How to create the purchase specification

First of all, it should be confirmed carefully whether your selected material is suitable for the working condition of the parts, incl. max. surrounding temperature, corrosive medium and its concentration, and whether it is used as widely under the same condition as possible, in order to avoid safety accidents and shortened service life.

The high-quality and cost-effective materials are always the priority.

The workability of the selected material should also be considered carefully by your engineer, incl. hot workability and machinability as per the part shape and dimension. A well-designed part is not only easy to be hot-worked and machined, but also its utilization rate of metal is improved for the lower manufacturing cost. Meanwhile, the mechanical properties can be satisfied as well.

The detectability of your designed part is also very important, e.g. the position and direction for sampling in the forging, the outline or shape suitable for ultrasonic inspection.

Generally, the complete purchase specification should be as follows:

1. Material grade and specification code

ASTM & ASME, SAE AMS, API, NACE, ISO, RCC, MIL, DIN EN, and etc. could be considerable.

2. Melting practice

VIM, AIM, VODC, and multiple melting practice using consumable electrodes incl. VIM+ESR, AIM+ESR, VODC+ESR, are optional. The cost of vacuum induction melting is higher than VODC and air induction melting, as the pure metals as raw material, e.g. Ni and Cr, are necessary for VIM. Therefore, the manufacturing cost of a same material grade is different due to the melting practice.

3. Dimension, quantity and weight

If it is forged product, the AutoCAD drawing of parts should be provided to us, in order to prepare the reasonable and economical process flow.

If it is bar or rod, the length of each part should be indicated to us as clear as possible, in order to determine the length of our delivery product, e.g. random length in a range, fixed length, multiple length. Normally, the longer the bar or rod is, the more it is difficult to be manufactured perfectly.

The weight of forgings before machining has approx. max. ±10% of difference with its calculated weight, due to the forging tolerance. So we think it is much better the forgings are priced by the piece and delivered after being rough machined.

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4. Delivery condition

Heat treatment:	Hot forged or hot rolled
	Soft-annealed
	Solution annealed
	Solution annealed & precipitation hardened
Surface condition:	Non-treated surface
	Polished
	Rough peeled
	Machined to the part

The polished or rough-peeled surface is preferable and favorable for nondestructive inspection, as we always advise. The micro defects are difficult to be detected via ultrasonic test (i.e. UT), due to the black, rough and uneven surface before being machined. Likewise, the bright surface is also necessary for liquid penetrant test (i.e. PT).

5. Inspection and certificate

The conventional test items as follow:

Chemical composition analysis
Tensile test
Impact test
Hardness test
Determination of average grain size
Determination of non-metallic inclusion content
Determination of resistance to intergranular corrosion
Ultrasonic examination
Liquid penetrant inspection

Mill test certificate in accordance with the requirement of EN 10204 type 3.1 will be prepared normally. Meanwhile, the test certificate as per EN 10204 Type 3.2 can also be provided, when the inspection by third-party, e.g. SGS, TÜV or SCT is designated if necessary.

6. Identification and package

The product ID, incl. material grade, heat number, dimension, client's material code, will be labelled by pneumatic punch marker normally. The Package, incl. fumigated wooden case or pallet, is not only seaworthy but also strong enough to protect the products from any damage.