

Minerals Council South Africa



EXAMINATION PAPER

SUBJECT: CHAMBER OF MINES OF SOUTH AFRICA – INTERMEDIATE CERTIFICATE IN MINE ENVIRONMENTAL CONTROL - PAPER 2 SUBJECT CODE: COMIMEC2 EXAMINATION DATE: 6 OCT 2025 TIME: 14:00 – 17:00 (3 HOURS)	EXAMINER: NEO DIKGALE MODERATOR: BILLY LETLAPE TOTAL MARKS: [100] PASS MARK: (60%)
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NUMBER OF PAGES: 4 (including this one)

EXAMINATION INSTRUCTIONS:

All candidates are advised to read the below instructions/requirements and adhere to them. Not adhering to them could lead to the loss of marks.

THIS IS **NOT** AN OPEN BOOK EXAMINATION. **THERE IS NO FORMULA HANDOUT**

INSTRUCTIONS TO CANDIDATES:

1. Answer all questions **legibly** in English.
2. Write your **ID number** on the outside cover of each book used and on any graph paper or other loose sheets handed in.

NB: Your name **must not** appear on any answer book or loose sheets.

3. Show all calculations **and check calculations on which the answers are based.**
4. Hand-held electronic calculators may be used for calculations.
5. Write **legibly** in ink on the **right hand page** only – **left hand pages will not be marked.**
6. Illustrate your answers by means of sketches, diagrams and tables wherever possible.
7. Answers must be given to an accuracy which is typical of practical conditions.
NB Ensure that the correct unit of measure (SI unit) are recorded in the calculations as marks will be deducted from answers if the incorrect unit is used. (Even if the calculated value is correct).
8. In answering the questions, full advantage should be taken of your practical experience as well as data given.
9. Please note that you are not allowed to contact your examiner or moderator regarding this examination.
10. Cell phones are NOT allowed in the examination room.
11. You are encouraged to make use of the **CoMCert Tip-off Hotline** whenever you witness or suspect any wrongdoing related to the CoMCert Examinations on landline **0800 118 998** or alternatively you can use email **COMCert@tip-offs.com**. This tip-off hotline and tip-off email is managed anonymously and confidentially through an independent service provider.
12. **The following chart is included: Psychrometric chart: 82.5 kPa; 87,5kPa; 105kPa; 110kPa; 112,5kPa**

QUESTION 1

- 1.1 Explain the law of conservation of energy. (2)
- 1.2 Describe the difference between temperature and heat (2)
- 1.3 What is “hidden” heat and how is it measured? (1)
- 1.4 Define the following terms: (5)
- Thermal Capacity
 - Power
 - Absolute Temperature
 - Joule
 - Auto-compression
- 1.5 List three (3) ways in which air velocities (volume) can be increased (3)
- 1.6 What is Acclimatization? (1)
- 1.7 Explain the heat stress management process for underground workers. (4)
- 1.8 One of the methods described, as heat stress hygiene practices, is self-determination. List two aspects of self-determination. (2)

[20]**QUESTION 2**

- 2.1. Air flows through a stope at velocity of 0.9m/s and the kata reading is 12. Calculate the wet-bulb temperature. (3)
- 2.2. Seven (7) litres of water at a temperature of 15°C is left in a bucket for 24 hours. How much heat has been added to the water, if the measured temperature is 26°C after 24 hours? (2)
- 2.3 Calculate the amount of heat that must be removed from 0.1m³ of water to lower the temperature from 26°C to a temperature of 15°C? (3)
- 2.4 Complete the table below: (4)

Wind Chill equivalent temperature	Maximum daily exposure limit
0°C to -18°C	2.4.1
-18 to -36°C	2.4.2
-34 to -57°C	2.4.3
< -57°C	2.4.4

