

### **3.0 AIRPLANE PERFORMANCE**

#### **3.1 General Information**

#### **3.2 Payload/Range for 0.85 Mach Cruise**

#### **3.3 F.A.R. Takeoff Runway Length Requirements**

#### **3.4 F.A.R. Landing Runway Length Requirements**

### 3.0 AIRPLANE PERFORMANCE

#### 3.1 General Information

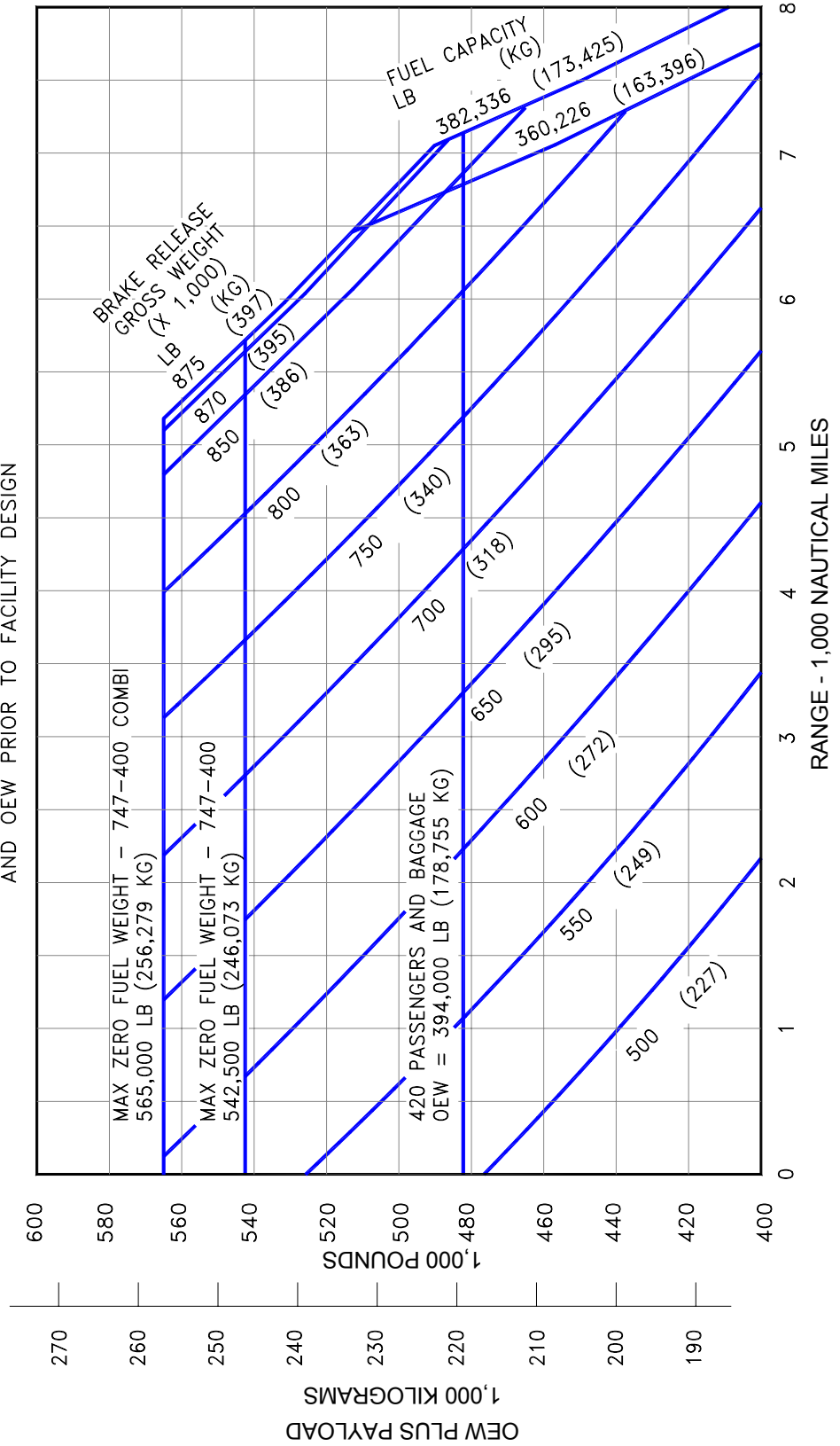
The graphs in Section 3.2 provide information on operational empty weight (OEW) and payload, trip range, brake release gross weight, and fuel limits for airplane models with the different engine options. To use these graphs, if the trip range and zero fuel weight (OEW + payload) are known, the approximate brake release weight can be found, limited by fuel quantity. Examples of loading conditions under certain OEW's are illustrated in each graph.

The graphs in Section 3.3 provide information on F.A.R. takeoff runway length requirements with the different engines at different pressure altitudes. Maximum takeoff weights shown on the graphs are the heaviest for the particular airplane models with the corresponding engines. Standard day temperatures for pressure altitudes shown on the F.A.R. takeoff graphs are given below:

PRESSURE ALTITUDE		STANDARD DAY TEMP	
FEET	METERS	°F	°C
0	0	59.0	15.00
2,000	610	51.9	11.04
4,000	1,219	44.7	7.06
6,000	1,829	37.6	3.11
8,000	2,438	30.5	-0.85
10,000	3,048	23.3	-4.81

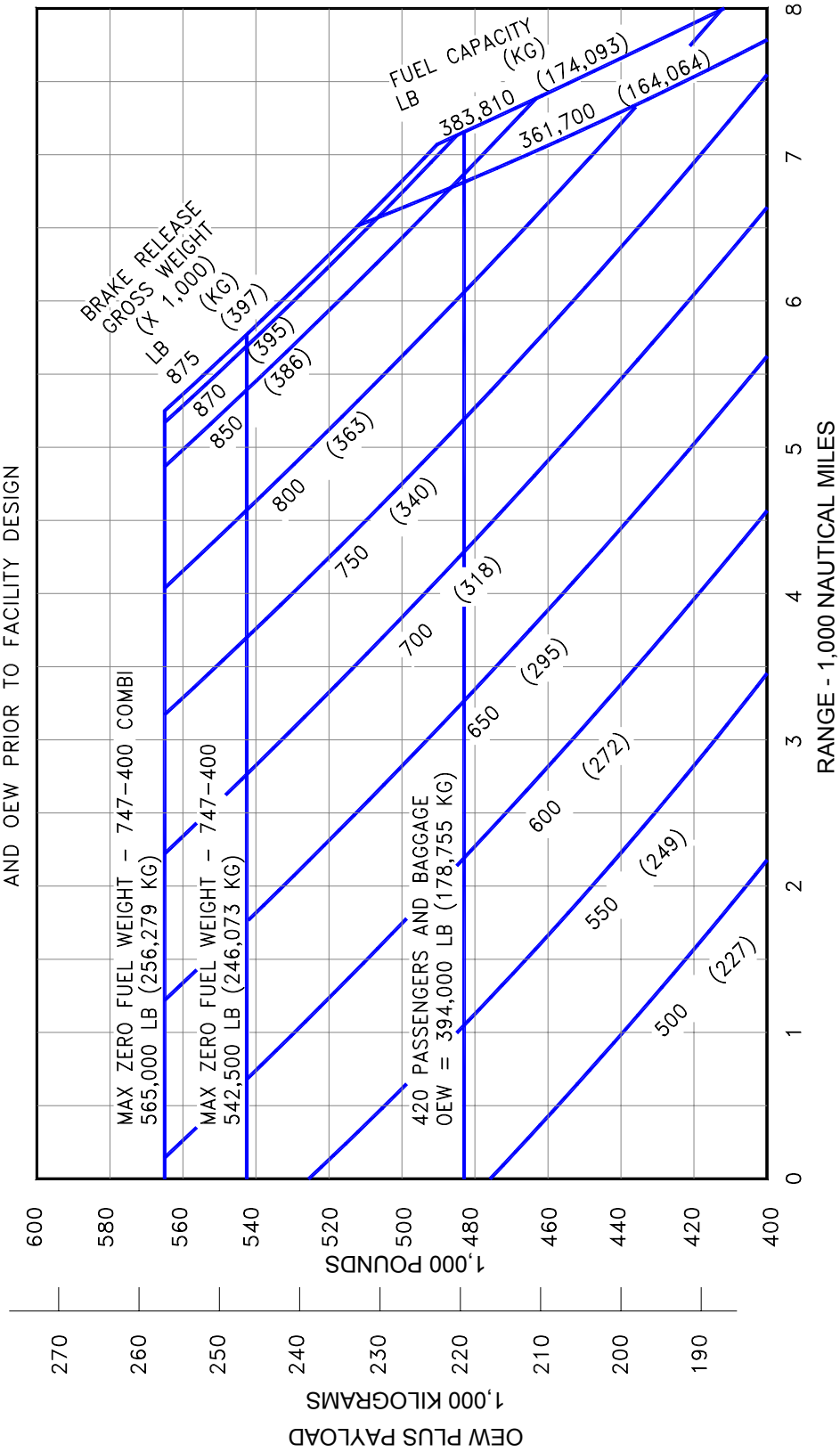
The graphs in Section 3.4 provide information on landing runway length requirements for different airplane weights and airport altitudes. The maximum landing weights shown are the heaviest for the particular airplane model.

- NOTES:
- \* STANDARD DAY
  - \* 0.85 MACH STEP CRUISE
  - \* FAR INTERNATIONAL RESERVES
  - \* 10% TRIP AIR TIME
  - \* 200-NMI ALTERNATIVE
  - \* 1/2 HOUR HOLD AT 1,500 FT
  - \* NORMAL POWER EXTRACTION AND AIR CONDITIONING BLEED
  - \* CONSULT USING AIRLINE FOR SPECIFIC OPERATING PROCEDURE AND OEW PRIOR TO FACILITY DESIGN



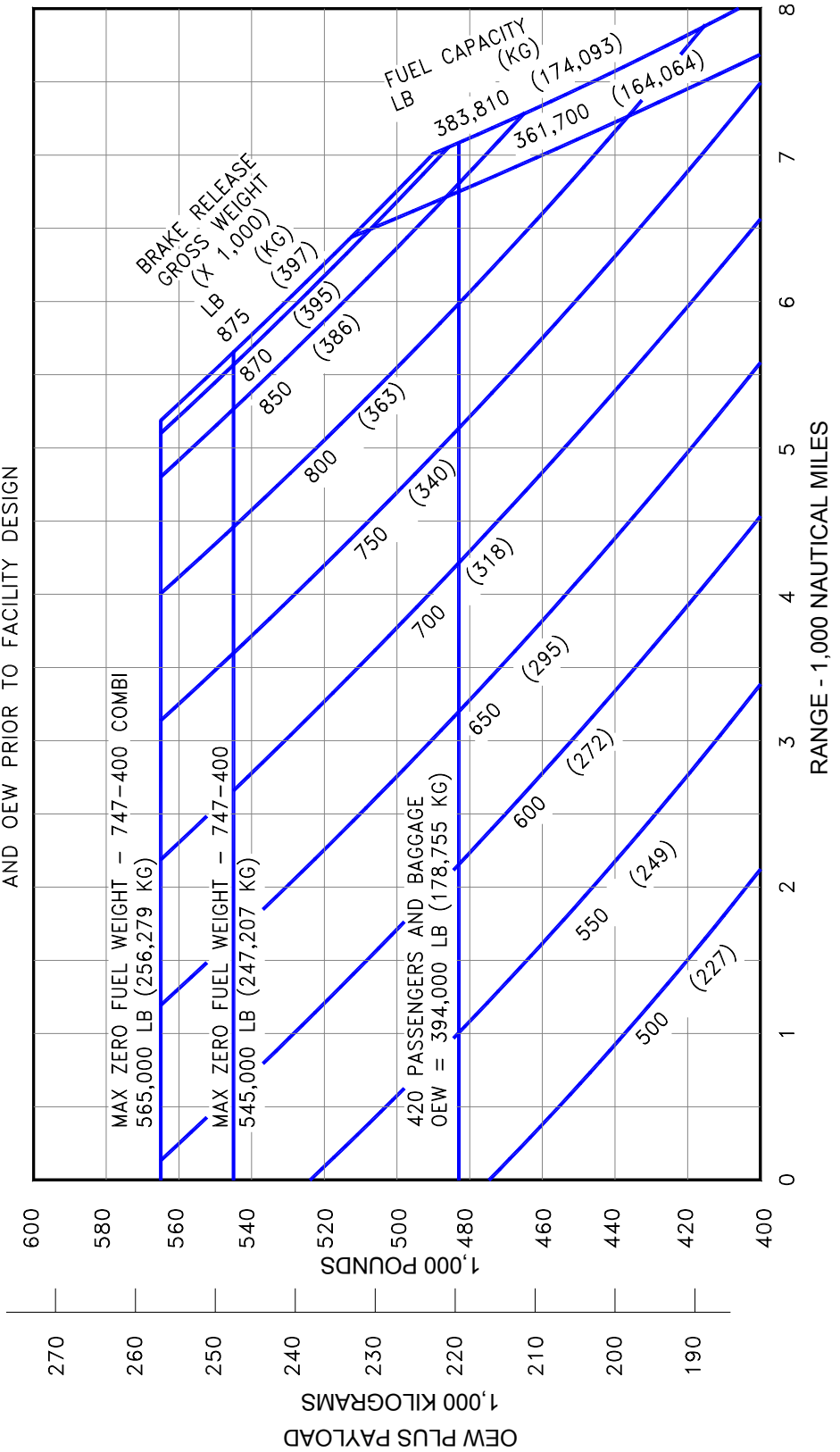
**3.2.1 PAYLOAD/RANGE FOR 0.85 MACH CRUISE**  
 MODEL 747-400, -400 COMBI (CF6-80C2B1F ENGINES)

- NOTES:
- \* STANDARD DAY
  - \* 0.85 MACH STEP CRUISE
  - \* FAR INTERNATIONAL RESERVES
  - \* 10% TRIP AIR TIME
  - \* 200-NMI ALTERNATIVE
  - \* 1/2 HOUR HOLD AT 1,500 FT
  - \* NORMAL POWER EXTRACTION AND AIR CONDITIONING BLEED
  - \* CONSULT USING AIRLINE FOR SPECIFIC OPERATING PROCEDURE AND OEW PRIOR TO FACILITY DESIGN



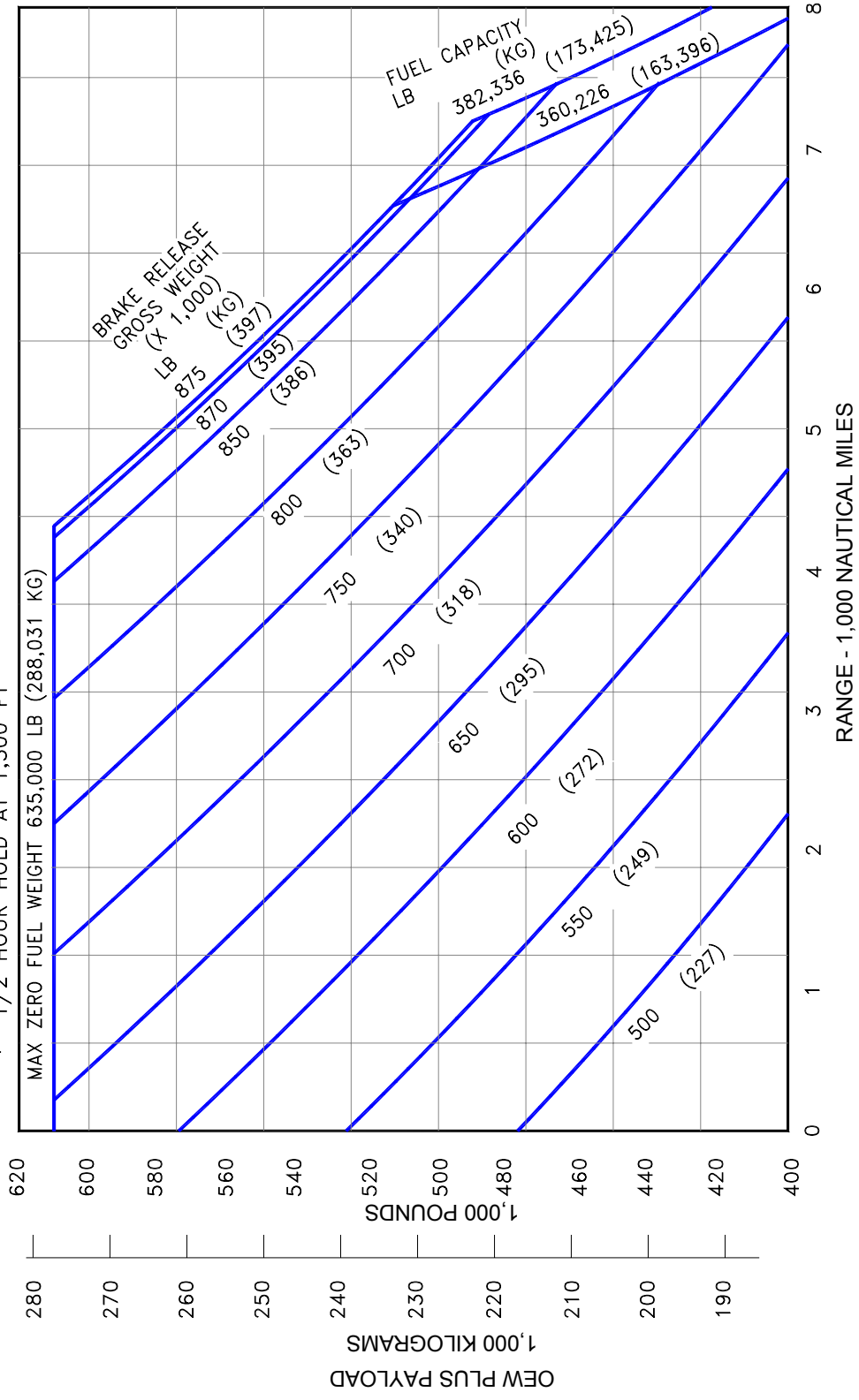
**3.2.2 PAYLOAD/RANGE FOR 0.85 MACH CRUISE**  
 MODEL 747-400, -400 COMBI (PW 4056 ENGINES)

- NOTES:
- \* STANDARD DAY
  - \* 0.85 MACH STEP CRUISE
  - \* FAR INTERNATIONAL RESERVES
  - \* 10% TRIP AIR TIME
  - \* 200-NMI ALTERNATIVE
  - \* 1/2 HOUR HOLD AT 1,500 FT
  - \* NORMAL POWER EXTRACTION AND AIR CONDITIONING BLEED
  - \* CONSULT USING AIRLINE FOR SPECIFIC OPERATING PROCEDURE AND OEW PRIOR TO FACILITY DESIGN



