GNL ITALIA

PANIGAGLIA

AMMODERNATO E ADEGUAMENTO IMPIANTO GNL DI PANIGAGLIA

ELECTRICAL TECHNICAL NOTE

Associated documents:

- Appendix 1: Rolls Royce – RB211 – Allegato 10
- Appendix 2: GE Power Service – PGT 25+ – Allegato 10
- S46232-E-6 200 – Electrical balance – Allegato 10
- Distribuzione Generale AT – Allegato 10
- Distribuzione Generale MT-BT – Allegato 10
- Quadro Principale MT –Schema unifilare MT – Allegato 10
- Quadro Impianto MT – Schema unifilare MT – Allegato 10

1	28/08/06	Up to date	YS	YS	PB	BC
0	04/08/06	Establishment	YS	PB	BC	BC
REV.	**DATE**	**DESIGNATION**	**Bench** *Issued*	**Checked** *Checked*	**Approval** *Approved*	**Approval** *Approved*

SYNOPSIS

1. OBJECT

The object of this technical note is to design a turbo generator to supply the consumers of the site in normal operation, starting from an electrical balance.

During period of electrical consumption peak, the consumers will be supplied in addition by the Electrical Network.

The electrical balance relates to the terminal of GNL-Italia for a future production of 8 bn Sm3 natural gas / year.

The project is a feasibility study, in order to design the main material.

2. BASES AND ASSUMPTIONS

The electrical balance integrates the consumers present on the switch board “PRINCIPALE (6kV)” and “IMPIANTO (6kV)” according to the documents:

- Distribuzione Generale MT-BT (Allegato 10)
- Quadro Principale MT – Schema unifilare MT (Allegato 10)
- Quadro Impianto MT – Schema unifilare MT (Allegato 10)
- Lista Apparecchiature (Allegato 12)

The base figures and the assumptions of this technical note are:

- Engines: cos $\varphi = 0,8$ / $\eta = 0,8$ / use coeff Cu = 0,8
- The equipments which do not appear on the unifilare HT and which are listed in “Lista apparecchiature” are supplied by tables of under switch board 400V in cascade behind “Principale” and “Impianto” switch board HT.
- The transformers will be balanced with a load factor of 0,6
- The power of the 20-E-11 is the same one as that of the 20-E-10, i.e. 230kW
- The fire water pumps 33-P-1180, 33-P-1182, 33-P-1183 will be supplied by the Electrical Network in the event of fire (the site will be stopped).
- MOTORE 10-P-102G = Ex RISERVA 10-P-102A
- MOTORE 10-P-102H = Ex RISERVA 10-P-102B
- MOTORE 20-K-12 = Ex 10-P-102C RISERVA

We consider the following approximations:

- MOTORE 35-MK-1120-A = 35-K-1120-A
- MOTORE 25-MK-201-A = 25-K-201-A
- MOTORE 20-MK-10-A = 20-E-10-A
- MOTORE 10-MK-1002 = 10-K-1002
- MOTORE 35-MK-1120B = 35-K-1120B
- MOTORE 25-MK-201-B = 25-K-201-B
- MOTORE MK-10B = 20-E-10B

3. ELECTRICAL BALANCE

See document S46232-E-6 200 – Electrical balance

4. ELECTRICAL BALANCE FOR 8 BN SM3/YEAR

total power for 8 bn Sm3/year: **21 226 kW / 26 253 kVA**
(See document S46232-E-6 200)

5. TECHNICAL SOLUTIONS AND CONCLUSIONS

5.1. TRANSFORMERS TR1 AND TR2:

To ensure a process with 8 bn Sm3/year, electric consumption will have to be of 26 253 kVA.

Transformers TR1 and TR2 must be designed with approximately 25% of power in reserve.

Power TR1 and TR2 necessary: 26,2MVA + 25% ~ **30MVA**

5.2. TURBO GENERATOR

5.2.1. CONNECTION

GNL-Italia is to use at least 70% of the electricity produced by the turbo generator to supply the site and the remainder is to be sold to the Electrical Network.

Rolling up 1: Connection of the secondary of the transformer on the switch board “PRINCIPALE”.

- Better output for the power supply of the site because energy does not go through by the transformers of 30MVA
- Solution independent of the Electrical Network in the event of loss of the 132kV switch board
- Installation of transformer (*) kV/6kV beside the “PRINCIPALE” switch board
- Beware of the behavior of the future material to the short-circuit. With standard material, the installation is limited to Icc=50kA and In=3150A for the set of bars of the “PRINCIPALE” switch board.
  The coupling between Sbarra A and SBarra B will have to be “Normally Open” under operation with the Turbo Generator and a transformer 30MVA in supplement for the peaks of powers on each set of bars.

Rolling up 2: Connection of the secondary of the transformer on switch board 132kV.

- Better output to sell electricity with the network, few losses due to the transit of energy through the Electrical Network

5.2.2. DESIGN OF THE TURBO GENERATOR

Bases of design:

The Turbo Generator is designed for an operation under 15°C (ISO Condition).
To have a power under 30°C, see the appendices 1 and 2 joined to the present technical note:

Production	Consumption of the site under normal operation (kW)	Consumption with 30% of sold electricity (kW)	Power harnesses with 30°C in kW (*)		% Consumed Electricity (*)	% sold Electricity (*)	Reference documents
8 bn Sm3/year	**21 226**	27594	**Rolls Royce RB211**	**27 190**	**78,1**	**21,9**	**Appendix 1**
8 bn Sm3/year	**21 226**	27594	**GE PGT 25+**	**26 400**	**80,4**	**19,6**	**Appendix 2**

(*): To be confirmed by supplier of the Turbo Generator

1st estimation: To be confirmed by supplier of the Turbo Generator

Rolls Royce RB211 : **27 190kW at 30°C**
GE PGT 25+ : **26 400kW at 30°C**

Connection of the Turbo Generator for 8 bn N.m3/year

(*): To be confirmed by supplier of the Turbo Alternator