- 2.5.1. Name and define one cold-stress disorder. (1)
- 2.5.2. What are two signs/symptoms of this disorder? (2)
- 2.5.3. Describe how you will treat a person who has the above symptoms (2)
- 2.6. Hydrogen Cyanide gas is one of the gases that can be encountered during the gold recovery process. List two (2) dangers of this gas and the method to detect it. (3)

[20]

QUESTION 3

- 3.1 Describe five (5) ways in which lighting conditions underground can be improved. (5)
- 3.2 Name at least three (3) cap-lamp requirements to comply with fiery mines. (3)
- 3.3. The anticipation, recognition, evaluation and control of health hazards in the workplace are usually classified in six categories. Name and explain (give examples) of these. (6)
- 3.4 Define what is meant by “ventilation district” (1)
- 3.5 Name four engineering controls used to lessen the effects of vibration on workers (4)
- 3.6 Name one common source of whole-body vibration on workers. (1)

[20]**QUESTION 4**

- 4.1 Using the Lombard’s air density chart attached:

Determine the true density from the following measured properties of an air-water vapour mixture:

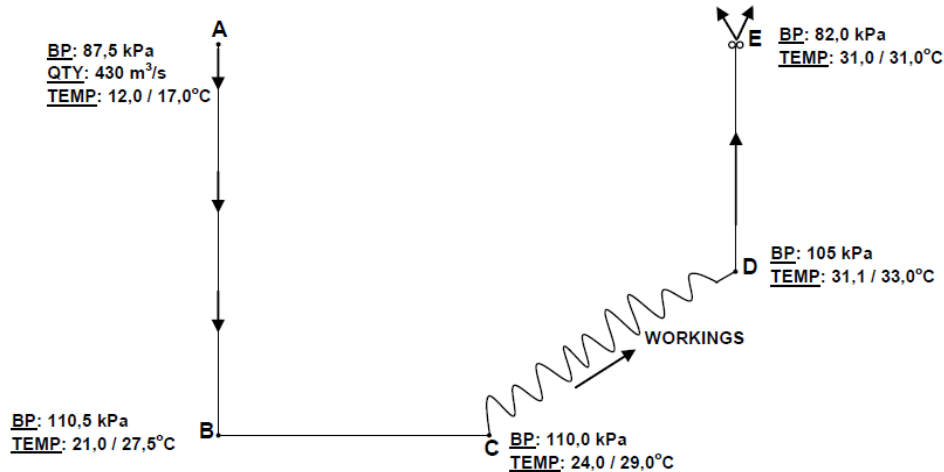
Barometric Pressure = 95.0 kPa

Air Temperature = 25°/ 35°C

(3)

- 4.2 The barometric pressure in an underground stope is 113.0 kPa and the air temperature 28.0/ 32.0°C. Using barometric charts, determine the sigma heat content of the air. (4)

Refer to the sketch below:



- 4.3. From the above sketch, calculate the quantities at B, C, D and E assuming there are no air leakages. (8)

[15]