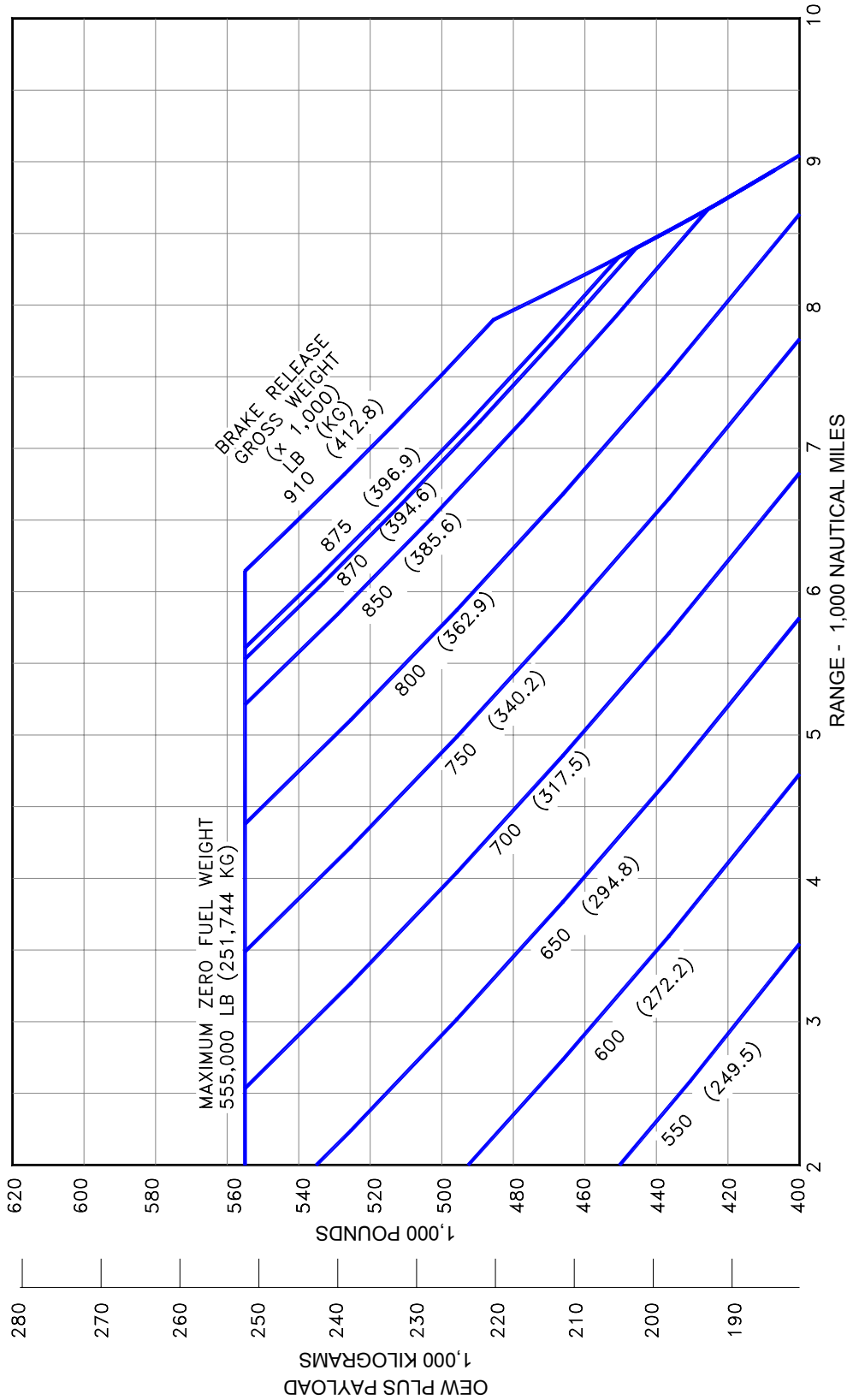
**3.2.3 PAYLOAD/RANGE FOR 0.85 MACH CRUISE**  
 MODEL 747-400, -400 COMBI (RB211-524G ENGINES)

- NOTES:
- \* STANDARD DAY
  - \* 0.84 MACH STEP CRUISE
  - \* FAR INTERNATIONAL RESERVES
  - \* 10% TRIP AIR TIME
  - \* 200-NMI ALTERNATIVE
  - \* 1/2 HOUR HOLD AT 1,500 FT
  - \* NORMAL POWER EXTRACTION AND AIR CONDITIONING BLEED
  - \* CONSULT USING AIRLINE FOR SPECIFIC OPERATING PROCEDURE AND OEW PRIOR TO FACILITY DESIGN



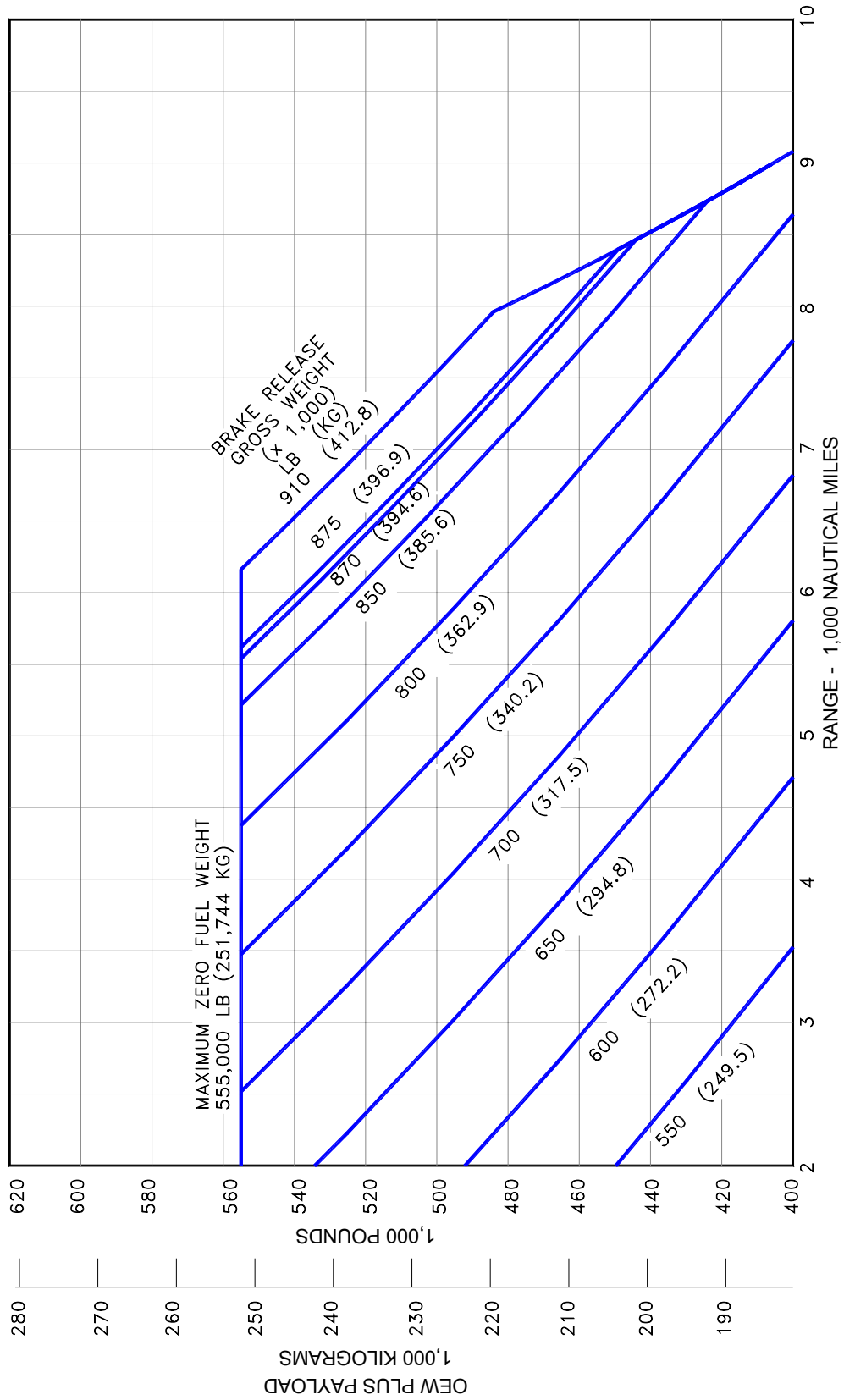
**3.2.4 PAYLOAD/RANGE FOR 0.85 MACH CRUISE**  
 MODEL 747-400 FREIGHTER (CF6-80C2B1F ENGINES)

NOTES: \* STANDARD DAY, ZERO WIND  
 \* 0.85 MACH STEP CRUISE  
 \* TYPICAL MISSION RULES  
 \* NORMAL POWER EXTRACTION AND AIR CONDITIONING BLEED  
 \* CONSULT USING AIRLINE FOR SPECIFIC OPERATING PROCEDURE  
 AND OEWR PRIOR TO FACILITY DESIGN



**3.2.5 PAYLOAD/RANGE FOR 0.85 MACH CRUISE**  
 MODEL 747-400ER (CF6-80C2B5F ENGINES)

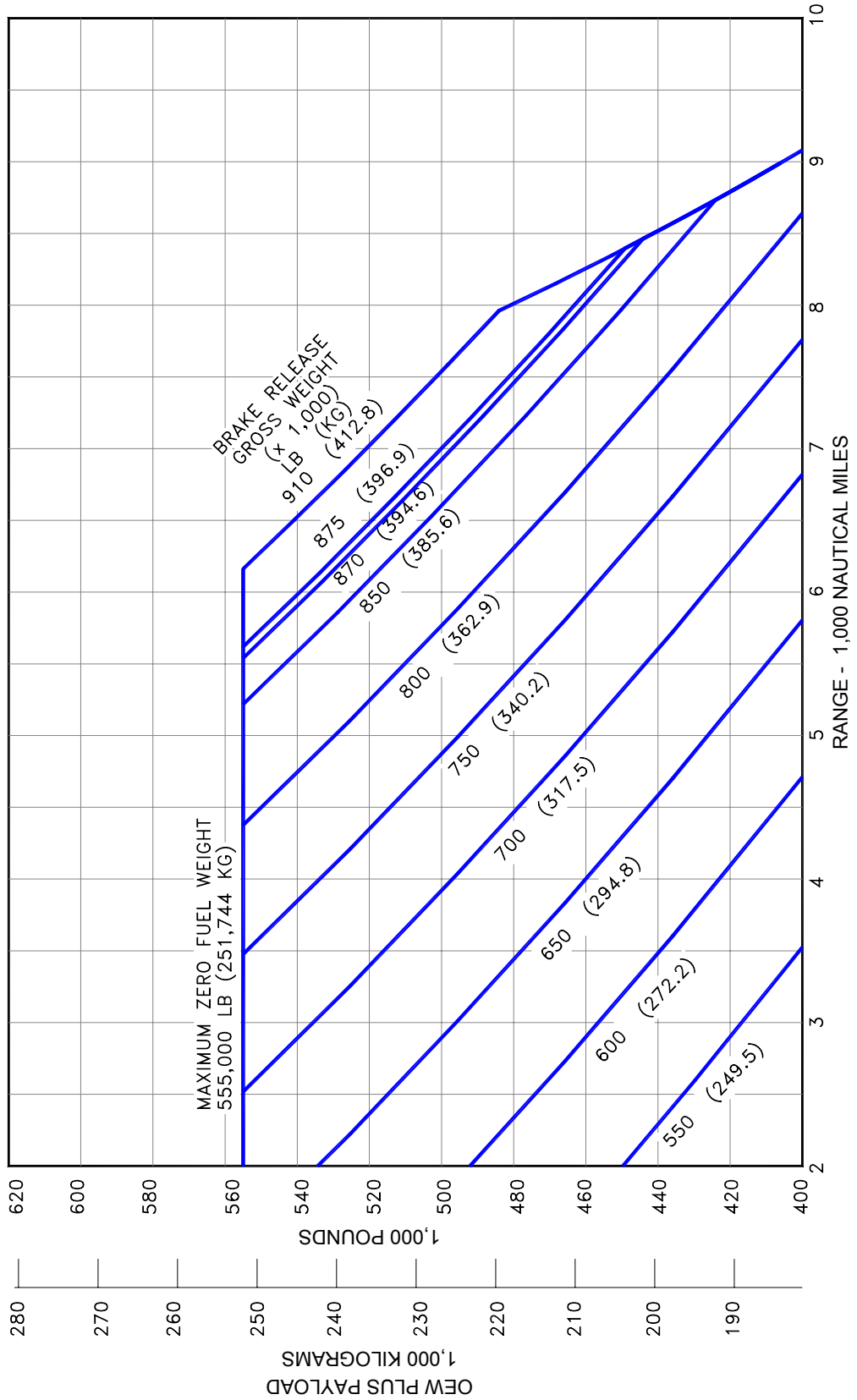
NOTES: \* STANDARD DAY, ZERO WIND  
 \* 0.85 MACH STEP CRUISE  
 \* TYPICAL MISSION RULES  
 \* NORMAL POWER EXTRACTION AND AIR CONDITIONING BLEED  
 \* CONSULT USING AIRLINE FOR SPECIFIC OPERATING PROCEDURE  
 AND OEW PRIOR TO FACILITY DESIGN



**3.2.6 PAYLOAD/RANGE FOR 0.85 MACH CRUISE**  
 MODEL 747-400ER (PW 4062 ENGINES)

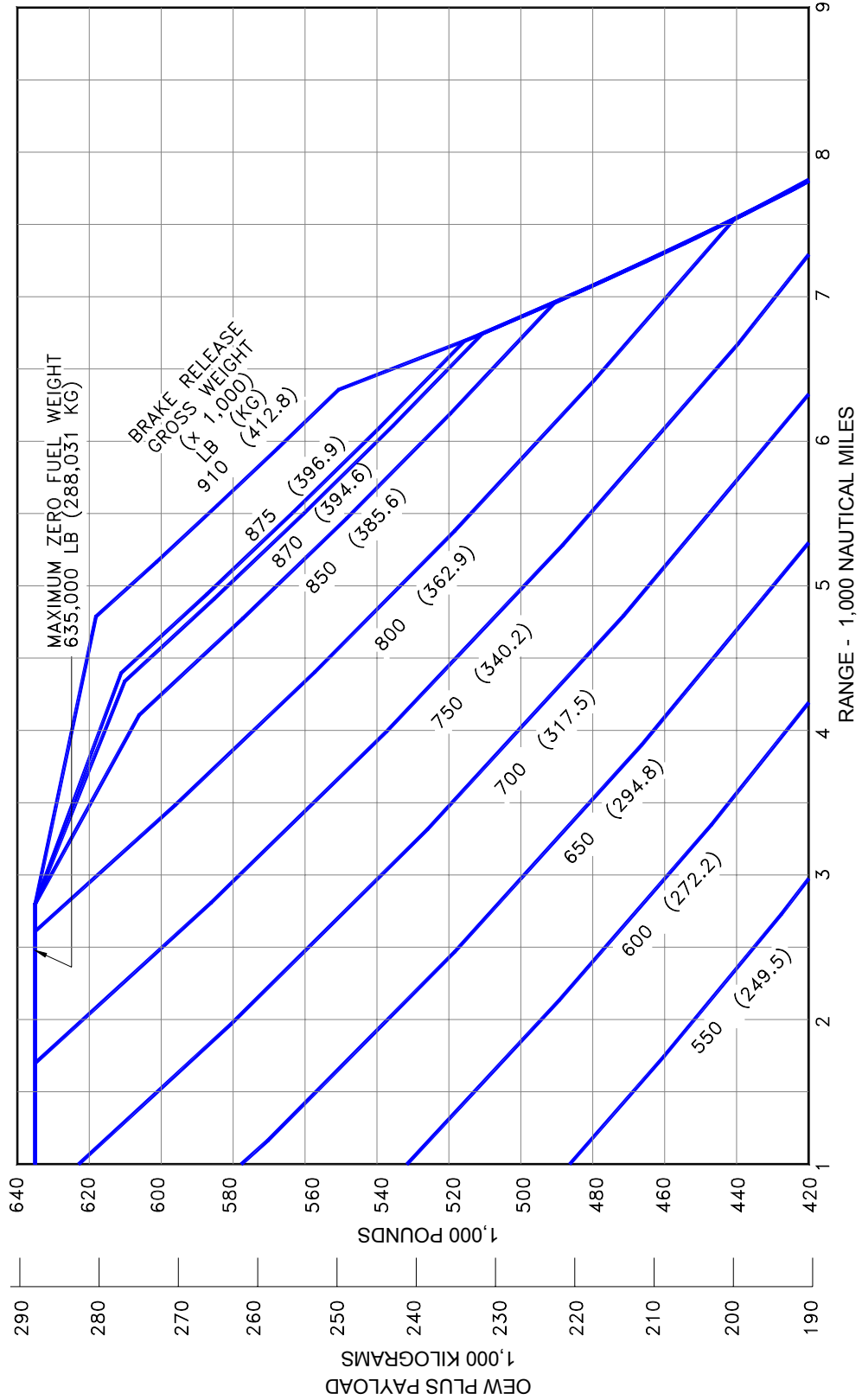


NOTES: \* STANDARD DAY, ZERO WIND  
 \* 0.85 MACH STEP CRUISE  
 \* TYPICAL MISSION RULES  
 \* NORMAL POWER EXTRACTION AND AIR CONDITIONING BLEED  
 \* CONSULT USING AIRLINE FOR SPECIFIC OPERATING PROCEDURE  
 AND OEW PRIOR TO FACILITY DESIGN



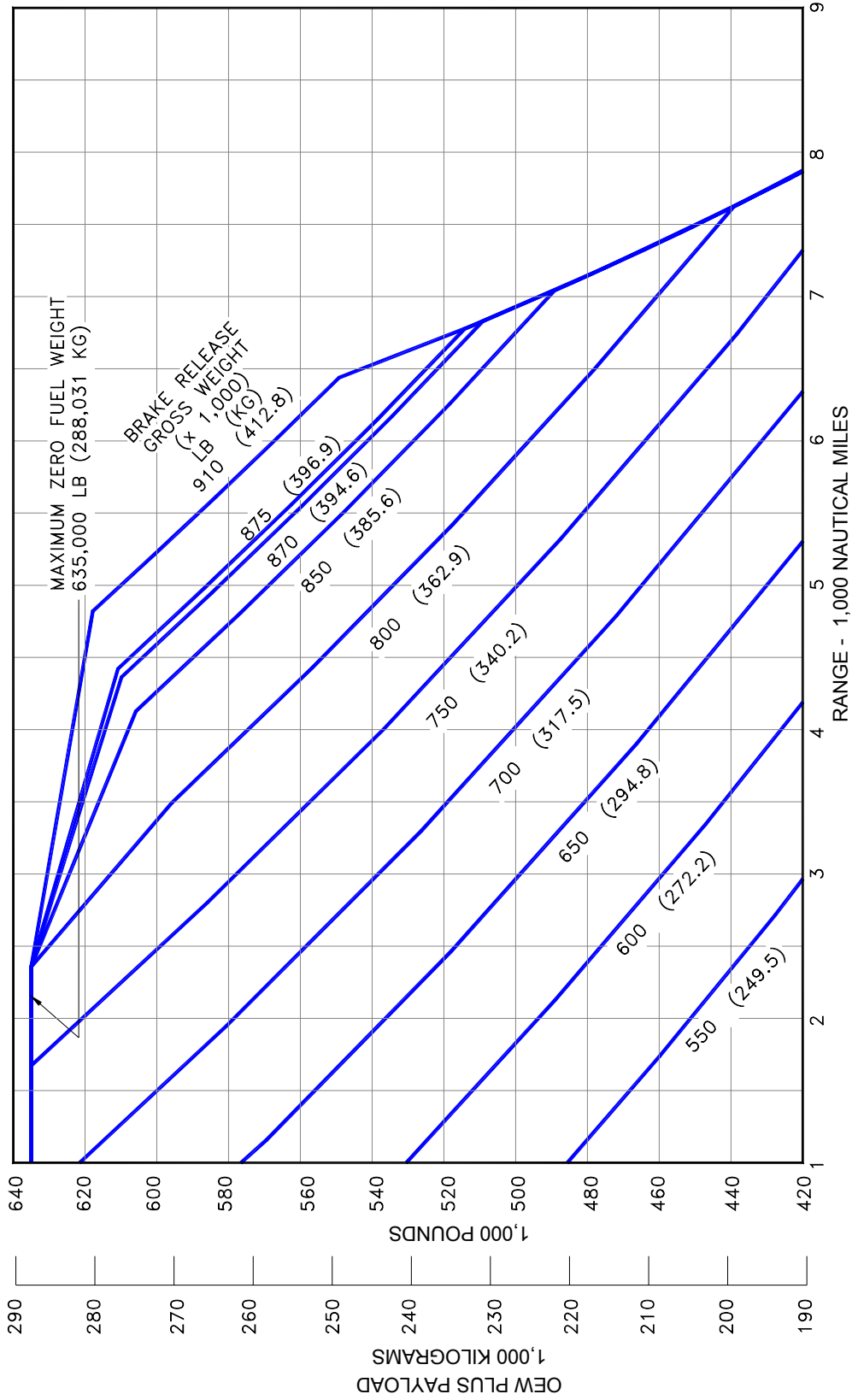
**3.2.7 PAYLOAD/RANGE FOR 0.85 MACH CRUISE**  
 MODEL 747-400ER (RB211-524H8-T ENGINES)

