trials, transportation, installation and final tests.
- 13.6.** The reports must present the methods used in the tests and the brief description of the services performed, which can be illustrated with images of the development of the activities.
- 13.7.** Compliance with the requirements below is considered mandatory for any and all manufacturers that, directly or indirectly, participate in the manufacture of the equipment and materials, the scope of this Technical Notebook.
- 13.8.** The equipment and materials will be subject to inspection at the factory by the CONTRACTING PARTY.
- 13.9.** The CONTRACTING PARTY shall be entitled, at its own cost, to inspect at any time whether the manufacture is being carried out in accordance with the specifications and the manufacturing schedule.
- 13.10.** During the equipment manufacturing process, the CONTRACTING PARTY representative must, upon prior notice to the CONTRACTED PARTY, have access to all its facilities or its sub-suppliers, where the work or testing of the ordered equipment is being carried out.
- 13.11.** The CONTRACTOR shall keep the following data available for examination by the CONTRACTING PARTY:
 - 13.11.1.** Specification and purchase orders for all components of the equipment being supplied;
 - 13.11.2.** Reports of all tests and inspections carried out by your quality control sector;
 - 13.11.3.** Drawings and technical data necessary to carry out the inspections.
- 13.12.** Any materials that do not meet the requirements set out in the purchase documents may be rejected and must be replaced by the CONTRACTOR.
- 13.13.** The acceptance of the equipment does not exempt the CONTRACTOR from the responsibilities and guarantees related to the supply.
- 13.14.** The analysis of the results of the tests will be done, whenever possible, by comparison. For this, the following basic standards will be adopted:
 - 13.14.1.** First: The values guaranteed by the CONTRACTOR in its proposal;
 - 13.14.2.** Second: The values and tolerances indicated in the Technical Specification;
 - 13.14.3.** Third: The tolerances indicated in the referenced technical standards.
- 13.15.** For the acceptance of the ramp by the SUPERVISION AND RECEIPT COMMISSION, the equipment must have the stability calculation statement according to NBR 15369, signed by a professional qualified with the respective ART in the CREA of the manufacturer's region and / or equivalent body. In addition, the ramp performance will be surveyed as stipulated in this technical book.
- 13.16.** The CONTRACTOR must present a prototype for the ramp object of the contract, which will be inspected by the SUPERVISION AND RECEIPT COMMITTEE.
- 13.17.** The approval of the PROTOTYPE will be carried out by the SUPERVISION AND RECEIPT COMMISSION directly at the factory, after a formal communication from the CONTRACTOR, and must meet all the specifications contained in this Technical Booklet.
- 13.18.** If the prototype is not approved, the CONTRACTOR shall submit, within 15 days, the proposal with the necessary adjustments indicated by the SUPERVISORY AND RECEIPT COMMISSION through a Technical Evaluation Report of the prototype.
- 13.19.** A new visit for the evaluation of the prototype may be made by the CONTRACTING PARTY, if deemed necessary, after prior formal communication.

- 13.20.** For the acceptance of the ramp by the SUPERVISION AND RECEIPT COMMITTEE, the following tests must be carried out to accept the prototypes: stability test, fixation system, functioning of electromechanical components, load test and compliance with the other items of this Technical Book.

14. WARRANTY AND TECHNICAL ASSISTANCE

- 14.1.** The CONTRACTOR shall ensure the provision of ample technical assistance and supply of spare parts, through representatives covering the entire national territory.
- 14.2.** The CONTRACTOR shall guarantee, without restriction and without limit, the perfect functioning of the equipment foreseen in the scope of supply for a period of at least 2 (two) years, counting from the date of issue of the Receipt of Receipt.
- 14.3.** The warranty periods will always be suspended, from the discovery of a defect by the CONTRACTING PARTY until its effective correction by the CONTRACTOR. In the event of replacement of parts and components, a new warranty period will be initiated only for the replaced item, counting the term from the acceptance by the CONTRACTING PARTY of the new part, component or equipment.
- 14.4.** The guarantee provided must cover any defects arising from the CONTRACTOR's errors or omissions, in particular, arising from raw materials, manufacturing, assembly and technical and administrative coordination. This Warranty must exclude, however, damage or defects resulting from normal wear and tear, abnormal use of equipment, excessive load, influence of chemical or electrochemical action, and other reasons beyond the CONTRACTOR's control.
- 14.5.** Depending on the guarantee provided, the CONTRACTOR is bound, without limitation, to replace the defective parts or repair them, placing the equipment perfectly in accordance with the provisions of this supply, without any burden to the CONTRACTING PARTY. For the purpose of repairing defects, the CONTRACTING PARTY, at its discretion, will make available to the CONTRACTED PARTY the facilities it deems necessary for the prompt repair of the same.
- 14.6.** If the CONTRACTED PARTY fails to take the necessary steps to replace or correct the materials and equipment within the period established in agreement with the CONTRACTING PARTY, after receiving written notice, the CONTRACTING PARTY may, at its sole discretion, replace or correct such equipment and materials as the case may be, charging the CONTRACTOR the cost of this procedure, remaining the same, for all purposes, as responsible for the perfect performance of the equipment, without altering or decreasing the general warranty provided for in this supply.
- 14.7.** The Guarantee defined herein, in no event will be altered or reduced, and approvals of drawings, inspections or inspections, exercised by the CONTRACTING PARTY, will not eliminate the CONTRACTOR's total and exclusive responsibility for the perfect quality of manufacture, the materials and services provided or provided.
- 14.8.** The CONTRACTOR shall also guarantee the provision of technical assistance and the supply of spare parts for a period of 10 (ten) years from the receipt of the equipment.
- 14.9.** The CONTRACTOR shall provide a detailed list of parts recommended for maintenance sufficient for a minimum period of 05 (five) years, containing prices and quantities, including in electronic media; the list will be informative and will not be included in the supply.
- 14.10.** The warranty must cover any and all defects in design, manufacture, assembly, performance or failure in normal operation. When the equipment or part does not meet the specified requirements, including errors or omissions on the part of the CONTRACTOR, it must be replaced at no additional cost to the CONTRACTING PARTY.