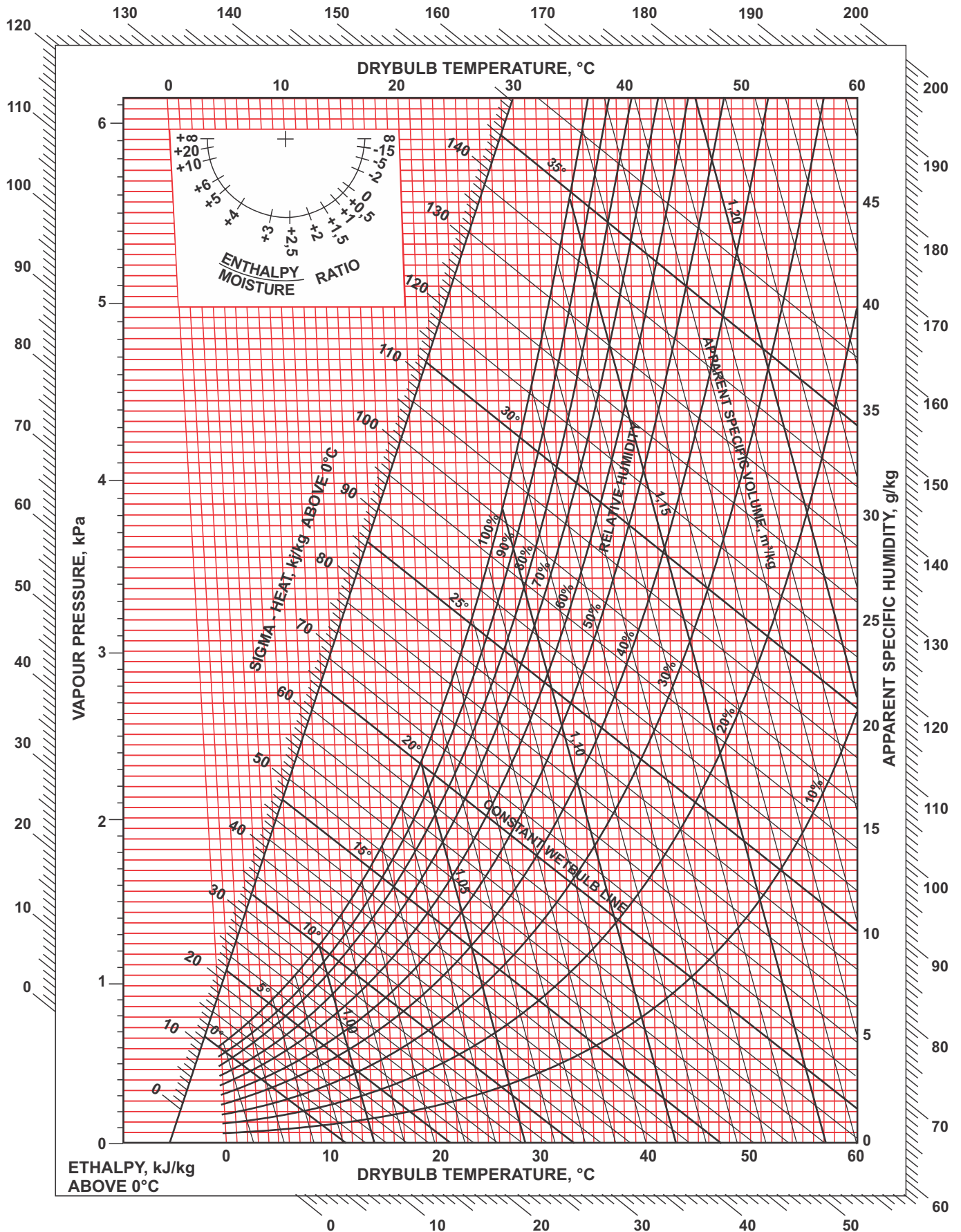
QUESTION 5

- 5.1 Discuss four engineering control measures used to limit noise exposures. (4)
- 5.2 Name and describe one type of noise exposure effect. (1)
- 5.3. With the aid of a sketch, explain the procedure you would follow to test for flammable gas in a development end that is ventilated using an exhaust overlap system. Use numbering to illustrate the correct sequence of testing steps. (12)
- 5.4 Name three common causes of an oxygen deficiency in underground workings. (3)
- 5.4 A bag filter has to be installed at a tip. The tip is 4 m long and 3 m wide. Each of the bags is 1.5 m long and has a diameter of 200 mm. Determine the number of bags required for the filter. (5)