- NOTES: \* STANDARD DAY, ZERO WIND  
 \* 0.85 MACH STEP CRUISE  
 \* TYPICAL MISSION RULES  
 \* NORMAL POWER EXTRACTION AND AIR CONDITIONING BLEED  
 \* CONSULT USING AIRLINE FOR SPECIFIC OPERATING PROCEDURE  
 \* AND OEI PRIOR TO FACILITY DESIGN



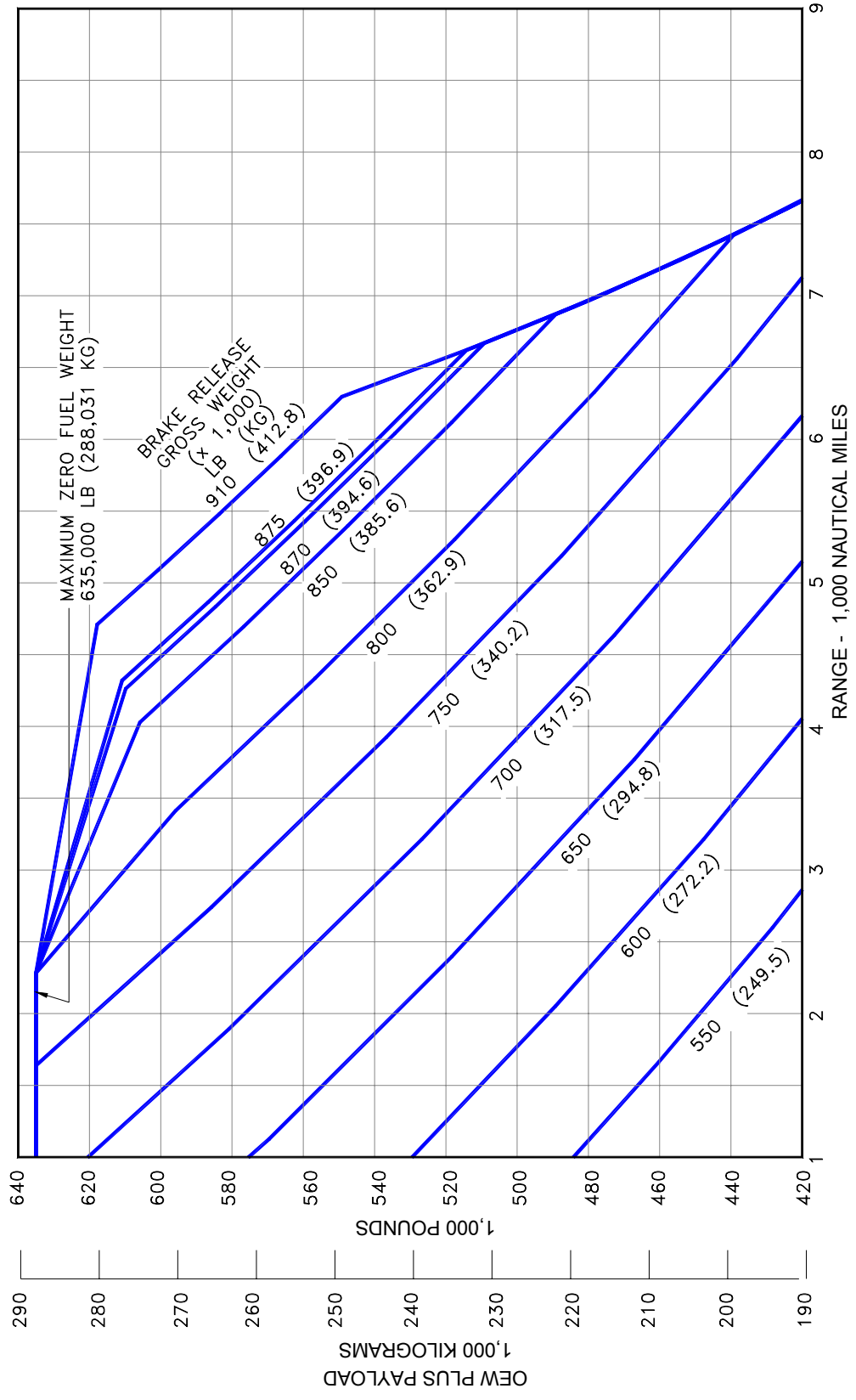
**3.2.8 PAYLOAD/RANGE FOR 0.85 MACH CRUISE**  
 MODEL 747-400ER FREIGHTER (CF6-80C2B5F ENGINES)

NOTES: \* STANDARD DAY, ZERO WIND  
 \* 0.85 MACH STEP CRUISE  
 \* TYPICAL MISSION RULES  
 \* NORMAL POWER EXTRACTION AND AIR CONDITIONING BLEED  
 \* CONSULT USING AIRLINE FOR SPECIFIC OPERATING PROCEDURE  
 AND OEW PRIOR TO FACILITY DESIGN



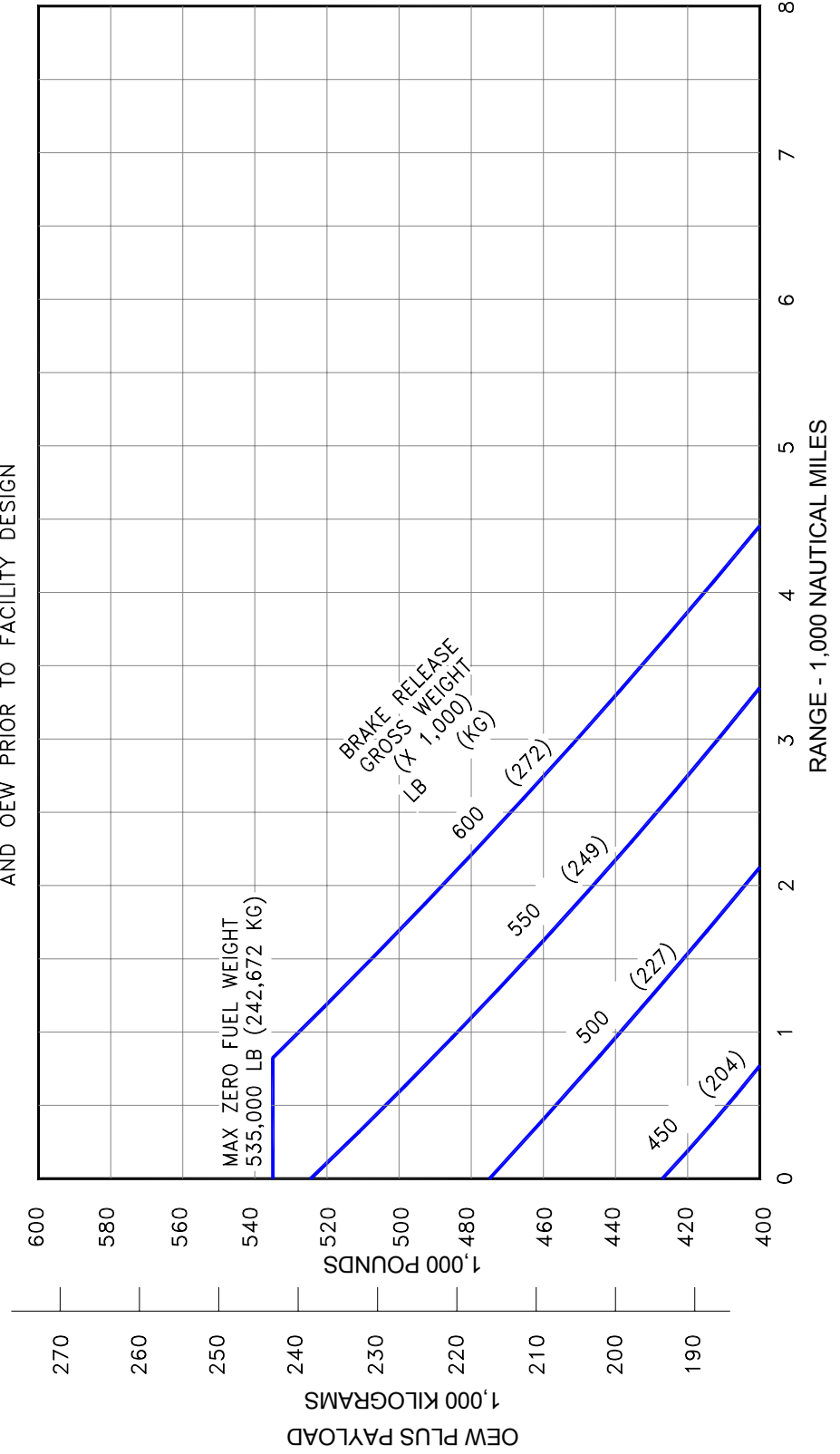
**3.2.9 PAYLOAD/RANGE FOR 0.85 MACH CRUISE**  
 MODEL 747-400ER FREIGHTER (PW4062 ENGINES)

NOTES: \* STANDARD DAY, ZERO WIND  
 \* 0.85 MACH STEP CRUISE  
 \* TYPICAL MISSION RULES  
 \* NORMAL POWER EXTRACTION AND AIR CONDITIONING BLEED  
 \* CONSULT USING AIRLINE FOR SPECIFIC OPERATING PROCEDURE  
 \* AND OEW PRIOR TO FACILITY DESIGN



**3.2.10 PAYLOAD/RANGE FOR 0.85 MACH CRUISE**  
 MODEL 747-400ER FREIGHTER (RB211-524H8-T ENGINES)

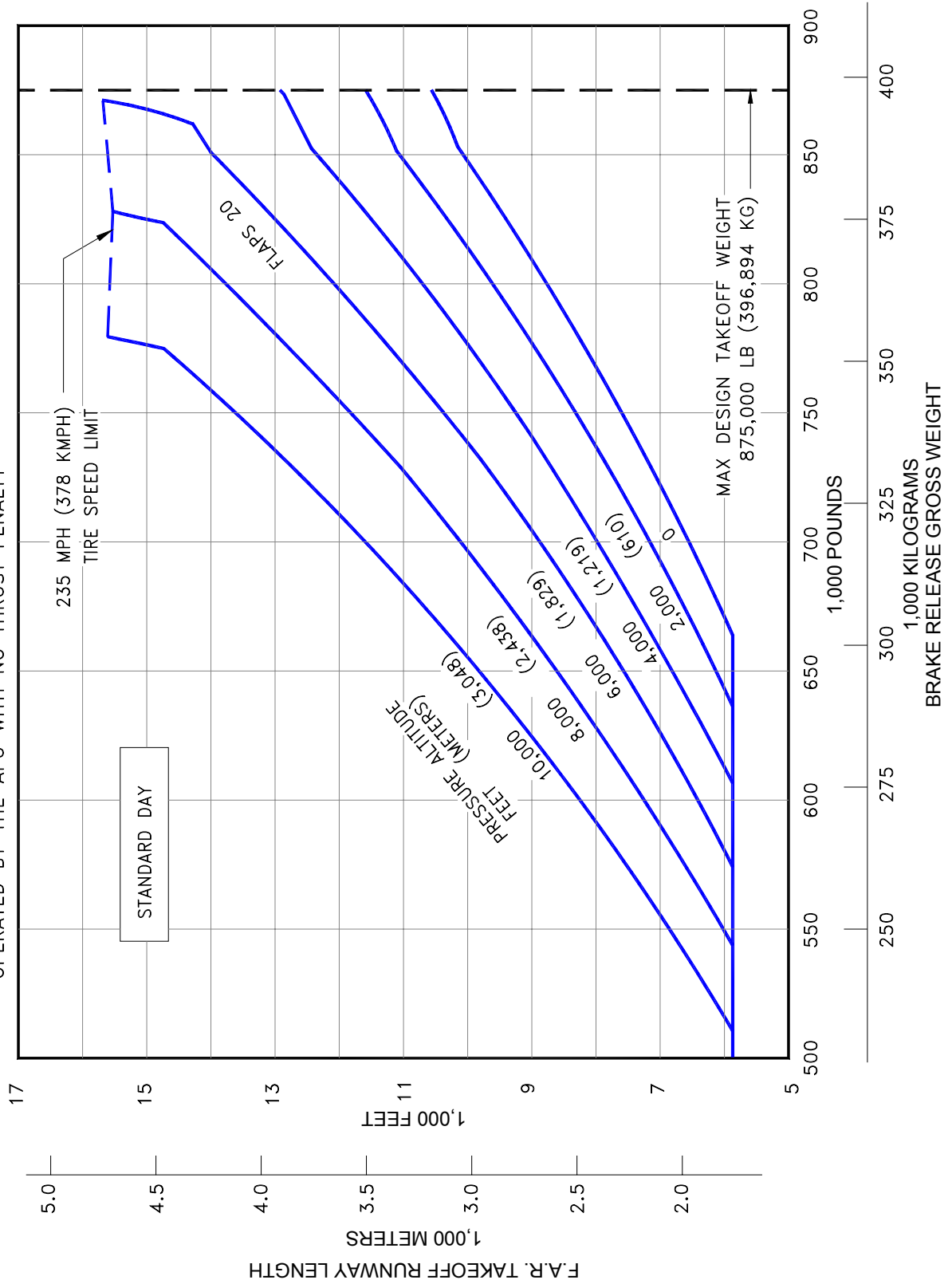
- NOTES:
- \* STANDARD DAY
  - \* 0.84 MACH STEP CRUISE
  - \* FAR INTERNATIONAL RESERVES
  - \* 10% TRIP AIR TIME
  - \* 200-NMI ALTERNATIVE
  - \* 1/2 HOUR HOLD AT 1,500 FT
  - \* NORMAL POWER EXTRACTION AND AIR CONDITIONING BLEED
  - \* CONSULT USING AIRLINE FOR SPECIFIC OPERATING PROCEDURE AND OEWS PRIOR TO FACILITY DESIGN



**3.2.11 PAYLOAD/RANGE FOR 0.84 MACH CRUISE**  
 MODEL 747-400 DOMESTIC (CF6-80C2B1F ENGINES)

NOTES:

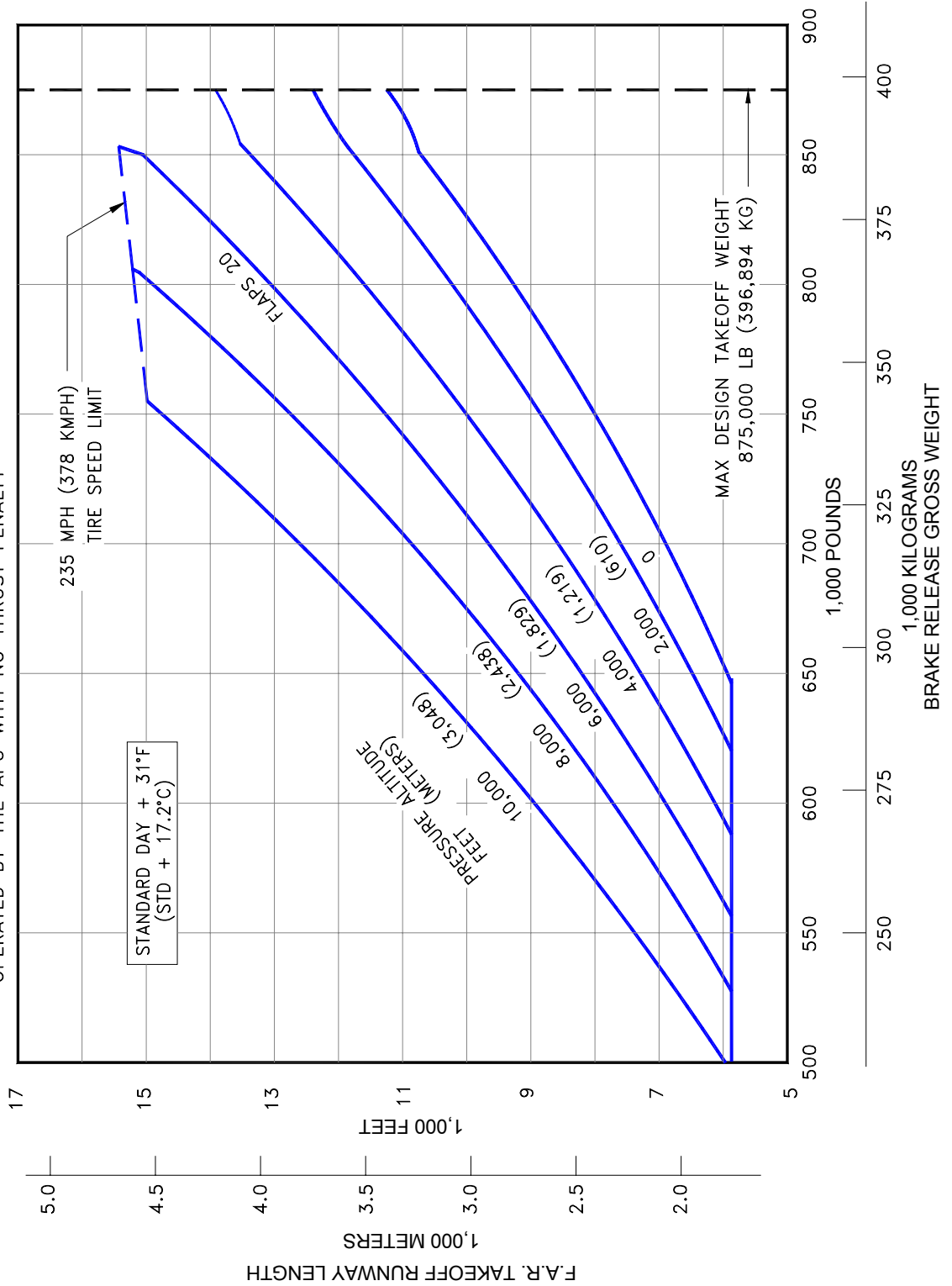
- \* CONSULT USING AIRLINE FOR SPECIFIC OPERATING PROCEDURE AND OEW PRIOR TO FACILITY DESIGN
- \* AIR CONDITIONING OFF. ONE PACK MAY BE OPERATED BY THE APU WITH NO THRUST PENALTY
- \* ZERO RUNWAY GRADIENT
- \* ZERO WIND



