UNITED TECHNOLOGIES CARRIER

Commercial Division
Carrier Corporation

BULLETIN: CA-SB-17-60-1
DATE: 8/17/60
PAGE: 1 OF: 3

SERVICE BULLETIN

SUPERSEDE BULLETIN:
DATE:
PAGE: OF:

SUBJECT:
OVERCOMING OIL FOAMING AT START-UP

PURPOSE

The purpose of this bulletin is to outline a method of overcoming oil foaming. Very often, on industrial jobs particularly, violent oil foaming at start-up causes the oil pump to lose its prime and the machine to cut out on low oil pressure. Even if the machine does not cut out on low oil pressure, considerable oil is lost at start-up.

MACHINES AFFECTED

17 Series

PROCEDURE

At start-up, the ideal position for the suction damper is partially opened. This will keep the compressor from pulling too much of a vacuum on the oil sump. When a vacuum is applied to the oil sump the refrigerant in the oil boils and the oil will foam. Therefore, the suction damper should be cracked open at start-up. On some installations this may not be possible as it may overload the compressor motor. Whether starting with a partially opened suction damper will overload the motor depends on the motor itself, the machine design conditions, starter characteristics and, in some cases, electric company limitations.

Starting the compressor with a partially opened damper will reduce the foaming problem but it will not always eliminate the problem. More effective is to eliminate as much refrigerant as possible from the oil prior to start-up. In order to accomplish this, low pressure steam or hot water (as well as cooling water) should be piped to the internal oil cooler. As always, this oil cooler must drain through an open sight drain. Whenever the machine is shutdown, circulate steam (or hot water) through the internal oil cooler heating the oil to about 160°F. It is important that this heating start soon after the machine is shutdown, since the cold suction wall of the compressor accelerates the absorption of refrigerant into the oil.

Approximately 15 minutes before start-up shut the steam off and circulate a maximum amount of cooling water through the internal oil cooler. The electric space heater above the oil sump must still remain energized, reducing the possibility of refrigerant entering the oil while it is being cooled. Lower the oil temperature to approximately 120°F or below before starting up. The lower the oil temperature, the less foaming at start-up. This is illustrated in the attached graph. Note the oil is at 120°F but since we have not permitted any refrigerant to enter the oil it contains only as much refrigerant as it could

hold at 160°F (19% in the example). Put another way, if we left the oil at 160°F and lowered the pressure over the oil sump (started the machine) the oil would immediately start to foam. However, by cooling the same mixture of refrigerant and oil down to 120°F the solution will remain stable and foaming will not occur until we have appreciably lowered the pressure above the oil sump (to 60 psi in the example).

Note that in the example, if we left the oil at say 120°F it would contain 37% refrigerant. If the compressor is started under these conditions the oil would foam violently. In addition, it would be necessary to foam one pound of refrigerant out of every four pounds of refrigerant-oil mixture. By heating at shutdown and cooling before starting it is only necessary to remove one pound of refrigerant from approximately twenty pounds of mixture. This means less foaming and lower oil loss.

Leave the auxiliary oil pump "off" until immediately prior to start-up. Circulation of oil through the compressor permits it to cool and pick up refrigerant thus increasing foaming.

If a high pressure machine is shutdown for a long time the refrigerant should be placed in the receiver. This will prevent oil foaming at start-up.

If a customer does not have steam or hot water available a high capacity electric heater may be installed in the cooling water line. This is better than an electric oil heater. Experience has shown that the latter frequently cause carbonization.

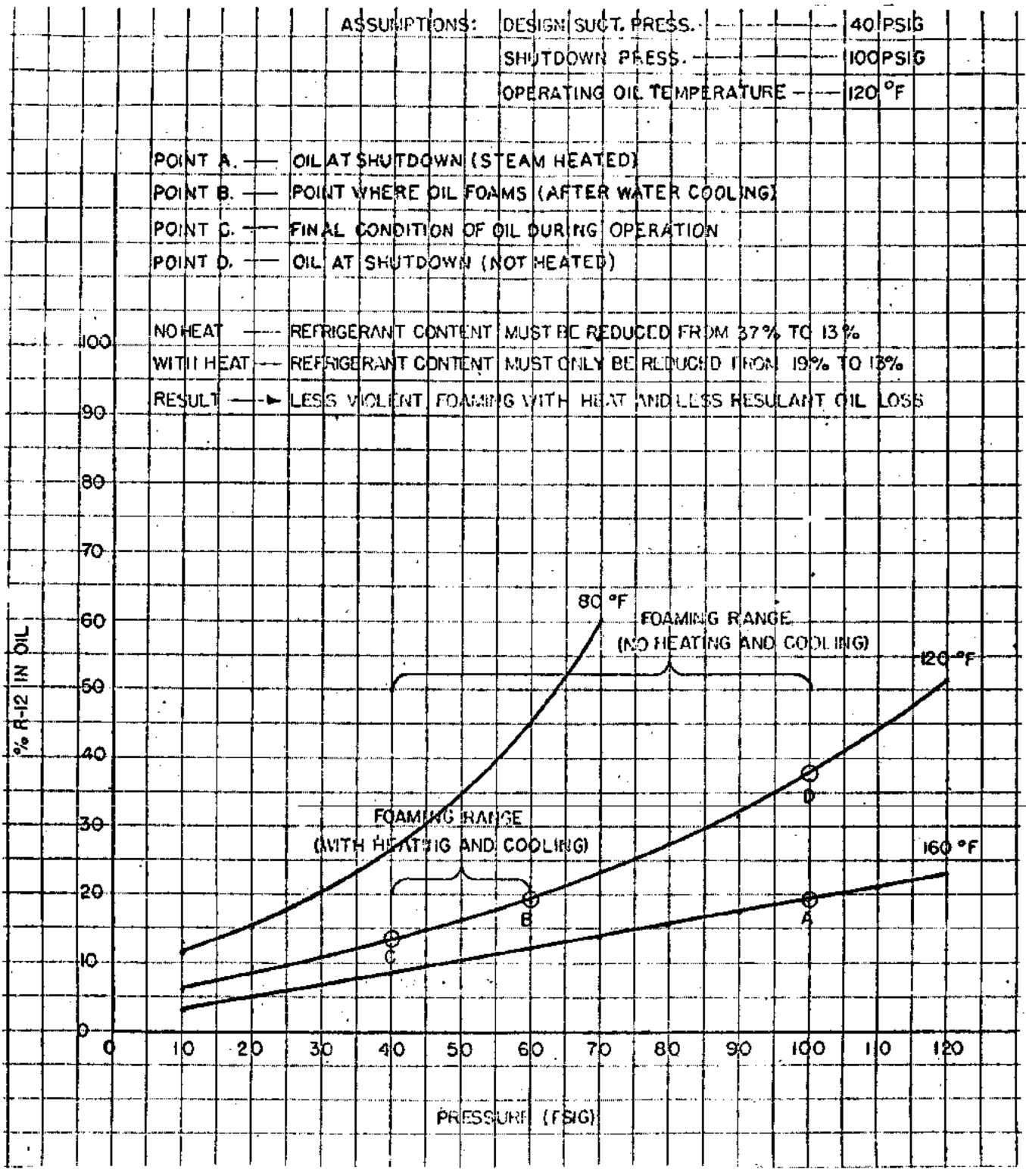
UNITED TECHNOLOGIES CARRIER

Commercial Division
Carrier Corporation

BULLETIN: CA-SB-17-60-1
DATE: 8/17/60
PAGE: 3 OF: 3

SERVICE BULLETIN

SUPERSEDE
BULLETIN:
DATE:
PAGE: OF:



R-5190A