[25]**[100]**

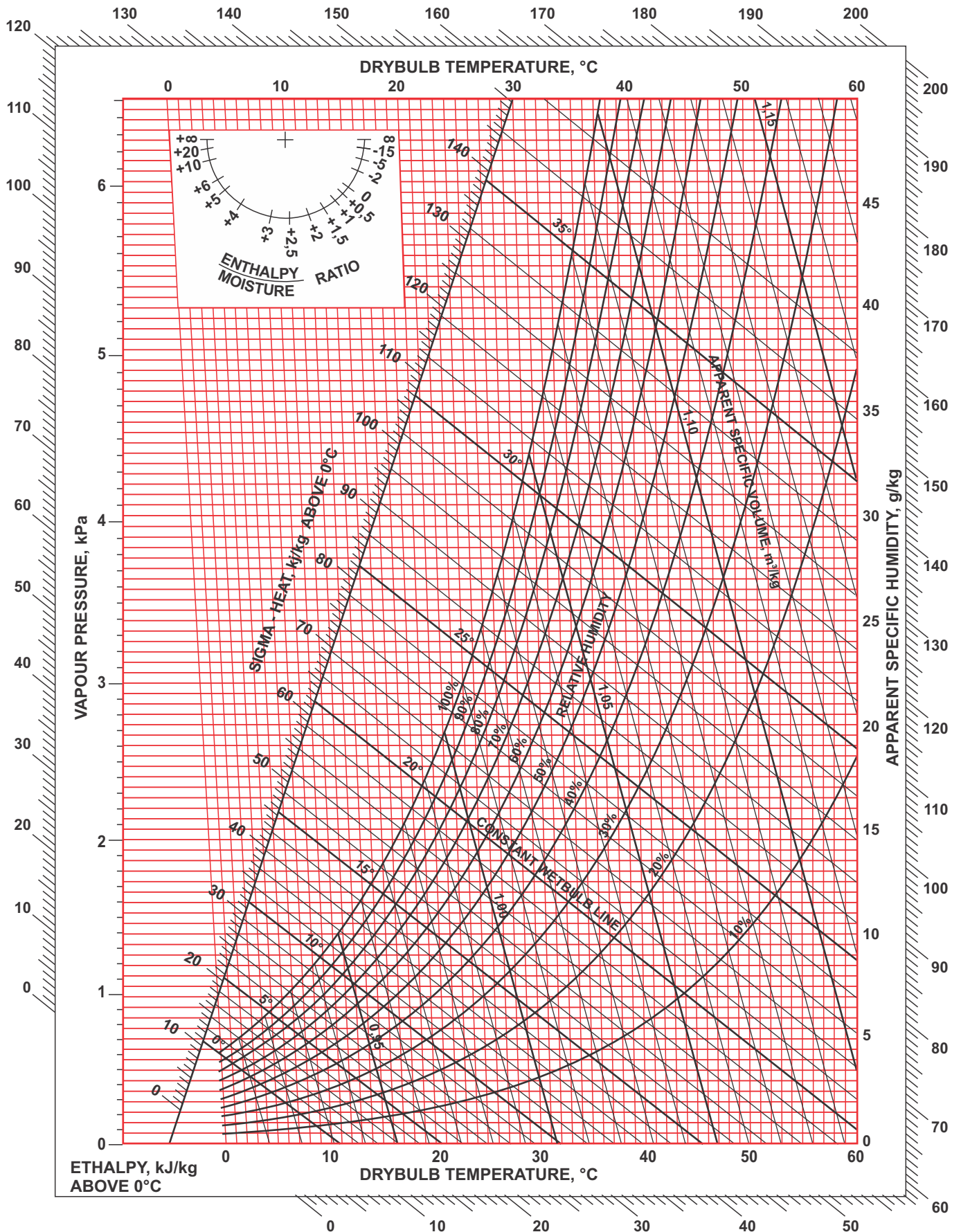
PSYCHROMETRIC CHART

82,5 kPa