**3.3.1 F.A.R. TAKEOFF RUNWAY LENGTH REQUIREMENTS - STANDARD DAY**  
 MODEL 747-400 (CF6-80C2B1 ENGINES)

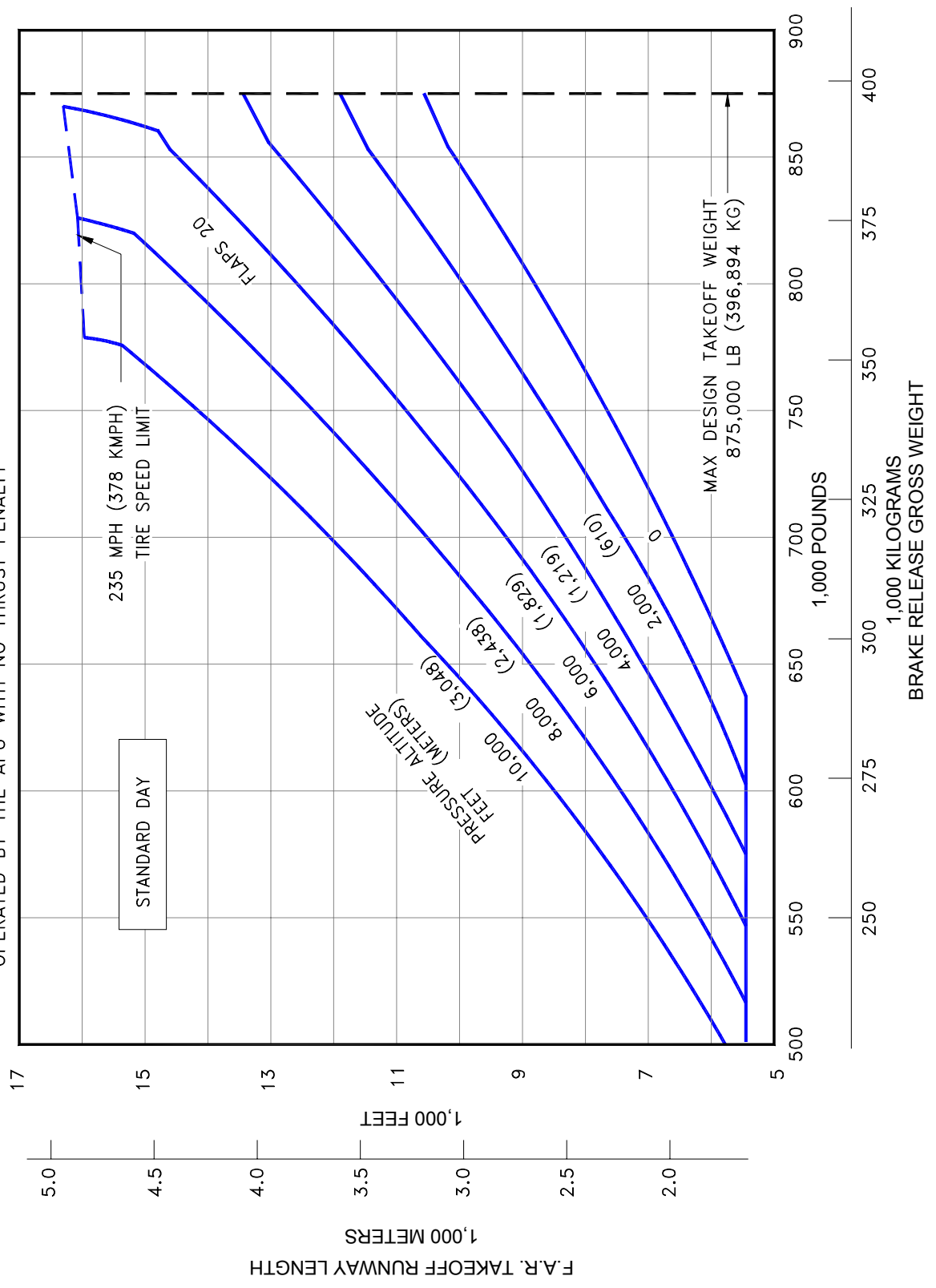
NOTES:

- \* CONSULT USING AIRLINE FOR SPECIFIC OPERATING PROCEDURE \* ZERO RUNWAY GRADIENT
- AND OEW PRIOR TO FACILITY DESIGN \* ZERO WIND
- \* AIR CONDITIONING OFF. ONE PACK MAY BE OPERATED BY THE APU WITH NO THRUST PENALTY



**3.3.2 F.A.R. TAKEOFF RUNWAY LENGTH REQUIREMENTS -**  
**STANDARD DAY +31°F (STD + 17.2°C)**  
 MODEL 747-400 (CF6-80C2B1 ENGINES)

NOTES:  
 \* CONSULT USING AIRLINE FOR SPECIFIC OPERATING PROCEDURE \* ZERO RUNWAY GRADIENT  
 AND OEW PRIOR TO FACILITY DESIGN \* ZERO WIND  
 \* AIR CONDITIONING OFF. ONE PACK MAY BE OPERATED BY THE APU WITH NO THRUST PENALTY

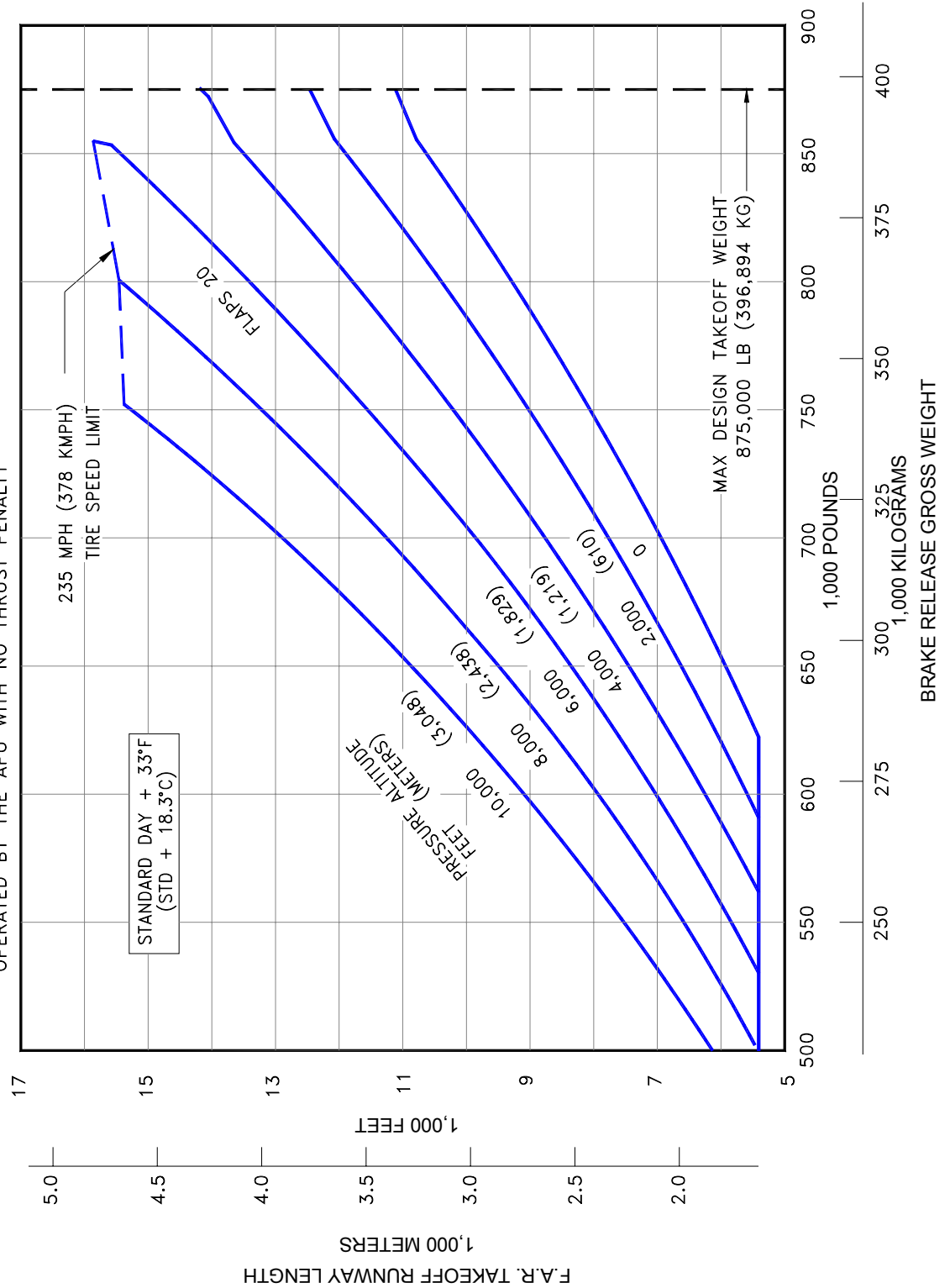


**3.3.3 F.A.R. TAKEOFF RUNWAY LENGTH REQUIREMENTS - STANDARD DAY**  
 MODEL 747-400 (PW-4056 ENGINES)



NOTES:

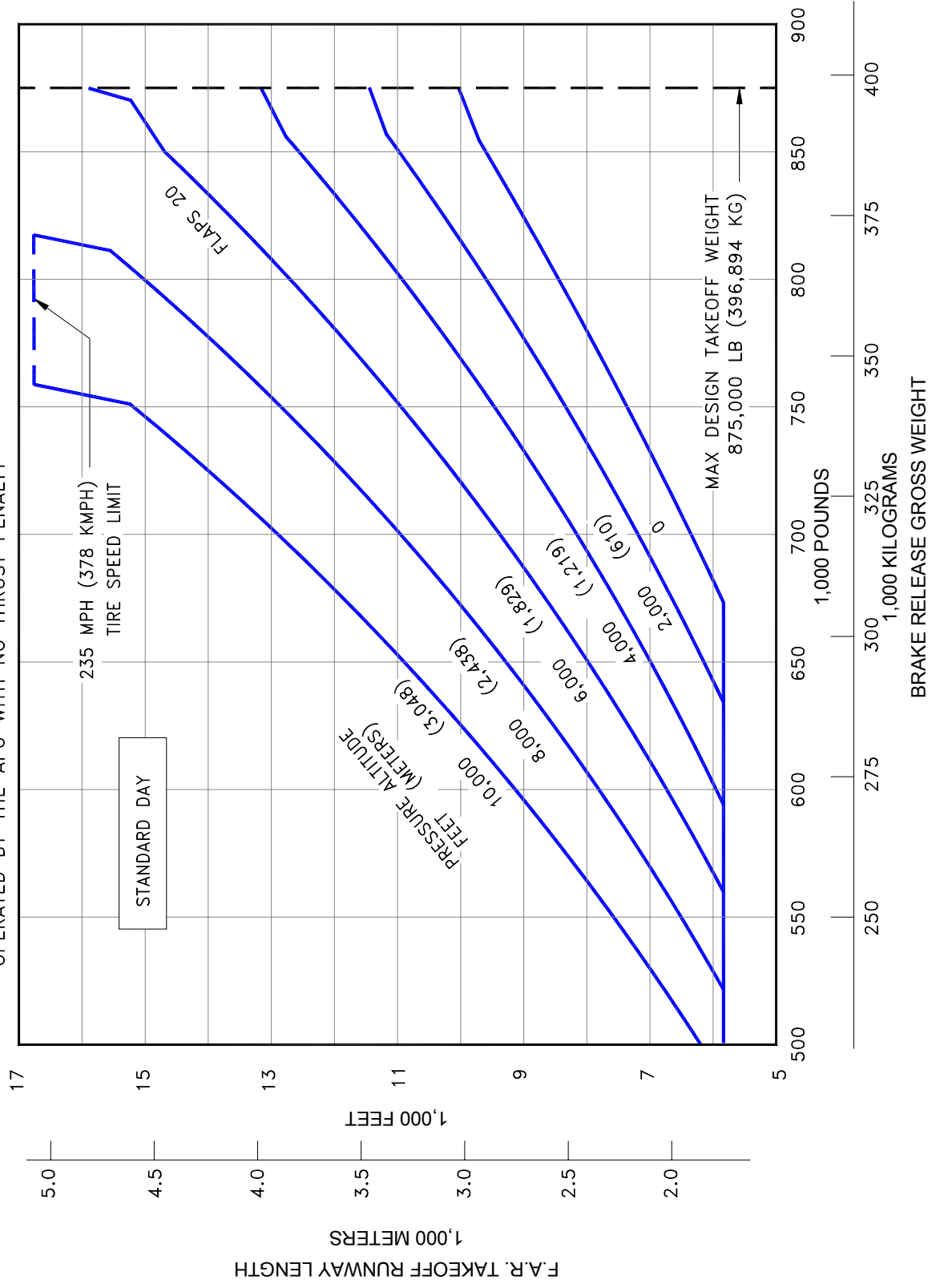
- \* CONSULT USING AIRLINE FOR SPECIFIC OPERATING PROCEDURE \* ZERO RUNWAY GRADIENT
- AND OEW PRIOR TO FACILITY DESIGN \* ZERO WIND
- \* AIR CONDITIONING OFF. ONE PACK MAY BE OPERATED BY THE APU WITH NO THRUST PENALTY



**3.3.4 F.A.R. TAKEOFF RUNWAY LENGTH REQUIREMENTS -**  
**STANDARD DAY +33°F (STD + 18.3°C)**  
 MODEL 747-400 (PW4056 ENGINES)

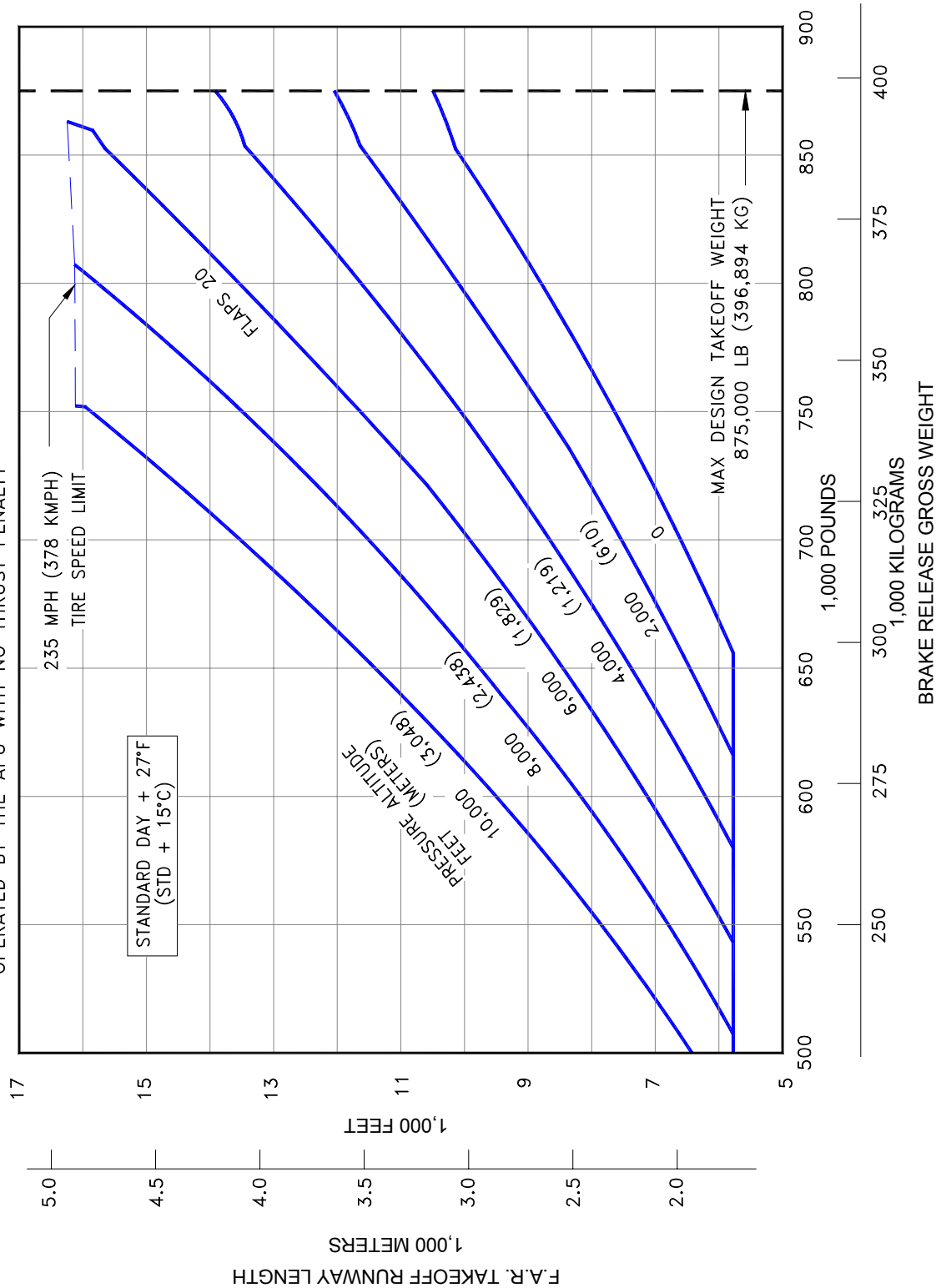
NOTES:

- \* CONSULT USING AIRLINE FOR SPECIFIC OPERATING PROCEDURE AND OEW PRIOR TO FACILITY DESIGN
- \* AIR CONDITIONING OFF. ONE PACK MAY BE OPERATED BY THE APU WITH NO THRUST PENALTY
- \* ZERO RUNWAY GRADIENT
- \* ZERO WIND



**3.3.5 F.A.R. TAKEOFF RUNWAY LENGTH REQUIREMENTS - STANDARD DAY**  
 MODEL 747-400 (RB211-524G2 ENGINES)

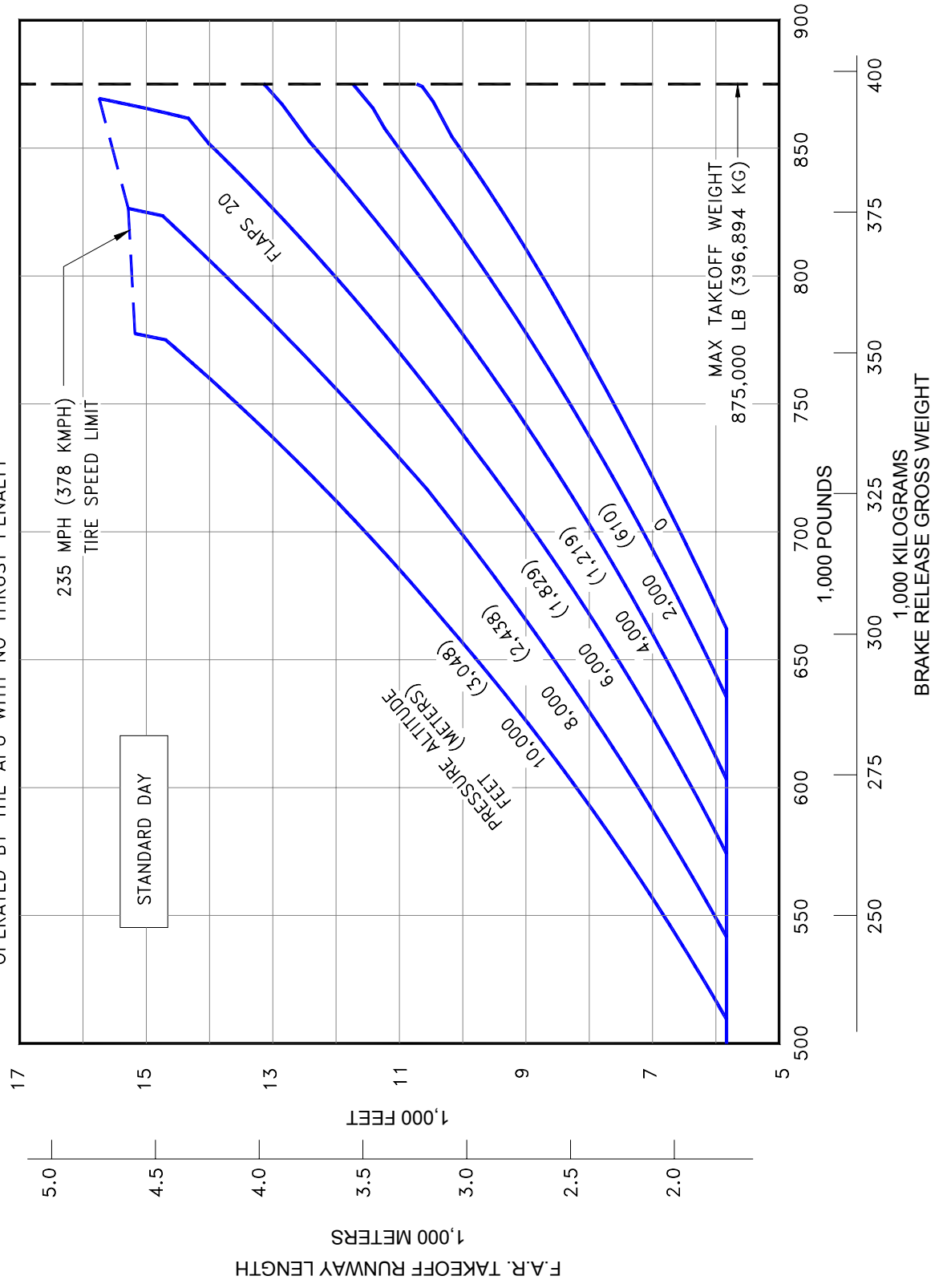
- NOTES:
- \* CONSULT USING AIRLINE FOR SPECIFIC OPERATING PROCEDURE \* ZERO RUNWAY GRADIENT
  - AND OEI PRIORITY TO FACILITY DESIGN \* ZERO WIND
  - \* AIR CONDITIONING OFF. ONE PACK MAY BE OPERATED BY THE APU WITH NO THRUST PENALTY