- 14.11.** The guarantee will always be independent of any and all results resulting from the tests carried out, that is, whatever the results may have been, the CONTRACTOR will be responsible for all guarantees.
- 14.12.** The acceptance by the CONTRACTING PARTY of any equipment or part of it, material or service, does not exempt the CONTRACTED PARTY from its full responsibility of all established guarantees.
- 14.13.** The warranty must cover the components supplied, in addition to any deficiency in performance, design or manufacturing defect, identified by the CONTRACTING PARTY during manufacture, transportation, inspection, assembly or testing.
- 14.14.** Defects or failures must be corrected without any burden to the CONTRACTING PARTY. All expenses arising from the supply, service and installation of new components or accessories, including transportation to the location when necessary, shall be incurred by the CONTRACTOR.
- 14.15.** The CONTRACTOR shall ensure that any components found to be defective or any abnormalities in operation will be promptly repaired and replaced during the warranty period.
- 14.16.** Corrosion and natural wear problems are not considered defects, except when such problems arise from deficiency in design or manufacture.
- 14.17.** All equipment and its components must be guaranteed by the manufacturer against defects in manufacturing and design, as well as the use of inappropriate materials.
- 14.18.** The CONTRACTED company shall provide the CONTRACTING PARTY, at the time of delivery of the team
- 14.19.** All spare parts and materials, during the Warranty period, must be new, used and refurbished items are not accepted, including accessories.
- 14.20.** The CONTRACTED PARTY must have a direct and / or electronic communication channel that allows the generation of a protocol number or other form of individual registration for the opening of technical assistance calls, through which calls can be made and problems easily solved. resolution.
- 14.21.** The Delegates or Operators of the aerodromes that will receive the equipment, object of this Technical Booklet, can directly activate the communication channels to request the opening of technical assistance calls, after having received them and given the training.
- 14.22.** The costs of shipping and returning the repaired equipment are the responsibility of the CONTRACTOR.
- 14.23.** The recovery period will be counted from the receipt of the equipment or the visit of the technician, with a definitive solution for a period not exceeding 15 (fifteen) working days.
- 14.24.** If it is not possible to recover the equipment within 15 (fifteen) business days, during the warranty period, it must be provided to replace it with equivalent or superior equipment, on a provisional basis, within a period of up to 15 (fifteen) days. Useful. If the CONTRACTOR finds the impossibility of repair within 30 (thirty) consecutive days, counting from the receipt of the equipment or visit by the technician, the replacement will become definitive, provided that the equipment is new and free of charge for the CONTRACTING PARTY.
- 14.25.** Maintenance can only be carried out by agents accredited and qualified by the CONTRACTOR.
- 14.26.** Preventive maintenance during the warranty period, if necessary, must take place during administrative hours, from 8 am to 5 pm, from Monday to Friday, explaining the day and time of the maintenance and parts of the equipment to be checked, for consideration. and authorization of the period of beginning and end of the technical intervention, as well as authorization of access by the Delegate or Operator of the Aerodrome contemplated with the equipment.

14.27. The CONTRACTOR's specialized professional, when carrying out maintenance interventions, must carry out the necessary procedures for accreditation in the locality and follow the guidelines of the local inspection, aiming not to impact on the operability of the aerodrome to be served.

14.28. In the event of 3 (three) calls, duly formalized, for problems of the same nature and for the same equipment, the CONTRACTOR must replace all the integral parts that presented defects, flaws or that defective unit (equipment), at their expense, within the maximum term 60 (sixty) days after being notified by the Aerodrome Delegate or Operator. Equipment and accessories must be replaced entirely.

15. MONITORING AND SUPERVISION

15.1. The CONTRACTING PARTY must monitor and inspect the execution of the contract in order to verify the compliance of the execution of the object of this Technical Booklet, in order to ensure its compliance.

15.2. Inspection of the provision of services will be exercised by the CONTRACTING PARTY, through the CONTRACTING PARTY'S SUPERVISION AND RECEIPT COMMISSION, in accordance with Article 67 of Law 8,666 / 93 and its amendments.