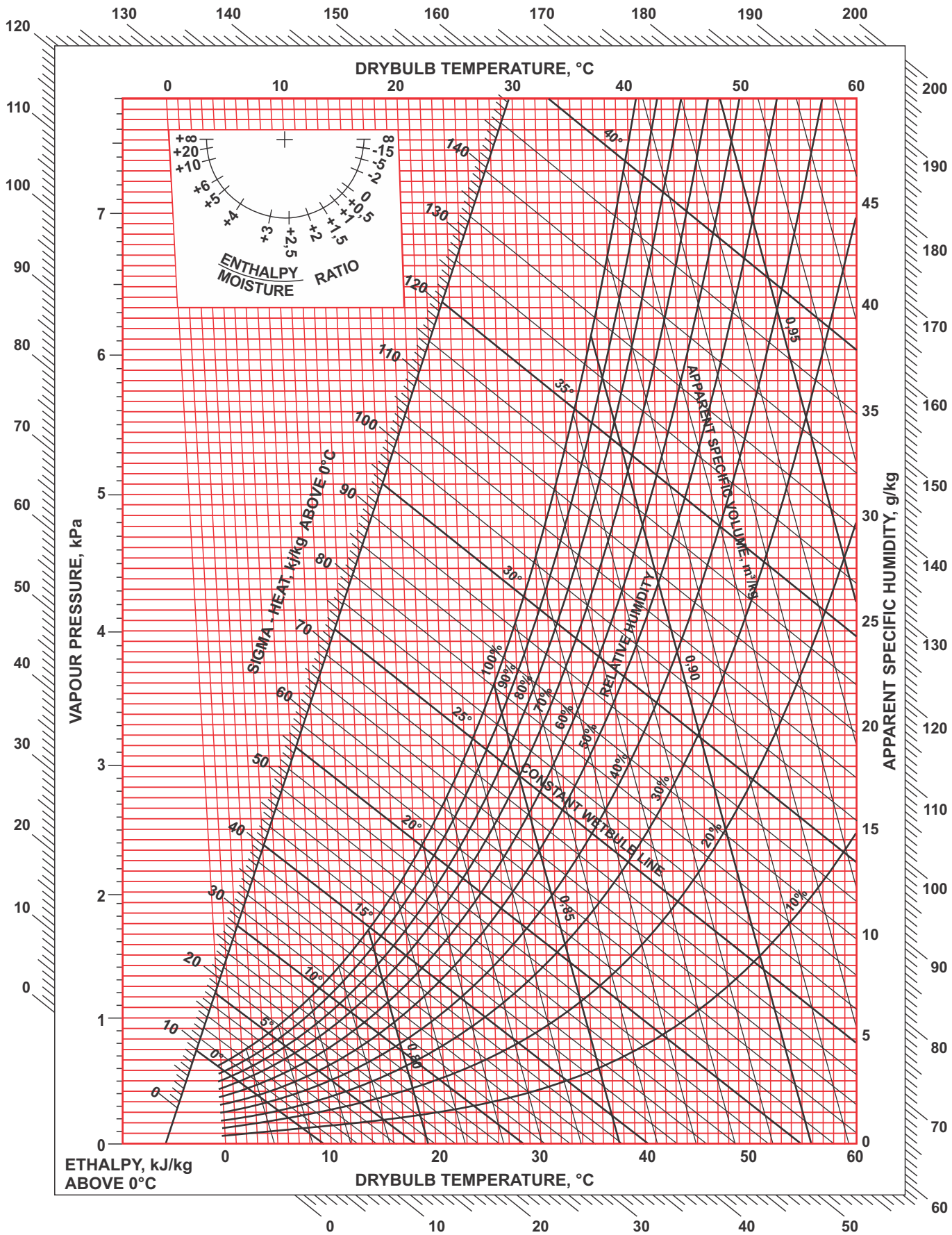
PSYCHROMETRIC CHART

87,5 kPa



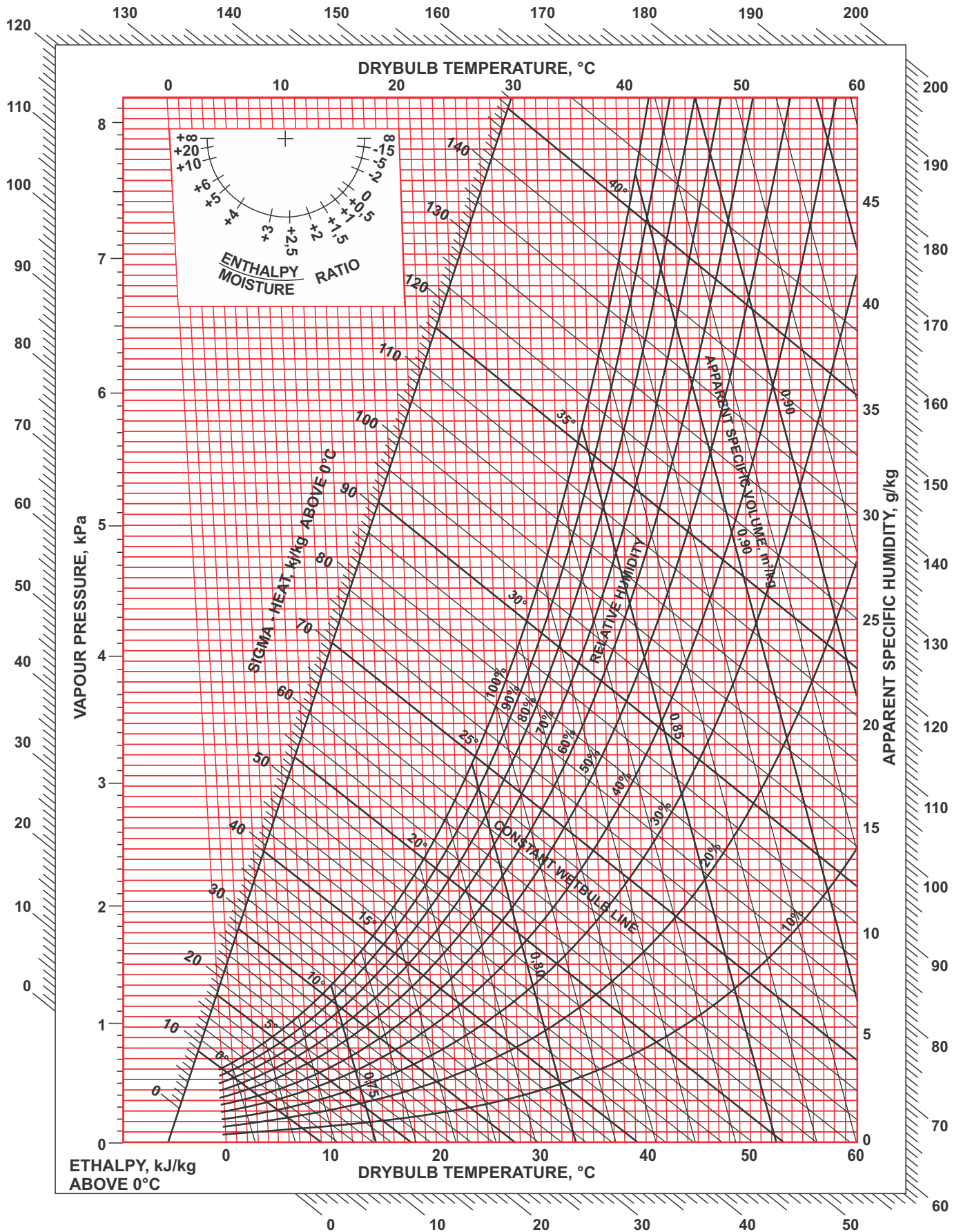
PSYCHROMETRIC CHART

105,0 kPa



PSYCHROMETRIC CHART

110,0 kPa



PSYCHROMETRIC CHART

112,5 kPa