**3.3.6 F.A.R. TAKEOFF RUNWAY LENGTH REQUIREMENTS -  
STANDARD DAY +27°F (STD + 15°C)  
MODEL 747-400 (RB211-524G2 ENGINES)**

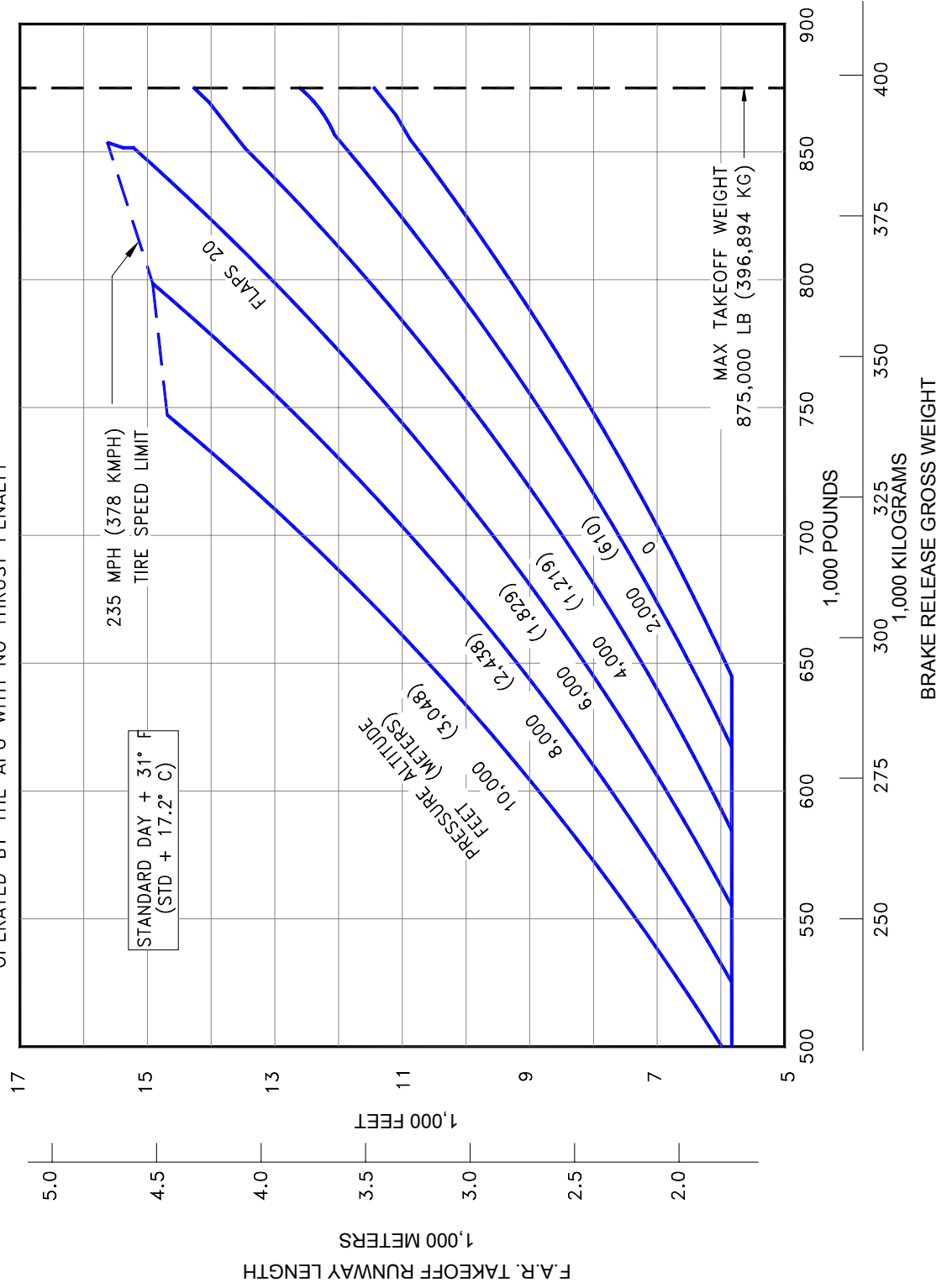
**NOTES:**

- \* CONSULT USING AIRLINE FOR SPECIFIC OPERATING PROCEDURE AND OEI TO FACILITY DESIGN
- \* AIR CONDITIONING OFF. ONE PACK MAY BE OPERATED BY THE APU WITH NO THRUST PENALTY
- \* ZERO RUNWAY GRADIENT
- \* ZERO WIND



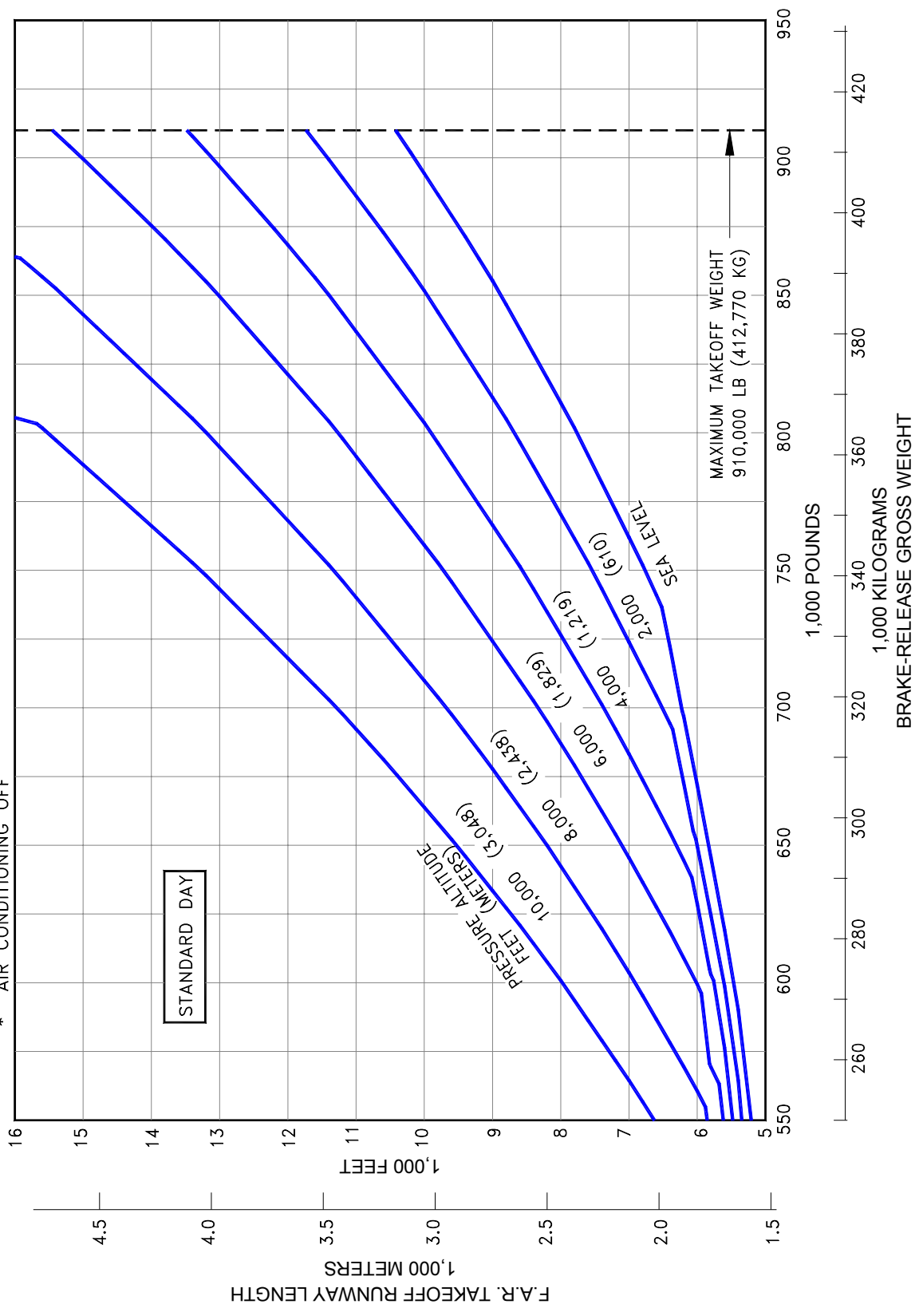
**3.3.7 F.A.R. TAKEOFF RUNWAY LENGTH REQUIREMENTS - STANDARD DAY**  
 MODEL 747-400 FREIGHTER (CF6-80C2B1 ENGINES)

NOTES:  
 \* CONSULT USING AIRLINE FOR SPECIFIC OPERATING PROCEDURE \* ZERO RUNWAY GRADIENT  
 AND OEI PRIOR TO FACILITY DESIGN \* ZERO WIND  
 \* AIR CONDITIONING OFF. ONE PACK MAY BE OPERATED BY THE APU WITH NO THRUST PENALTY



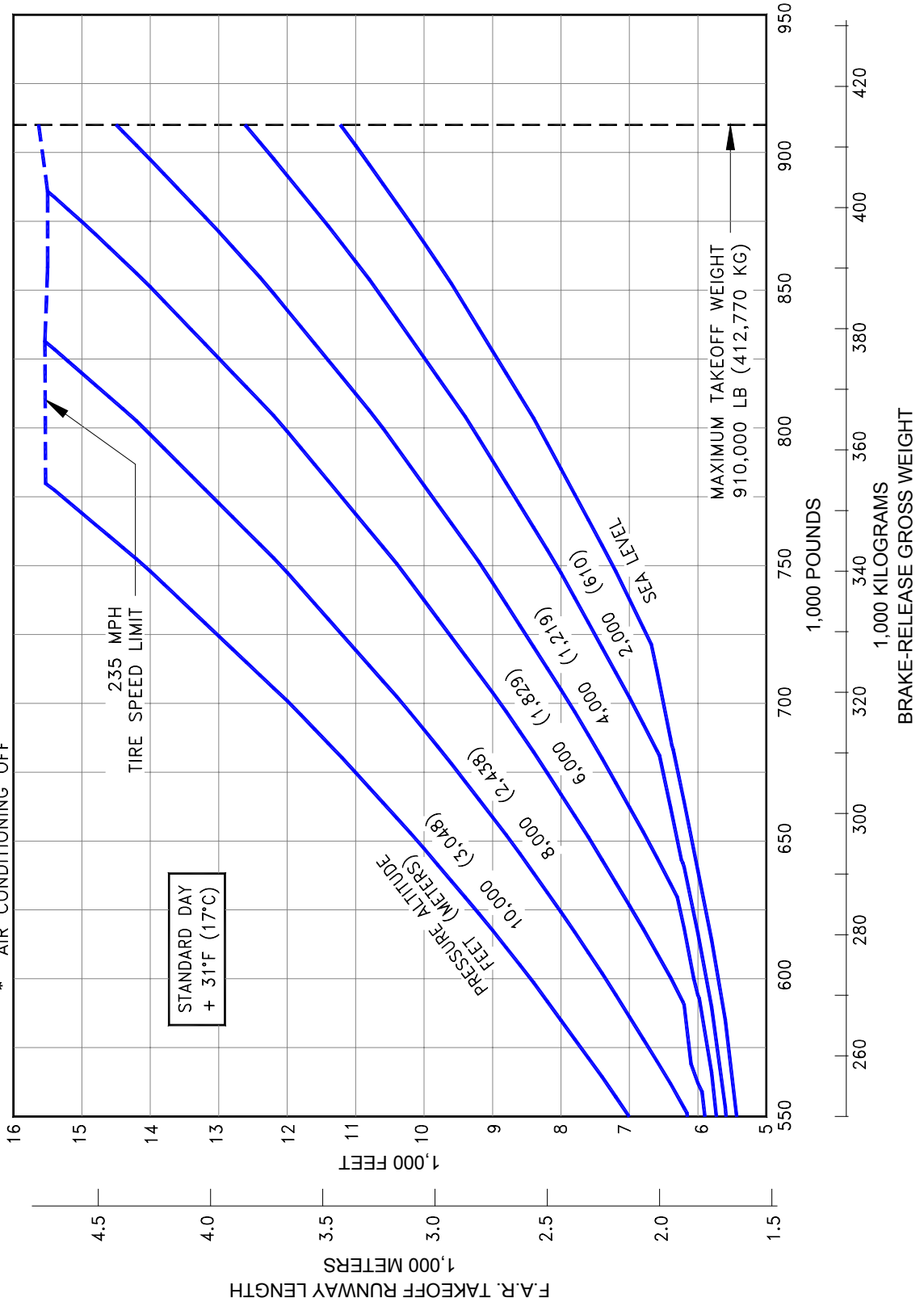
**3.3.8 F.A.R. TAKEOFF RUNWAY LENGTH REQUIREMENTS -**  
**STANDARD DAY +31°F (STD + 17.2°C)**  
 MODEL 747-400 FREIGHTER (CF6-80C2B1 ENGINES)

NOTES:  
 \* CONSULT USING AIRLINE FOR SPECIFIC OPERATING PROCEDURE PRIOR TO FACILITY DESIGN  
 \* AIR CONDITIONING OFF  
 \* ZERO RUNWAY GRADIENT  
 \* ZERO WIND



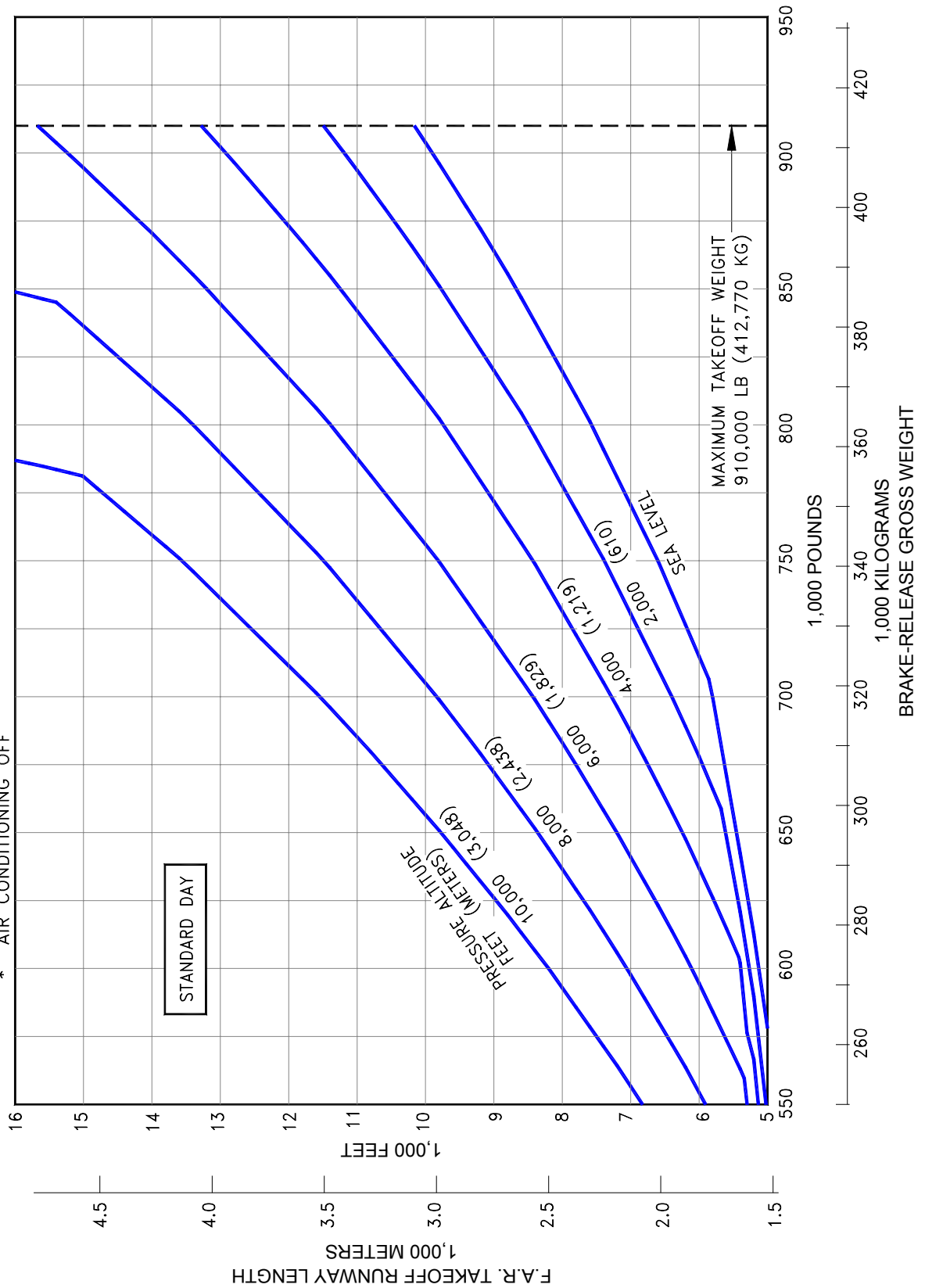
**3.3.9 F.A.R. TAKEOFF RUNWAY LENGTH REQUIREMENTS - STANDARD DAY**  
 MODEL 747-400ER (CF6-80C2B5F ENGINES)

NOTES:  
 \* CONSULT USING AIRLINE FOR SPECIFIC OPERATING PROCEDURE PRIOR TO FACILITY DESIGN  
 \* AIR CONDITIONING OFF  
 \* ZERO RUNWAY GRADIENT  
 \* ZERO WIND



**3.3.10 F.A.R. TAKEOFF RUNWAY LENGTH REQUIREMENTS - STANDARD DAY + 31°F (STD + 17°C)**  
 MODEL 747-400ER (CF6-80C2B5F ENGINES)

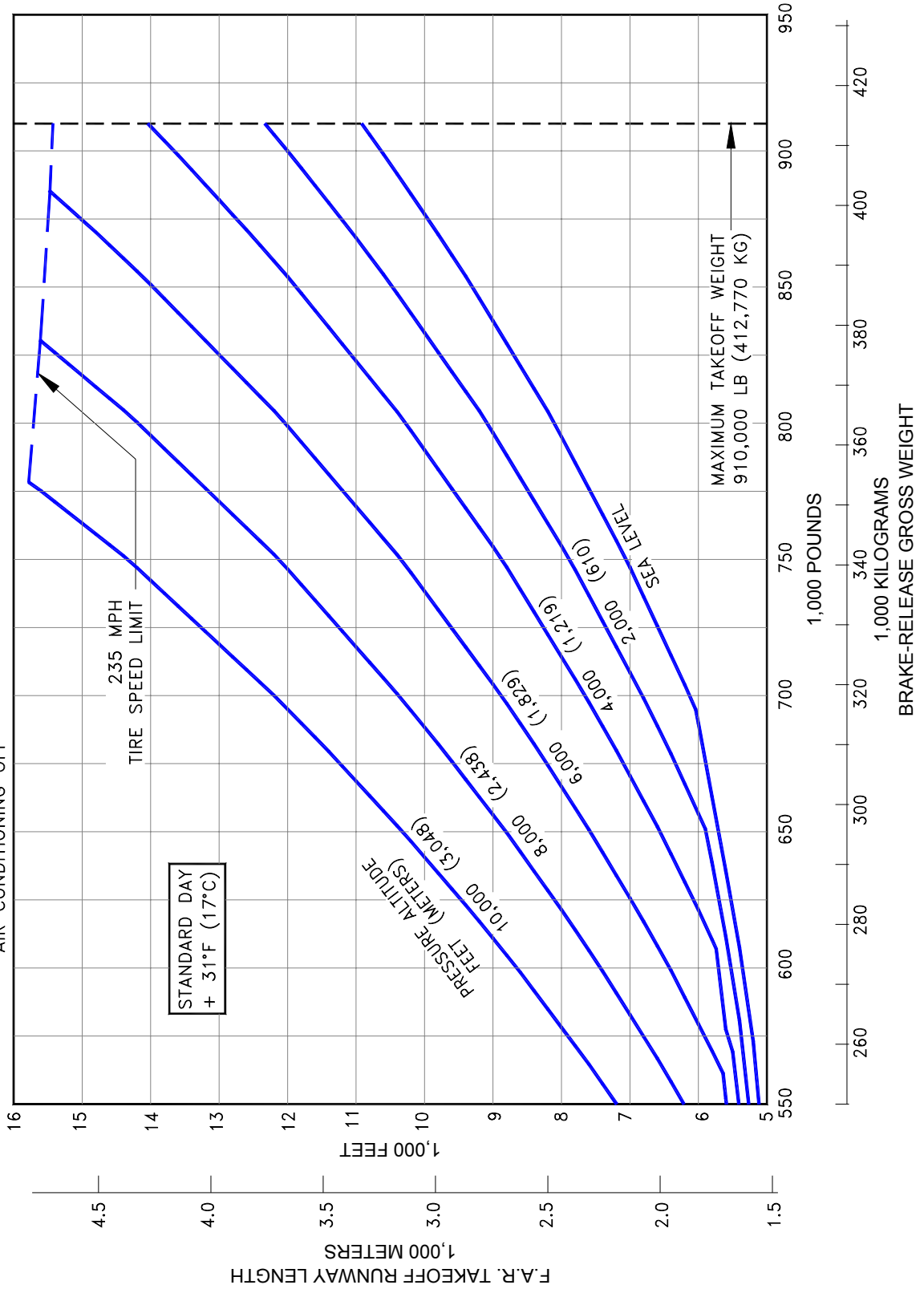
NOTES:  
 \* CONSULT USING AIRLINE FOR SPECIFIC OPERATING PROCEDURE PRIOR TO FACILITY DESIGN  
 \* AIR CONDITIONING OFF  
 \* ZERO RUNWAY GRADIENT  
 \* ZERO WIND