15.3. The designated SUPERVISION AND RECEIPT COMMISSION must accompany and supervise the delivery of the equipment and certify the corresponding tax documents, when the contractual provisions are complied with, for payment purposes.

15.4. The presence of the CONTRACTING PARTY's inspection does not eliminate nor diminish the responsibility of the CONTRACTED company.

15.5. The representative of the Delegate and / or Aerodrome Operator will record in his own record all occurrences related to the execution of the contractual guarantee, indicating the day, month and year, as well as the name of the employees eventually involved, determining what is necessary to rectify the failures. or defects observed and forwarding the notes to the CONTRACTOR for the appropriate measures, with notice to the CONTRACTING PARTY for follow-up.

15.6. The equipment must be delivered to the addresses indicated by the CONTRACTING PARTY, as stipulated in this Technical Booklet and in each Service Order, which will be the formal instrument for requesting deliveries, according to the quantities contained in this Technical Booklet.

15.7. All expenses for the displacement of the SUPERVISORY AND RECEIPT COMMITTEE to the place for evaluation of the sample will be borne by the CONTRACTING PARTY.

15.8. The CONTRACTOR must present the Equipment Quality Certificate, with proof that the equipment offered meets the specifications listed in this Technical Booklet and in the test methodology provided by the CONTRACTING PARTY.

15.9. The equipment must be delivered complete and ready for immediate operation, plus all devices, accessories and with complete access to all the features provided by the equipment manufacturer.

15.10. The equipment brand identification labels cannot characterize the manufacturer's advertisement, and should be limited to the discreet presentation of the manufacturer's and / or model of the equipment.

15.11. The CONTRACTOR shall obligatorily provide all materials, instruments, devices, certificates, authorizations, certificates, technical information and any other item that is necessary for the legal, full and correct operation of the object to be provided, as described in this Technical Booklet .

- 15.12.** The CONTRACTOR will be subject to the penalties provided for in the Contract Term in case of non-compliance with the deadlines provided for in this Technical Book without previous justification.
- 15.13.** THE SUPERVISION AND RECEIPT COMMITTEE will carry out the necessary tests to verify the conformity of the equipment with the specifications contained in this Technical Booklet and, if any ramp is rejected, it must be replaced within a maximum of 30 (thirty) working days, counted from the date of the rejection notice.
- 15.14.** The criteria and concepts pre-defined in this Technical Book are aimed at the lowest cost for contracting this object considering technologies available on the market, and any component or device not provided here must be subject to prior assessment for similarity, before its application.
- 15.15.** As for occupational safety and medicine, the CONTRACTOR shall design the equipment now described in this Technical Booklet, as provided for in the Regulatory Norms (NR) of Law No. 6.514, of December 22, 1977, approved by Administrative Rule No. 3,214, of June 8, 1978 from the Ministry of Labor.
- 15.16.** The CONTRACTING PARTY will not accept a subsequent claim for any service that appears in the course of the contract for the complete performance of the services / supplies, due to allegation of ignorance. The CONTRACTING PARTY will not bear any burden resulting from the failure to observe the previous conditions.
- 15.17.** Upon delivery, for each equipment, the following documents must be provided by the CONTRACTOR:
- 15.17.1. Technical catalog with the technical characteristics of the equipment offered, to assess compliance with the requirements defined in this Technical Notebook;
 - 15.17.2. Technical manuals for equipment operation and maintenance (printed and electronic file);
 - 15.17.3. Technical manuals for all accessories (printed and electronic file);
 - 15.17.4. List of parts suppliers with their respective phones, e-mails and addresses;
 - 15.17.5. Life expectancy and estimated maintenance cost for each type of equipment, year by year, separated into the cost of labor, technical material (spare parts, etc.) and consumable material (filters, lubricants, etc.). For this purpose, the operating regime of 04 (four) hours per day should be considered;
 - 15.17.6. Detailed operating and maintenance training programs, along with the instructors' curriculum.
- 15.18.** The services actually performed and accepted will be measured per unit provided.

16. FINAL PROVISIONS

- 16.1.** Modifications to the execution of services that change the essence of the contracting of services will not be allowed, as well as the presentation of justifications for the implementation of new technologies that are not properly explained as economically and technically proven.
- 16.2.** The CONTRACTOR will have full responsibility for its results, and must act proactively to guarantee the desired productivity and reliability and, consequently, the quality of the services provided, without additional burden to the CONTRACTING PARTY.
- 16.3.** During the contract, verbal communications will not be taken into account, except for the recommendations of reduced technical complexity, objective technical guidelines carried out during the execution of a certain maintenance activity or those of urgency or emergency made by the SUPERVISORY AND RECEIVING COMMITTEE.

- 16.4.** Except as provided in the previous item, all communications that involve the execution of the contract, will be considered sufficient if made in writing and delivered in the protocol of the CONTRACTING PARTY and or CONTRACTED PARTY or any other means that proves the receipt.
- 16.5.** The acceptance of the proposal presented in the bidding does not release the CONTRACTOR from responsibility for its results, so if the proposal does not have the expected effects when the contract is executed, the CONTRACTOR must act immediately to guarantee the desired productivity and reliability and, consequently, the quality services, without additional burden to the CONTRACTING PARTY.