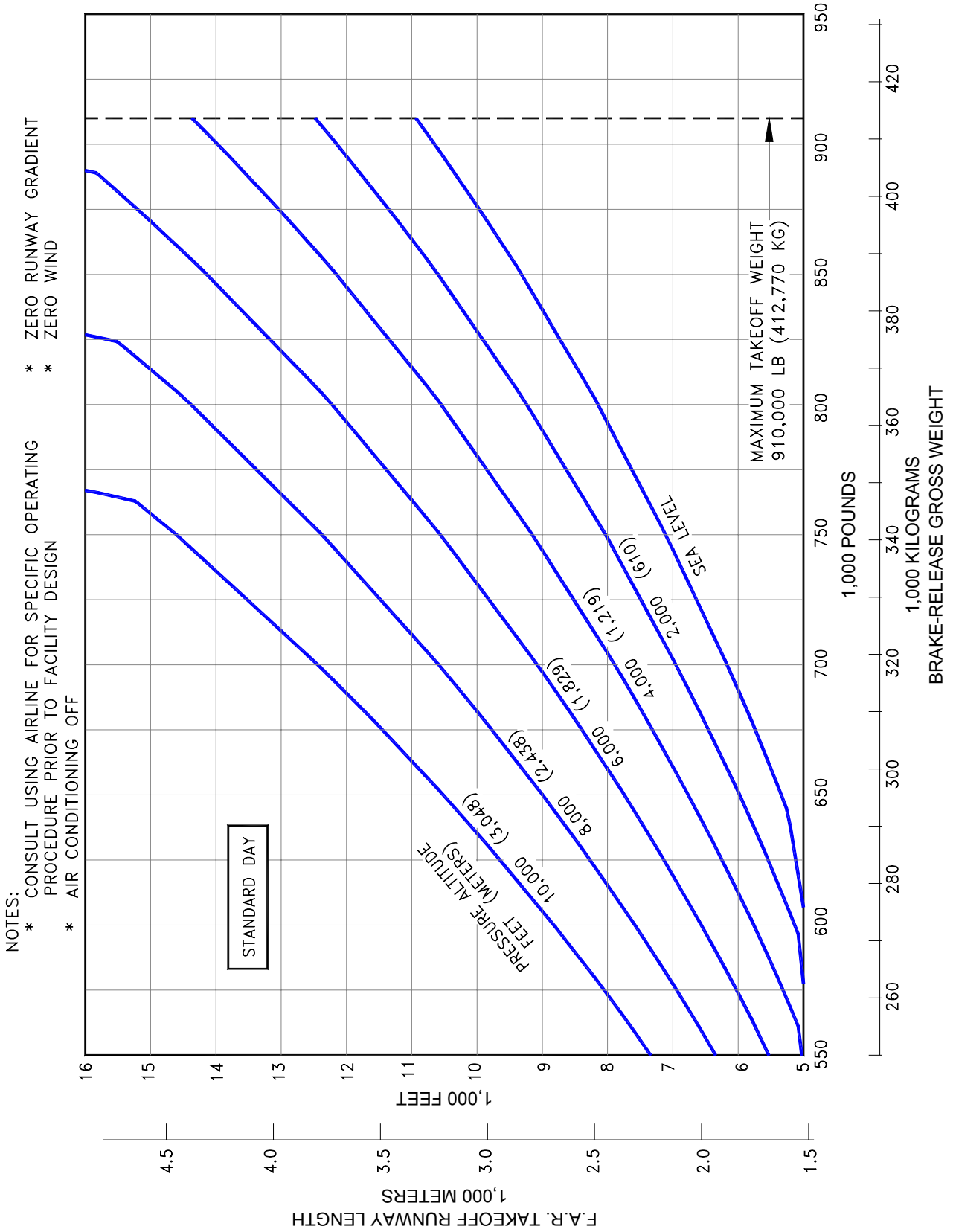
**3.3.11 F.A.R. TAKEOFF RUNWAY LENGTH REQUIREMENTS - STANDARD DAY**  
 MODEL 747-400ER (PW-4062 ENGINES)



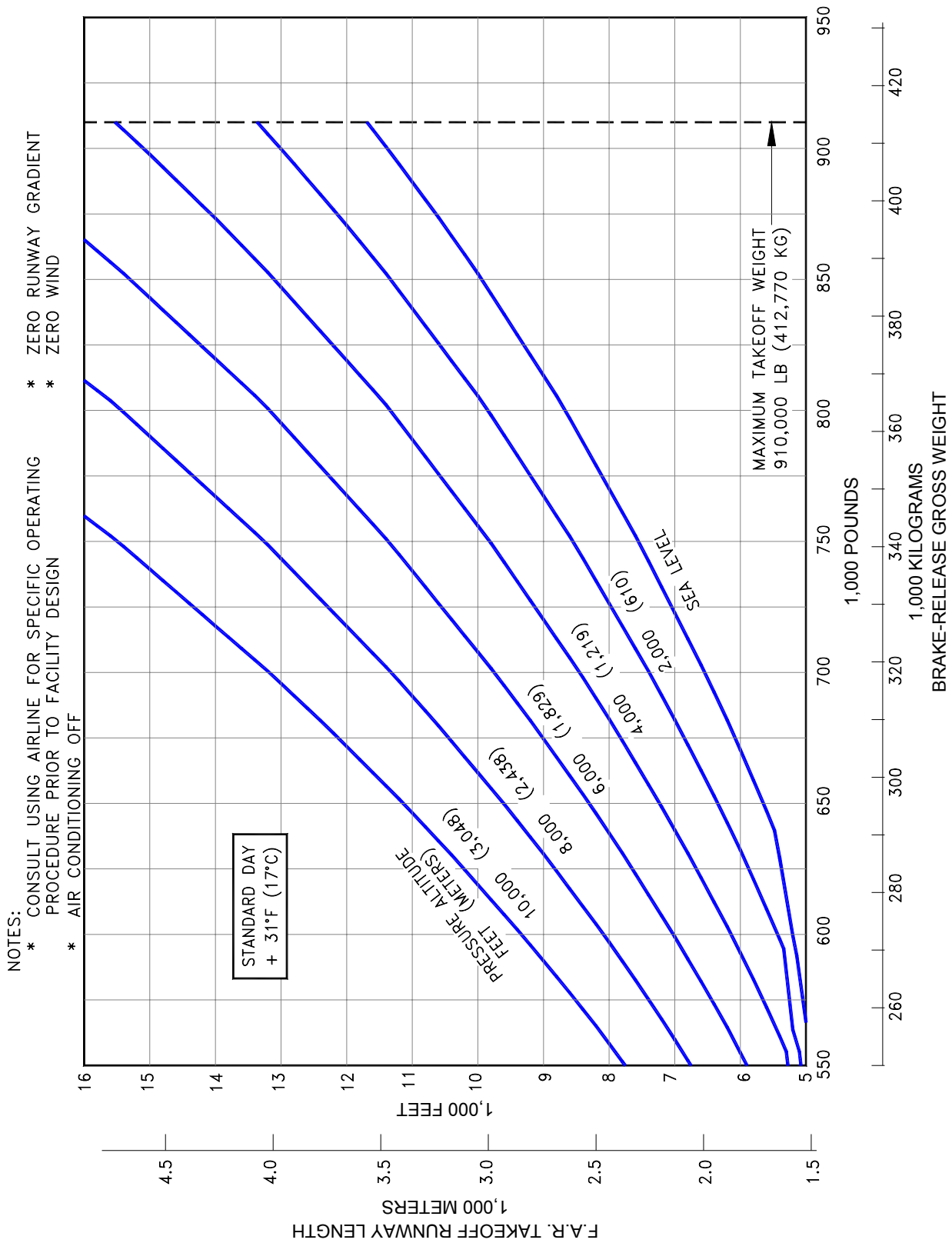
NOTES:  
 \* CONSULT USING AIRLINE FOR SPECIFIC OPERATING PROCEDURE PRIOR TO FACILITY DESIGN  
 \* AIR CONDITIONING OFF  
 \* ZERO RUNWAY GRADIENT  
 \* ZERO WIND



**3.3.12 F.A.R. TAKEOFF RUNWAY LENGTH REQUIREMENTS -**  
**STANDARD DAY +31°F (STD + 17°C)**  
 MODEL 747-400ER (PW4062 ENGINES)

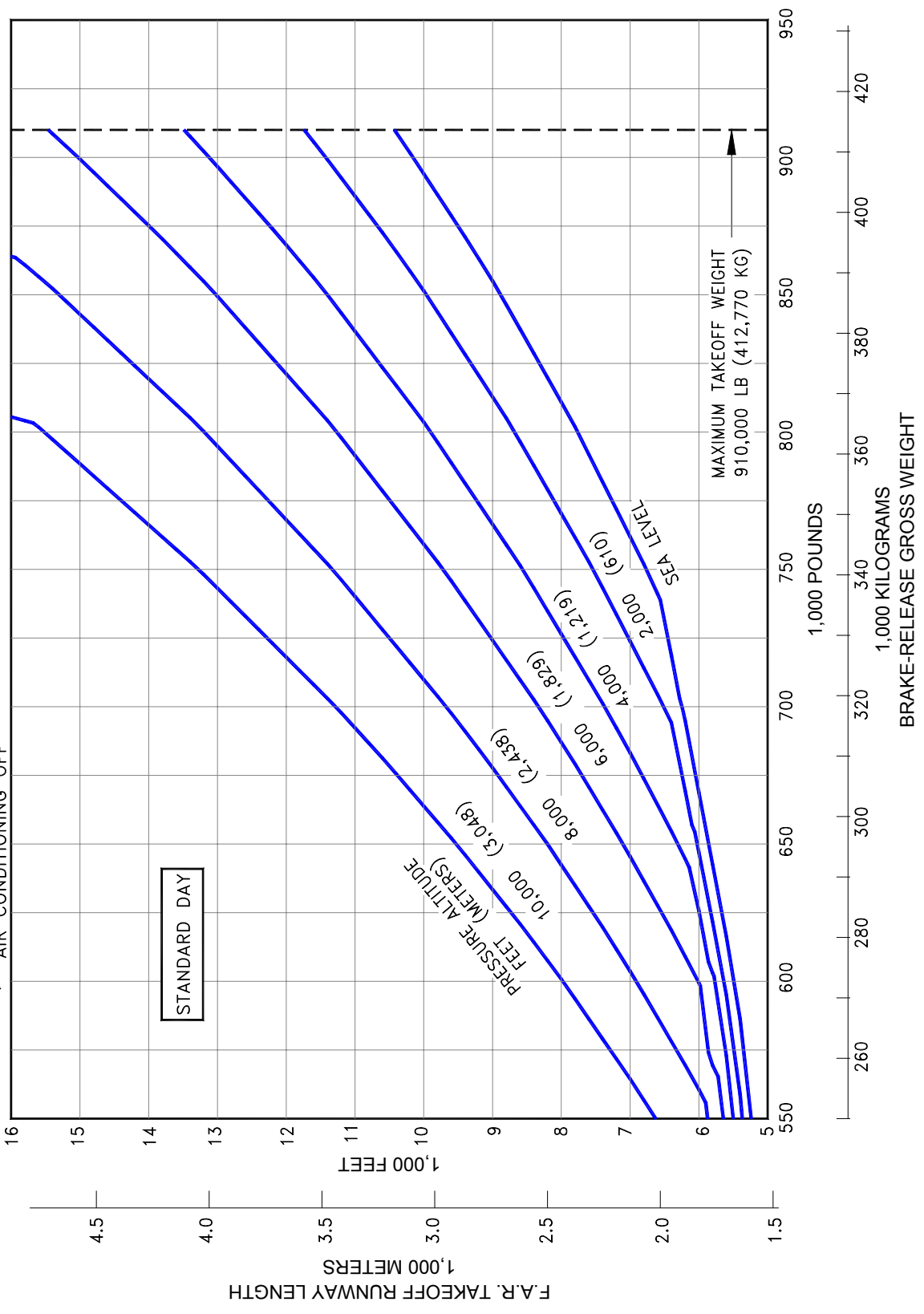


**3.3.13 F.A.R. TAKEOFF RUNWAY LENGTH REQUIREMENTS - STANDARD DAY**  
 MODEL 747-400ER (RB211-524H8-T ENGINES)

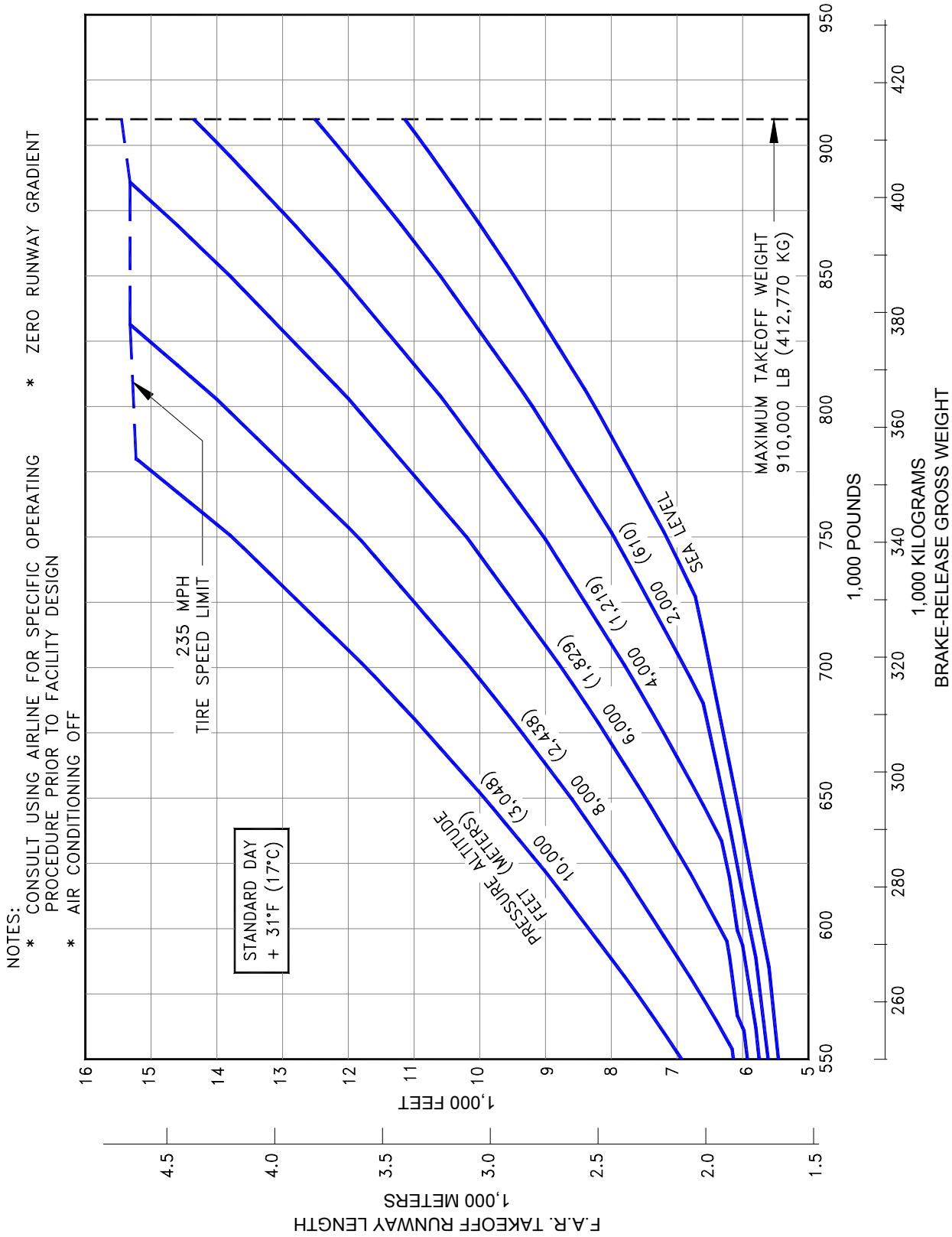


**3.3.14 F.A.R. TAKEOFF RUNWAY LENGTH REQUIREMENTS -  
 STANDARD DAY +31°F (STD + 17°C)  
 MODEL 747-400ER (RB211-524H8-T ENGINES)**

NOTES:  
 \* CONSULT USING AIRLINE FOR SPECIFIC OPERATING PROCEDURE PRIOR TO FACILITY DESIGN  
 \* AIR CONDITIONING OFF  
 \* ZERO RUNWAY GRADIENT

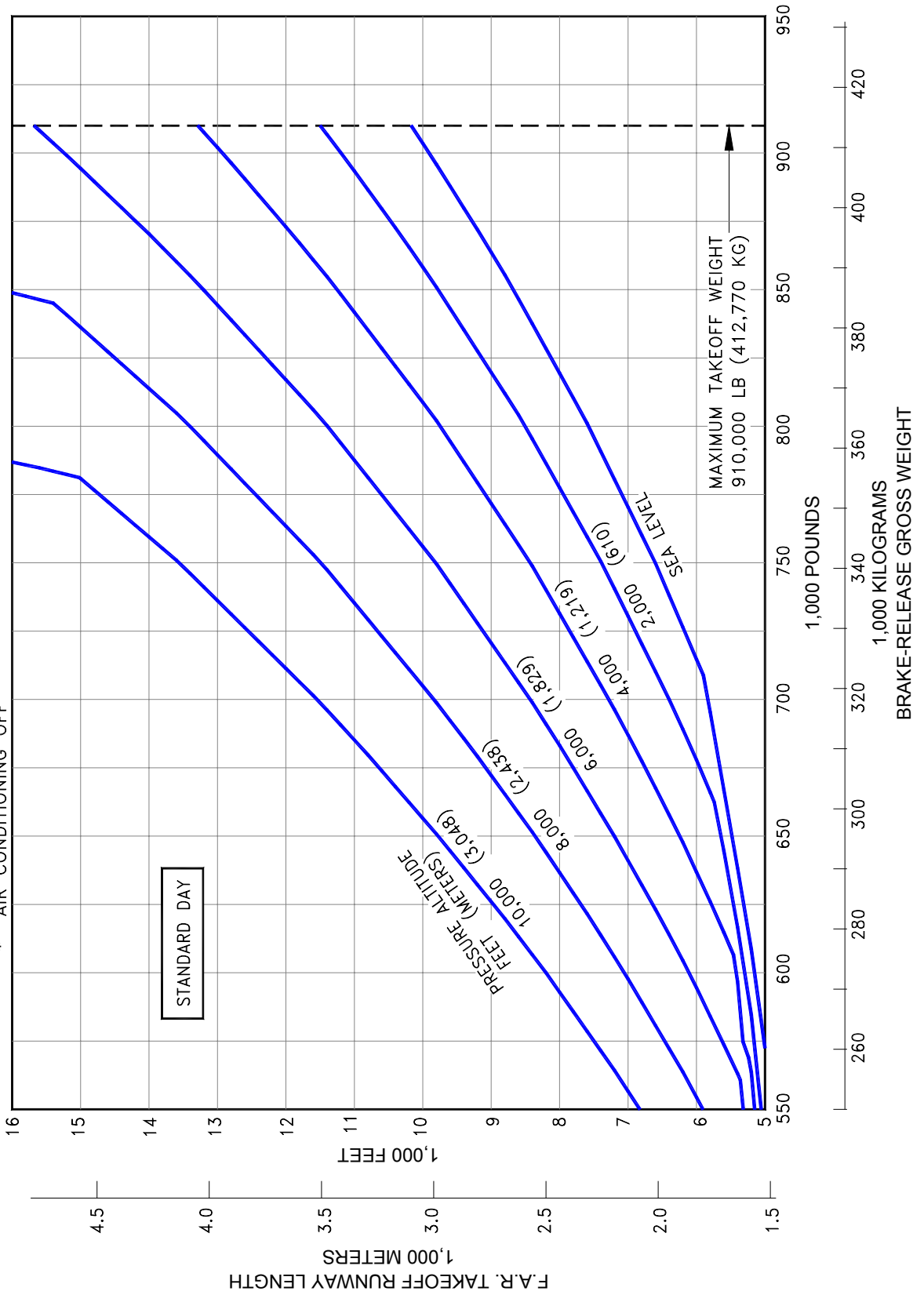


**3.3.15 F.A.R. TAKEOFF RUNWAY LENGTH REQUIREMENTS - STANDARD DAY**  
 MODEL 747-400ER FREIGHTER (CF6-80C2B5F ENGINES)

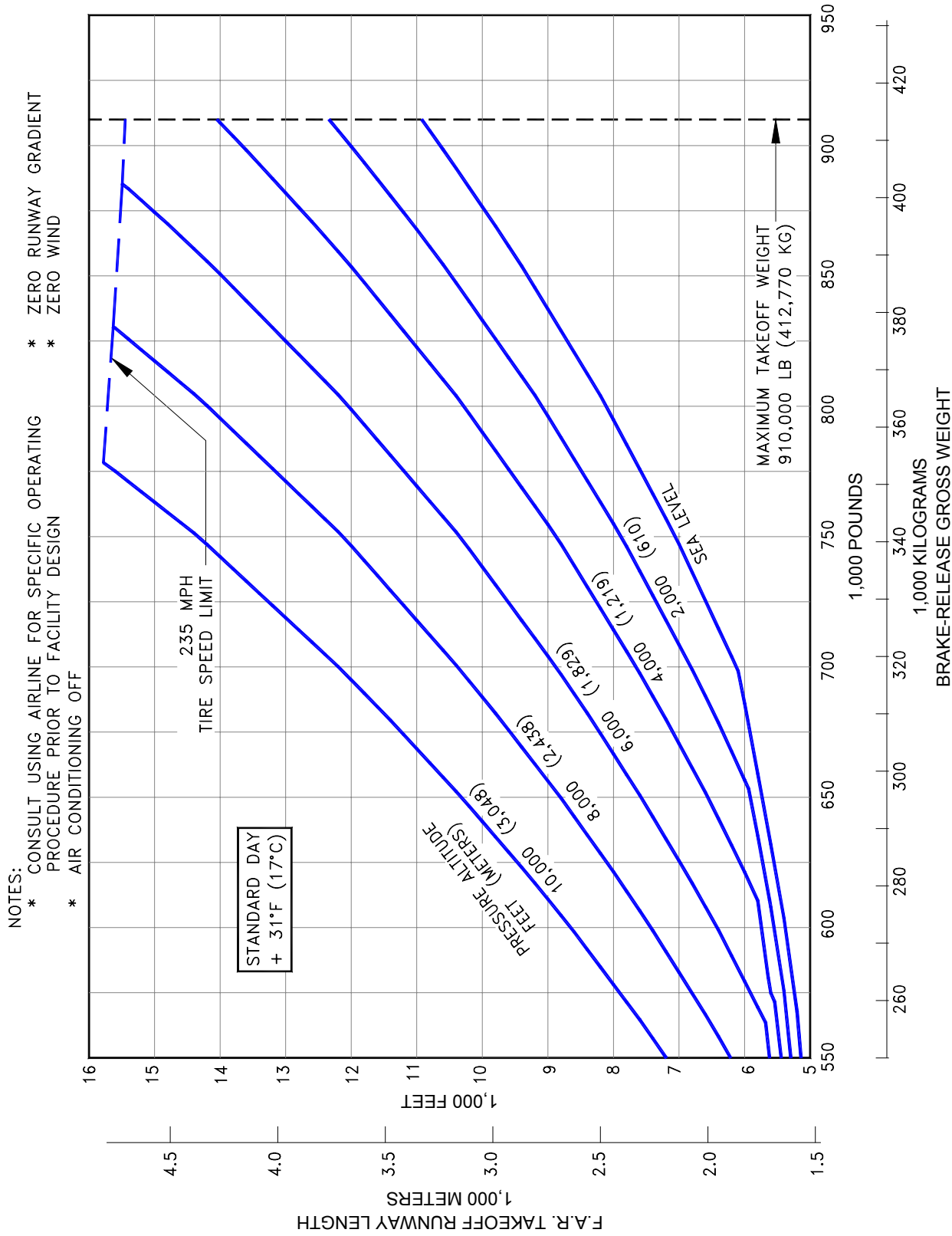


**3.3.16 F.A.R. TAKEOFF RUNWAY LENGTH REQUIREMENTS -  
 STANDARD DAY + 31°F (STD + 17°C)  
 MODEL 747-400ER FREIGHTER (CF6-80C2B5F ENGINES)**

NOTES:  
 \* CONSULT USING AIRLINE FOR SPECIFIC OPERATING PROCEDURE PRIOR TO FACILITY DESIGN  
 \* AIR CONDITIONING OFF  
 \* ZERO RUNWAY GRADIENT  
 \* ZERO WIND

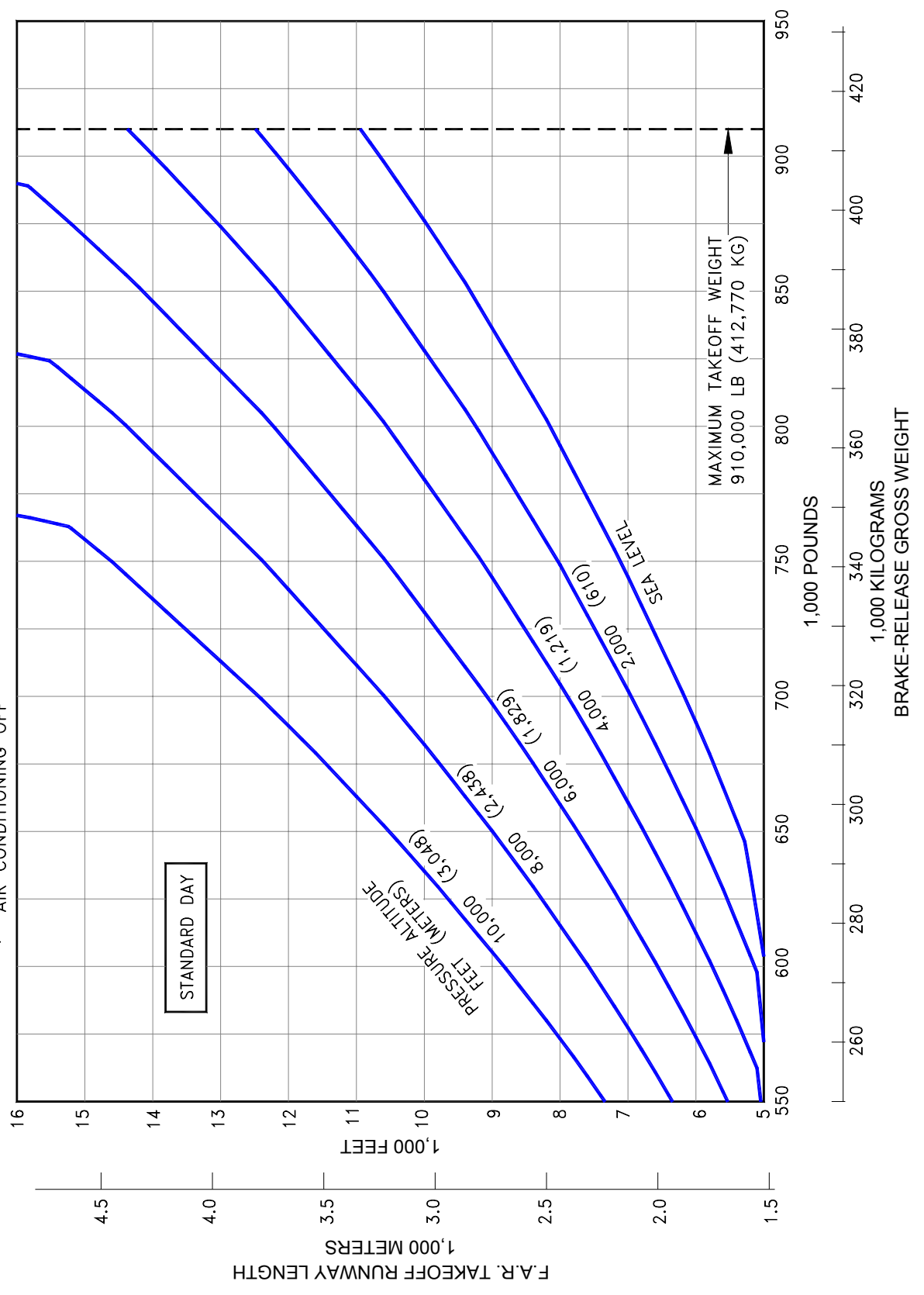


**3.3.17 F.A.R. TAKEOFF RUNWAY LENGTH REQUIREMENTS - STANDARD DAY**  
 MODEL 747-400ER FREIGHTER (PW4062 ENGINES)



**3.3.18 FA.R. TAKEOFF RUNWAY LENGTH REQUIREMENTS -**  
**STANDARD DAY + 31°F (STD + 17°C)**  
 MODEL 747-400ER FREIGHTER (PW4062 ENGINES)

NOTES:  
 \* CONSULT USING AIRLINE FOR SPECIFIC OPERATING PROCEDURE PRIOR TO FACILITY DESIGN  
 \* AIR CONDITIONING OFF  
 \* ZERO RUNWAY GRADIENT  
 \* ZERO WIND

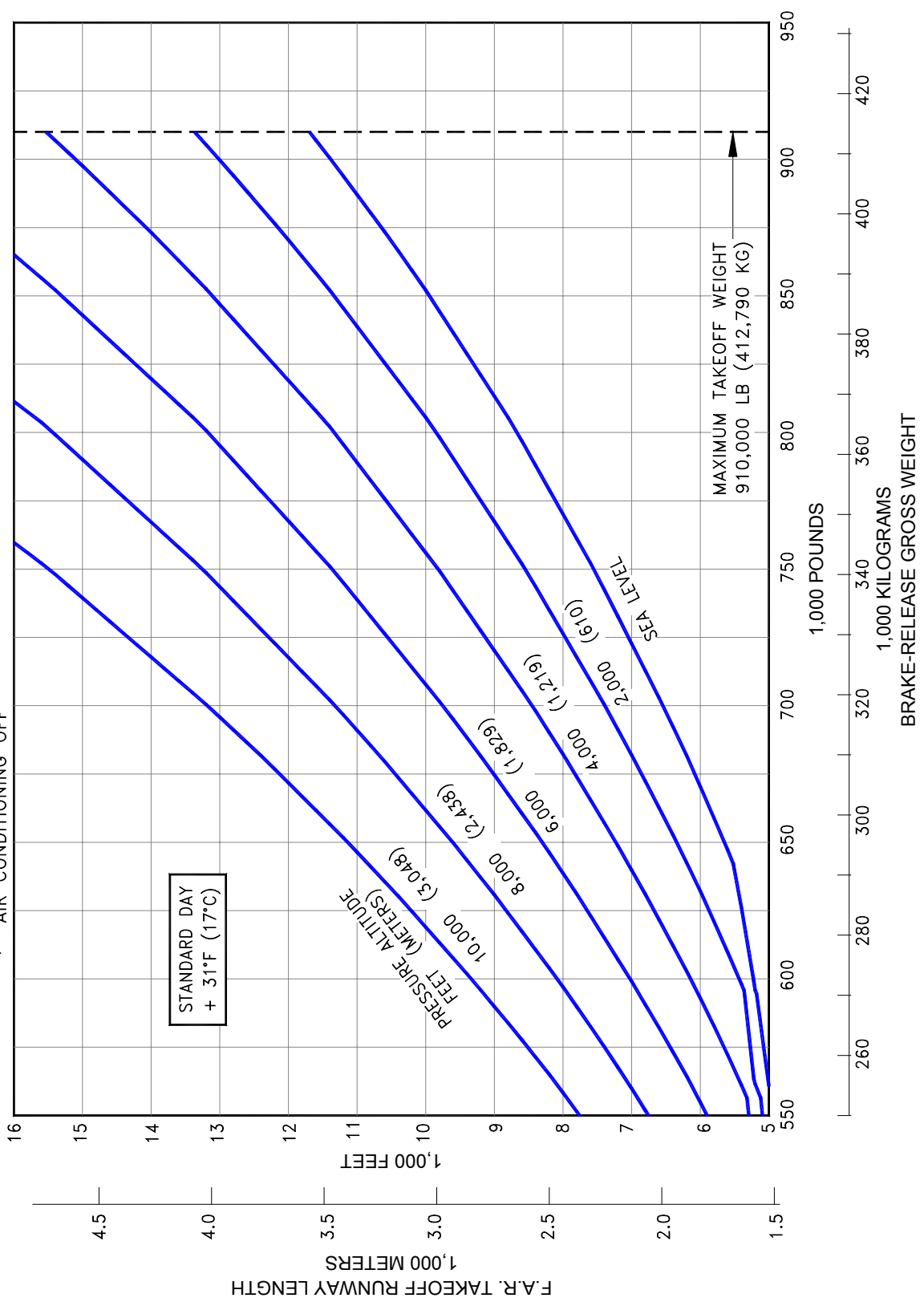


**3.3.19 F.A.R. TAKEOFF RUNWAY LENGTH REQUIREMENTS - STANDARD DAY**  
 MODEL 747-400ER FREIGHTER (RB211-524H8-T ENGINES)

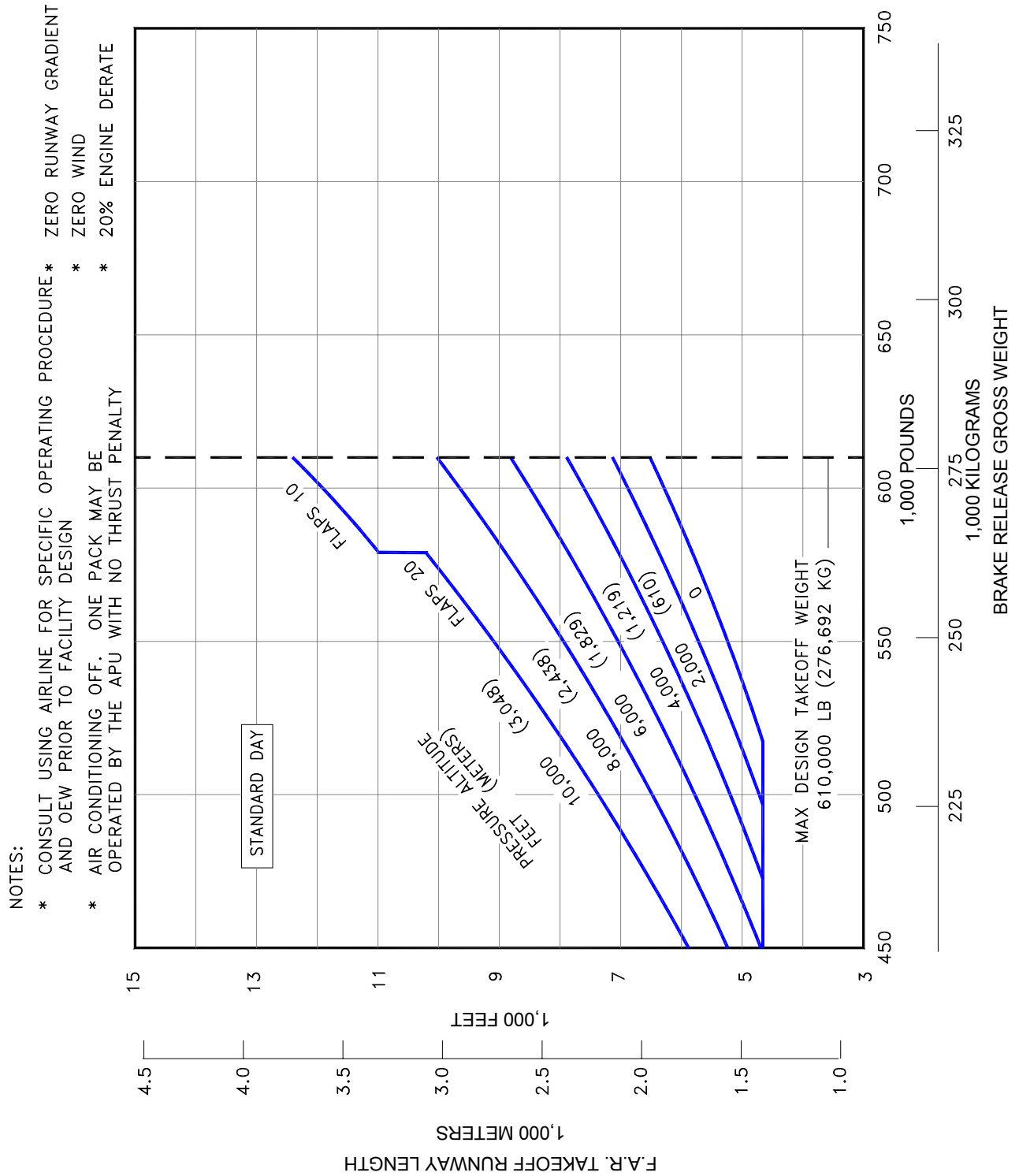
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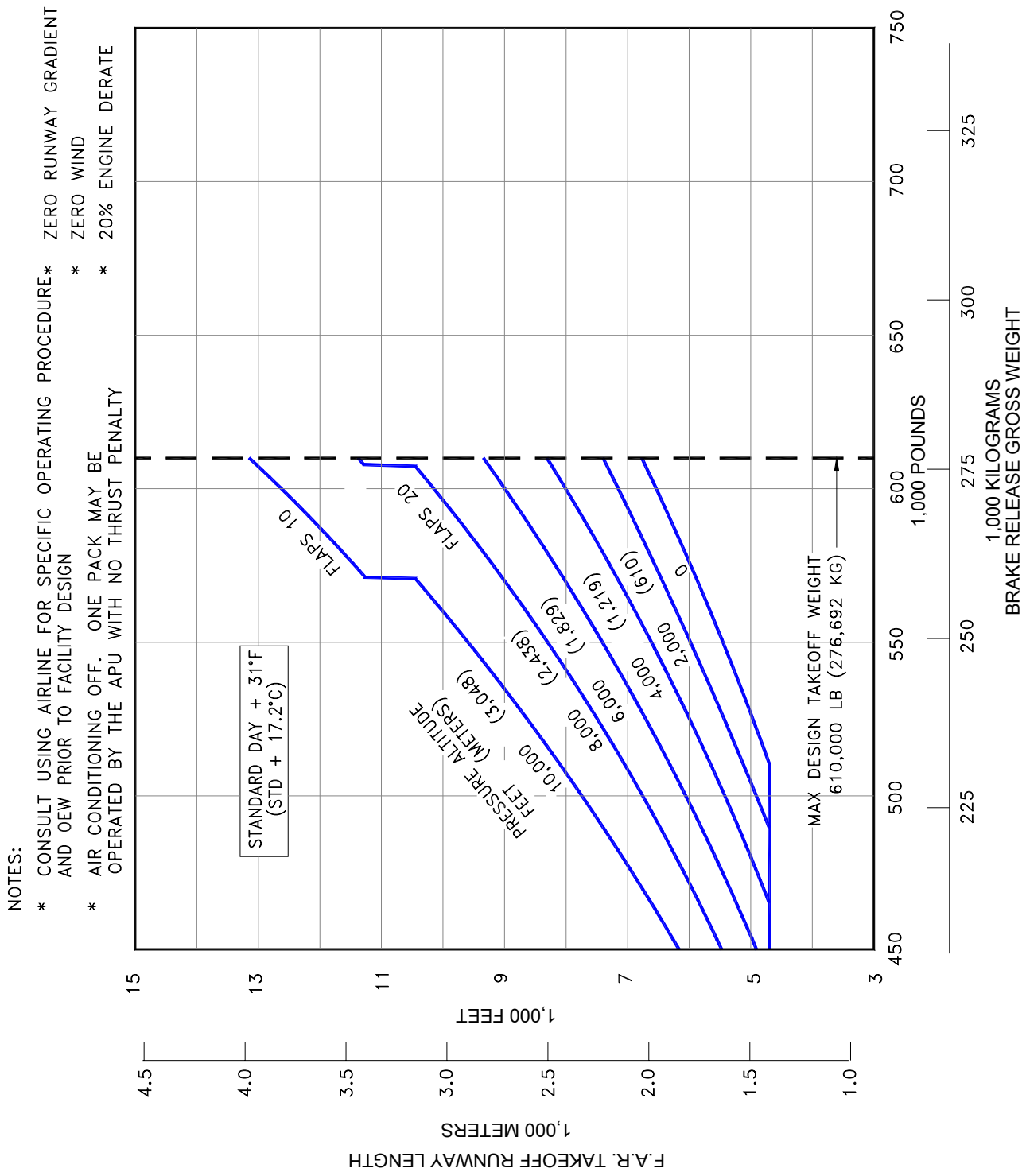
NOTES:  
 \* CONSULT USING AIRLINE FOR SPECIFIC OPERATING PROCEDURE PRIOR TO FACILITY DESIGN  
 \* AIR CONDITIONING OFF  
 \* ZERO RUNWAY GRADIENT  
 \* ZERO WIND



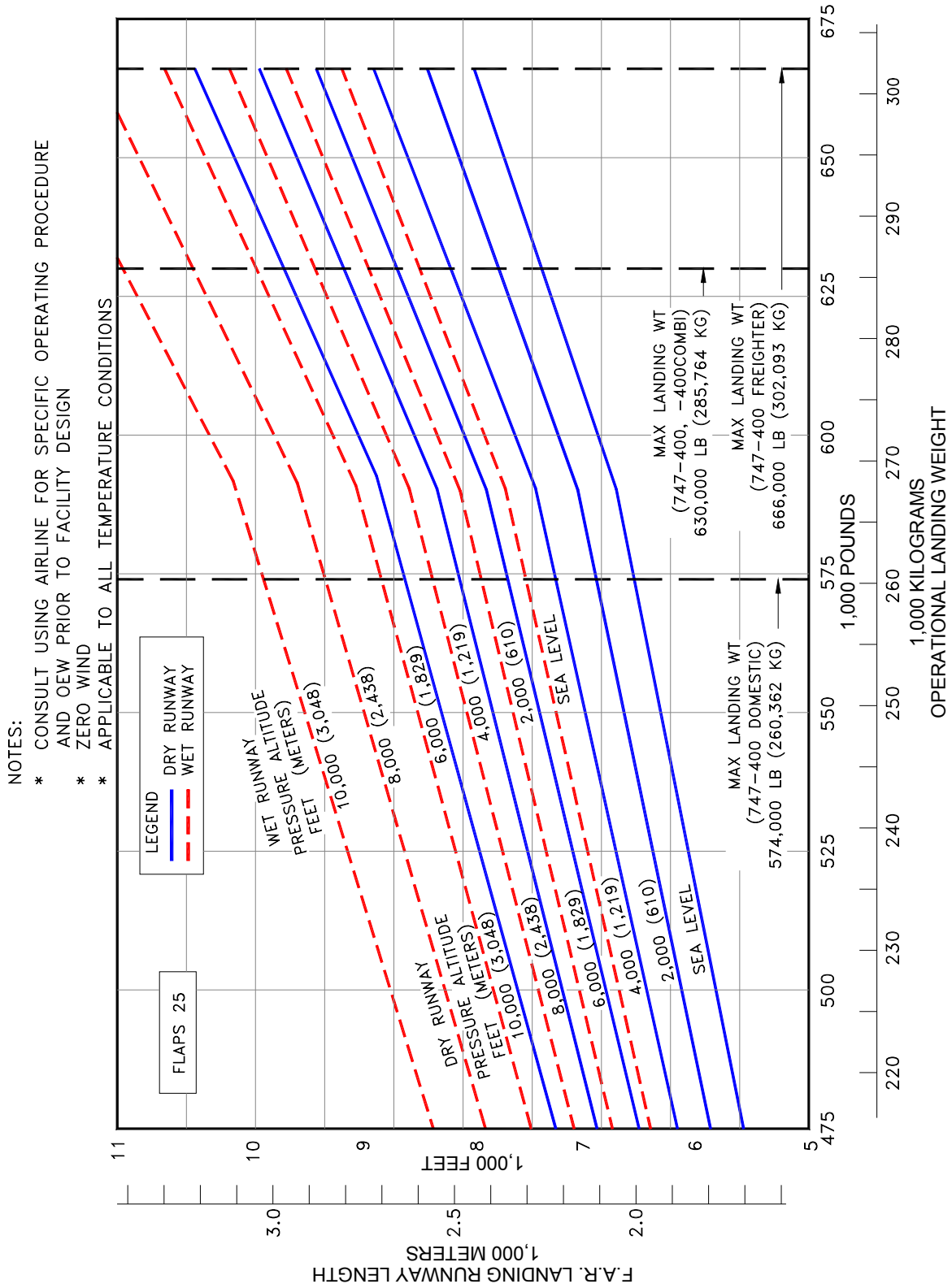
**3.3.20 F.A.R. TAKEOFF RUNWAY LENGTH REQUIREMENTS -  
 STANDARD DAY + 31°F (STD + 17°C)  
 MODEL 747-400ER FREIGHTER (RB211-524H8-T ENGINES)**



**3.3.21 F.A.R. TAKEOFF RUNWAY LENGTH REQUIREMENTS - STANDARD DAY**  
 MODEL 747-400 DOMESTIC (CF6-80C2B1 ENGINES)



**3.3.22 F.A.R. TAKEOFF RUNWAY LENGTH REQUIREMENTS -  
STANDARD DAY +31°F (STD + 17.2°C)  
MODEL 747-400 DOMESTIC (CF6-80C2B1 ENGINES)**

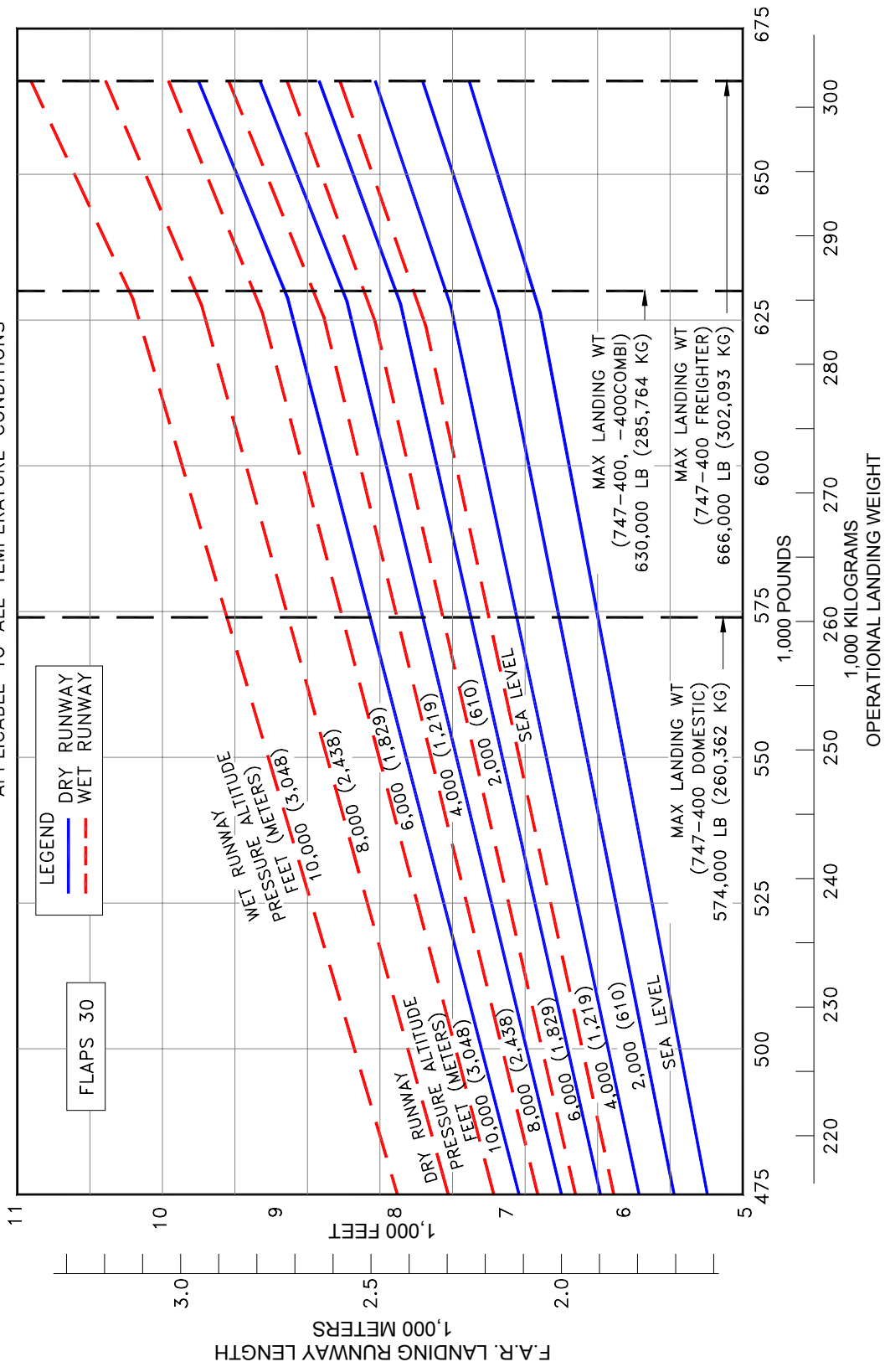


**3.4.1 F.A.R. LANDING RUNWAY LENGTH REQUIREMENTS - FLAPS 25**

MODEL 747-400, -400 COMBI, -400 DOMESTIC, -400 FREIGHTER

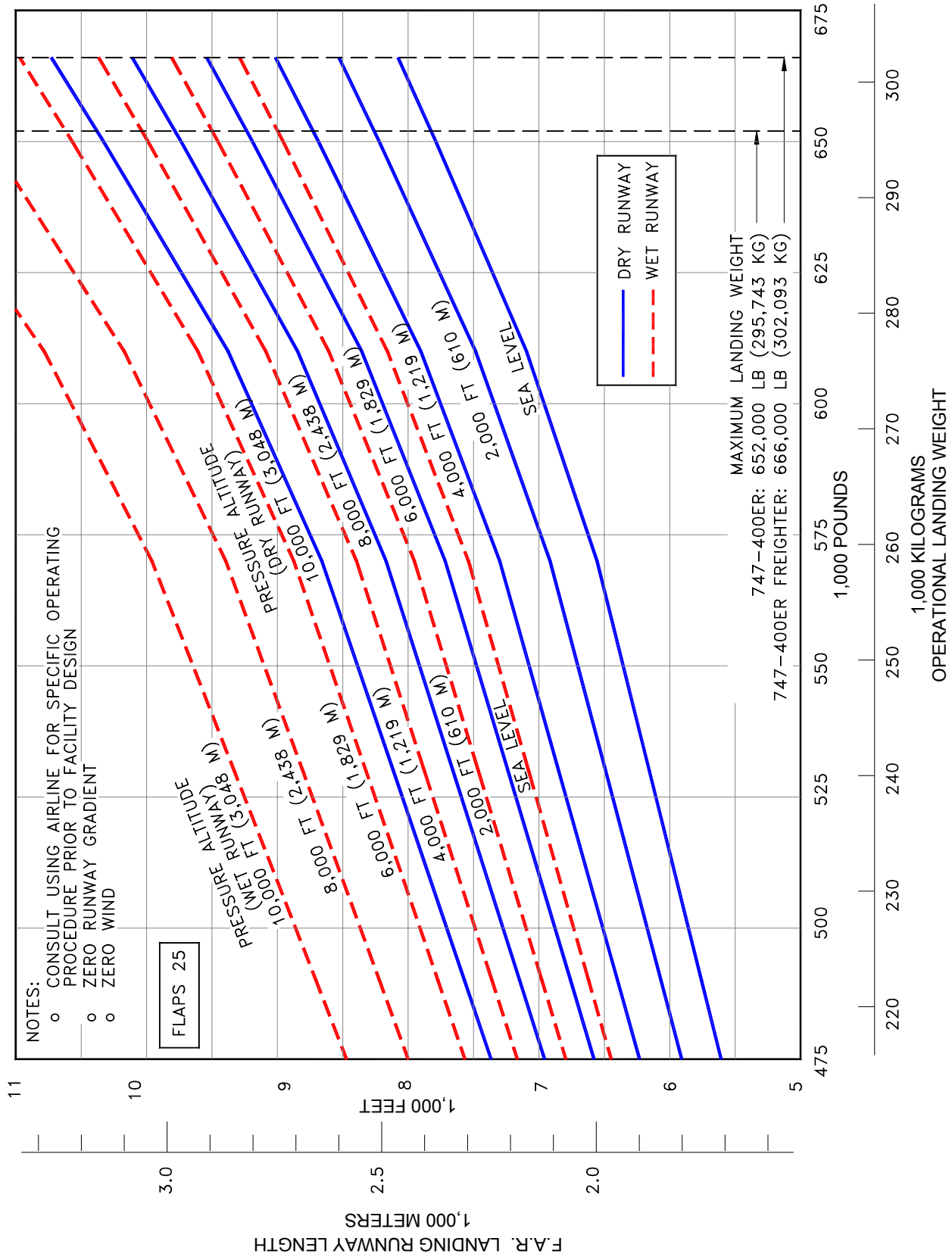
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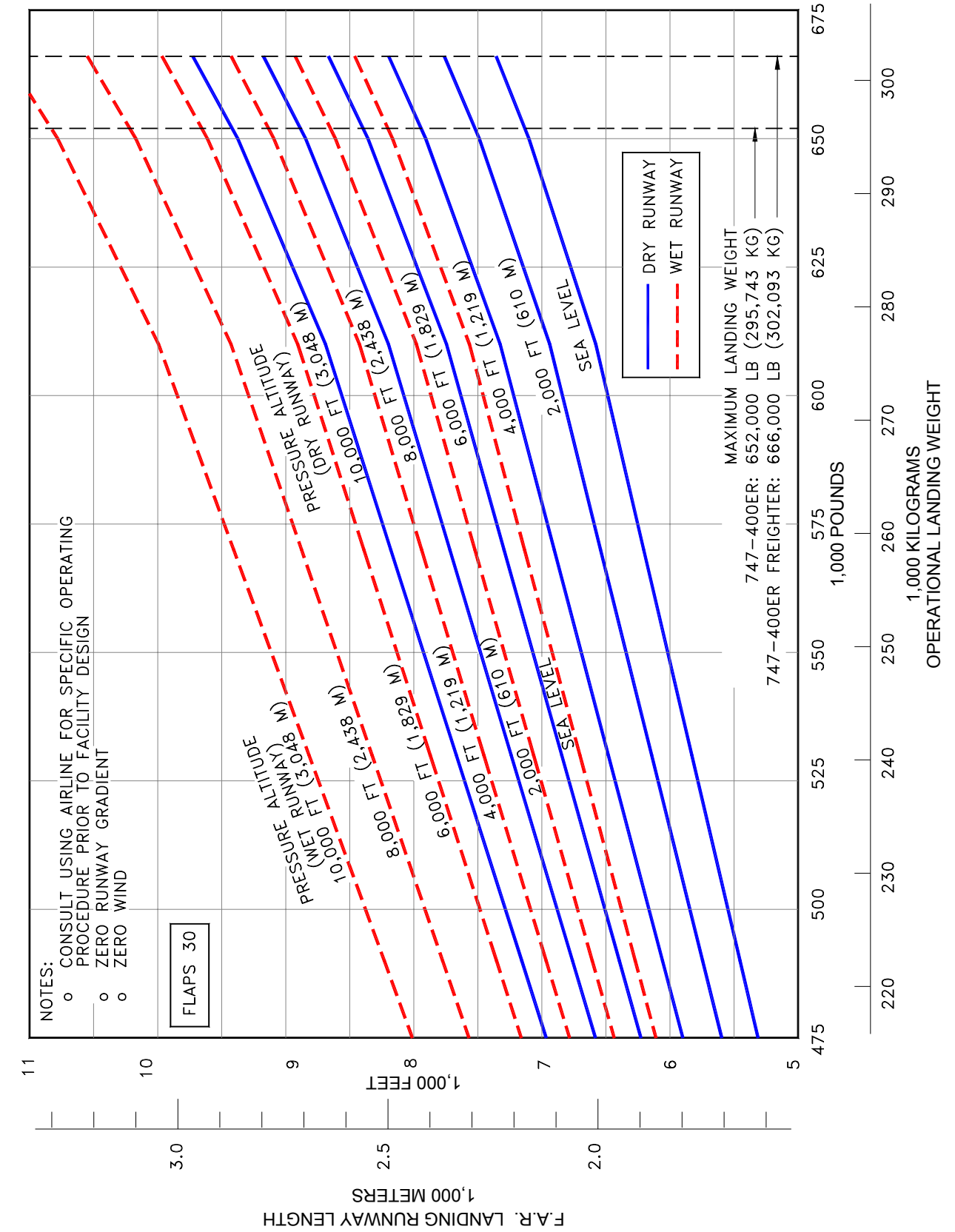
NOTES:  
 \* CONSULT USING AIRLINE FOR SPECIFIC OPERATING PROCEDURE AND OEW PRIOR TO FACILITY DESIGN  
 \* ZERO WIND  
 \* APPLICABLE TO ALL TEMPERATURE CONDITIONS



**3.4.2 F.A.R. LANDING RUNWAY LENGTH REQUIREMENTS - FLAPS 30**  
 MODEL 747-400, -400 COMBI, -400 DOMESTIC, -400 FREIGHTER

**3.4.3 F.A.R. LANDING RUNWAY LENGTH REQUIREMENTS - FLAPS 25**  
 MODEL 747-400ER, -400ER FREIGHTER





**3.4.4 F.A.R. LANDING RUNWAY LENGTH REQUIREMENTS - FLAPS 30**  
 MODEL 747-400ER, -400ER FREIGHTER

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